NAH Range

NAH Range uses very thin plates and is designed for application where there is a demand for a relatively high current over short periods, usually 30 minutes in duration. The application can have frequent or infrequent discharges. The range is typically used in starting and power back up applications.

Charging

The NAH type cells can be charged by all normal methods.

- Taper
- Constant Current
- Constant Voltage
- Pulse

The NAH type cells may be operated satisfactorily in any state of charge. For operating conditions other that fully charged.

Capacity

The rated capacity (C_5) of a cell is the capacity available in ampere hours (Ah) at the 5 hour discharge rate to an end voltage of 1.00 volts per cell.

Discharge Rate

The nominal discharge voltage is 1.2 volts per cell.

Constant Current Charging

Standard charge : $0.2C_5$ amperes for 8 hours.

Fast charge : $0.4C_5$ amperes for 2.5 hours followed by $0.2C_5$ amperes for 2.5 hours.

Minimum charge : 2.0mA per Ah.

Constant Voltage Charging

Two levels charging

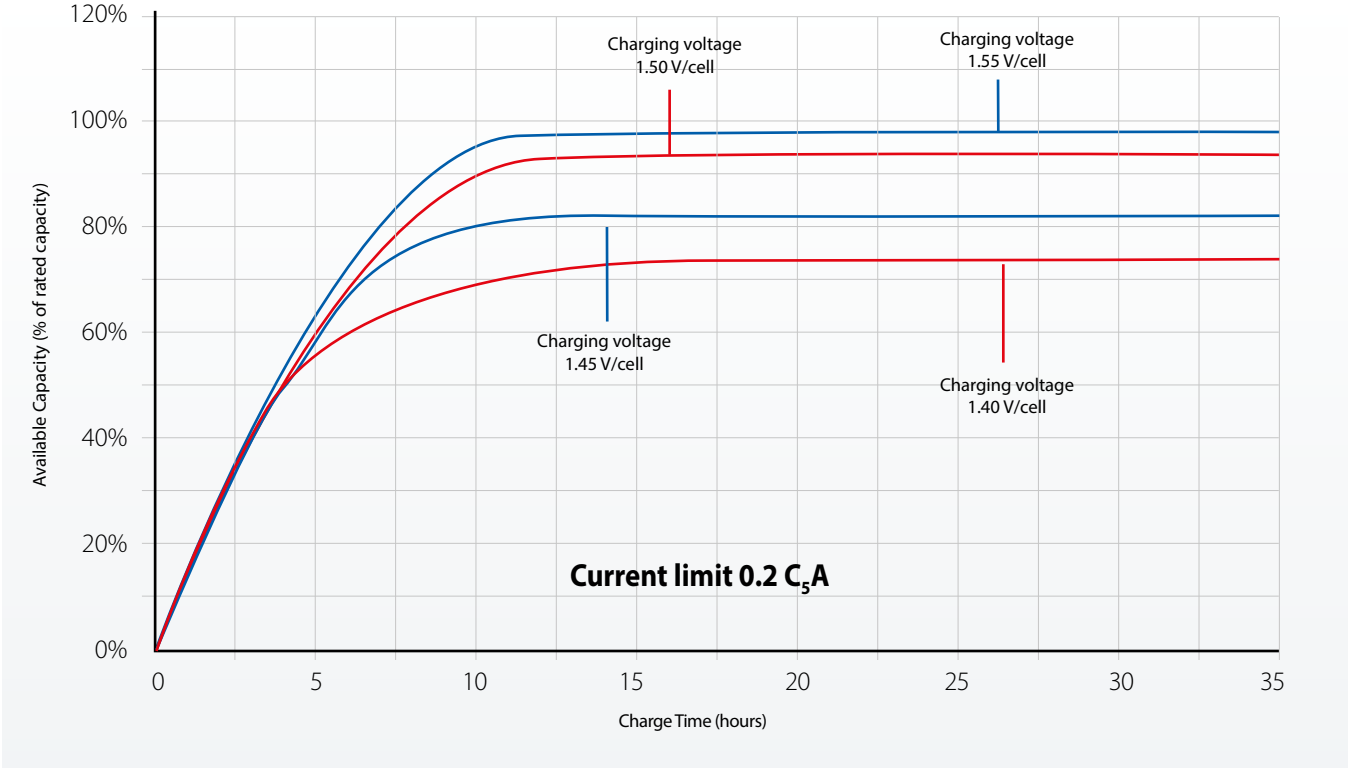
Float voltage : 1.40 V/cell.

Boost voltage : 1.45 - 1.70 V/cell.

Singel level charging
1.43 - 1.50 V/cell.

Cell Data

Short Circuit : Max 25 x C_5 Amps



Time to reach state-of-charging voltages for fully discharge NAH range

NAH Range Cell Performance

Capacities and dimensions

International System of units

Cell type	Capacity C_5 Ah	Overall Height*	Width per cell	Length per cell	Approx. Weight per cell	Approx. electrolyte volume between level marks	Electrolyte per cell		Internal resistance *	Cell connection bolt per pole
							Solid	Liquid		
	Ah	mm	mm	mm	Kg	cm^3	Kg	L	mOhm	
NAH 9	9	270	121	42	1.80	143	0.23	0.70	3.33	M 6
NAH 12	12	270	121	42	1.90	140	0.23	0.70	2.50	M 6
NAH 17	17	270	121	42	2.10	138	0.19	0.60	1.76	M 6
NAH 21	21	270	121	66	3.00	232	0.36	1.10	1.43	M 6
NAH 25	25	270	121	66	3.20	230	0.36	1.10	1.20	M 6
NAH 29	29	270	121	66	3.30	227	0.32	1.00	1.03	M 6
NAH 34	34	270	121	66	3.50	224	0.29	0.90	0.88	M 6
NAH 40	40	357	192	68	6.50	530	0.87	2.70	0.35	M 8
NAH 50	50	357	192	68	6.90	520	0.84	2.60	0.78	M 8
NAH 60	60	357	192	68	7.30	510	0.81	2.50	0.65	M 10
NAH 70	70	357	192	68	7.70	510	0.78	2.40	0.56	M 10
NAH 80	80	357	192	68	8.10	500	0.71	2.20	0.49	M 10
NAH 90	90	357	192	93	10.3	720	1.10	3.40	0.43	M 10
NAH 100	100	357	192	93	10.7	720	1.07	3.30	0.39	M 10
NAH 110	110	357	192	93	11.1	710	1.04	3.20	0.35	M 10
NAH 120	120	357	192	93	11.4	700	1.00	3.10	0.33	M 10
NAH 130	130	413	192	93	12.6	720	1.26	3.90	0.33	M 10
NAH 145	145	413	192	93	13.0	710	1.20	3.70	0.30	M 10
NAH 155	155	413	192	93	13.4	700	1.17	3.60	0.28	M 10
NAH 170	170	413	192	122	16.8	960	1.68	5.20	0.25	2 x M 10
NAH 185	185	413	192	122	17.2	950	1.62	5.00	0.23	2 x M 10
NAH 210	210	413	192	122	18.2	940	1.52	4.70	0.20	2 x M 10

Capacities and dimensions

Imperial units

Cell type	Capacity C_5 Ah	Overall Height*	Width per cell	Length per cell	Approx. Weight per cell	Approx. electrolyte volume between level marks	Electrolyte per cell		Internal resistance *	Cell connection bolt per pole
							Solid	Liquid		
	Ah	in	in	in	lbs	in^3	lbs	US Gal.	mOhm	
NAH 9	9	10.6	4.76	1.65	3.97	8.73	0.50	0.18	3.33	M 6
NAH 12	12	10.6	4.76	1.65	4.19	8.54	0.50	0.18	2.50	M 6
NAH 17	17	10.6	4.76	1.65	4.63	8.42	0.43	0.16	1.76	M 6
NAH 21	21	10.6	4.76	2.60	6.61	14.2	0.79	0.29	1.43	M 6
NAH 25	25	10.6	4.76	2.60	7.05	14.0	0.79	0.29	1.20	M 6
NAH 29	29	10.6	4.76	2.60	7.28	13.9	0.71	0.26	1.03	M 6
NAH 34	34	10.6	4.76	2.60	7.72	13.7	0.64	0.24	0.88	M 6
NAH 40	40	14.1	7.56	2.68	14.3	32.3	1.93	0.71	0.35	M 8
NAH 50	50	14.1	7.56	2.68	15.2	31.7	1.86	0.69	0.78	M 8
NAH 60	60	14.1	7.56	2.68	16.1	31.1	1.79	0.66	0.65	M 10
NAH 70	70	14.1	7.56	2.68	17.0	31.1	1.71	0.63	0.56	M 10
NAH 80	80	14.1	7.56	2.68	17.9	30.5	1.57	0.58	0.49	M 10
NAH 90	90	14.1	7.56	3.66	22.7	43.9	2.43	0.90	0.43	M 10
NAH 100	100	14.1	7.56	3.66	23.6	43.9	2.36	0.87	0.39	M 10
NAH 110	110	14.1	7.56	3.66	24.5	43.3	2.29	0.85	0.35	M 10
NAH 120	120	14.1	7.56	3.66	25.1	42.7	2.21	0.82	0.33	M 10
NAH 130	130	16.3	7.56	3.66	27.8	43.9	2.79	1.03	0.33	M 10
NAH 145	145	16.3	7.56	3.66	28.7	43.3	2.64	0.98	0.30	M 10
NAH 155	155	16.3	7.56	3.66	29.5	42.7	2.57	0.95	0.28	M 10
NAH 170	170	16.3	7.56	4.80	37.0	58.6	3.71	1.37	0.25	2 x M 10
NAH 185	185	16.3	7.56	4.80	37.9	58.0	3.57	1.32	0.23	2 x M 10
NAH 210	210	16.3	7.56	4.80	40.1	57.4	3.36	1.24	0.20	2 x M 10

** Height includes the IP2X terminal cover.*

NAH Range Cell Performance

At 20˚C ± 5˚C (+68˚F ± 9˚F)
Available amperes for fully charged cells after constant current charging to IEC 623

Final voltage : 1.00V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1.5	1	30	20	15	10	5	1	30	5	1
NAH 9	9	1.13	1.80	2.96	4.39	5.79	8.4	15.3	20.4	23.5	28.0	34.7	46.6	52.7	66.9	70.9
NAH 12	12	1.50	2.40	3.95	5.86	7.73	11.3	20.4	27.2	31.3	37.3	46.3	62.2	70.2	89.3	94.5
NAH 17	17	2.13	3.40	5.59	8.3	10.9	15.9	28.9	38.6	44.4	52.9	65.6	88.1	99.5	126	134
NAH 21	21	2.63	4.20	6.90	10.25	13.5	19.7	35.7	47.6	54.8	65.3	81.0	109	123	156	165
NAH 25	25	3.13	5.00	8.22	12.2	16.1	23.4	42.5	56.7	65.3	77.7	96.5	130	146	186	197
NAH 29	29	3.63	5.80	9.53	14.2	18.7	27.2	49.3	65.8	75.7	90.2	112	150	170	216	228
NAH 34	34	4.25	6.80	11.2	16.6	21.9	31.9	57.8	77.1	88.8	106	131	176	199	253	268
NAH 40	40	5.02	8.00	13.1	19.5	25.7	37.6	69.0	92.7	108	128	159	206	235	296	325
NAH 50	50	6.28	10.0	16.4	24.4	32.1	47.0	86.2	116	135	160	199	258	294	370	407
NAH 60	60	7.53	12.0	19.7	29.3	38.6	56.4	103	139	162	193	239	309	353	444	488
NAH 70	70	8.79	14.0	23.0	34.1	45.0	65.8	121	162	189	225	279	361	411	519	569
NAH 80	80	10.0	16.0	26.3	39.0	51.4	75.2	138	185	216	257	318	412	470	593	651
NAH 90	90	11.3	18.0	29.6	43.9	57.9	84.6	155	208	243	289	358	464	529	667	732
NAH 100	100	12.6	20.0	32.9	48.8	64.3	94.0	172	232	270	321	398	515	588	741	813
NAH 110	110	13.8	22.0	36.1	53.7	70.7	103	190	255	297	353	438	567	647	815	895
NAH 120	120	15.1	24.0	39.4	58.5	77.1	113	207	278	324	385	478	618	705	889	976
NAH 130	130	16.3	26.0	42.9	63.6	83.7	122	222	299	342	405	491	616	695	845	899
NAH 145	145	18.2	29.0	47.9	70.9	93.3	137	248	333	382	451	547	687	776	943	1003
NAH 155	155	19.4	31.0	51.2	75.8	99.8	146	265	356	408	482	585	734	829	1008	1072
NAH 170	170	21.3	34.0	56.1	83.1	109	160	291	391	448	529	642	806	909	1106	1176
NAH 185	185	23.2	37.0	61.1	90.5	119	174	316	425	487	576	698	877	989	1203	1280
NAH 210	210	26.3	42.0	69.3	103	135	198	359	483	553	654	793	995	1123	1366	1453

At 20˚C ± 5˚C (+68˚F ± 9˚F)
Available amperes for fully charged cells after constant current charging to IEC 623

Final voltage : 1.05V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1.5	1	30	20	15	10	5	1	30	5	1
NAH 9	9	1.11	1.77	2.91	4.30	5.68	8.21	14.5	17.4	20.2	23.8	28.5	38.5	45.2	55.2	59.6
NAH 12	12	1.49	2.36	3.89	5.74	7.58	11.0	19.4	23.3	26.9	31.8	37.9	51.3	60.3	73.7	79.5
NAH 17	17	2.10	3.35	5.50	8.13	10.7	15.5	27.4	32.9	38.1	45.0	53.7	72.7	85.4	104	113
NAH 21	21	2.60	4.13	6.80	10.0	13.3	19.2	33.9	40.7	47.0	55.6	66.4	89.8	106	129	139
NAH 25	25	3.09	4.92	8.09	12.0	15.8	22.8	40.3	48.4	56.0	66.2	79.0	107	126	153	166
NAH 29	29	3.59	5.71	9.39	13.9	18.3	26.5	46.8	56.2	65.0	76.8	91.7	124	146	178	192
NAH 34	34	4.21	6.69	11.0	16.3	21.5	31.0	54.8	65.9	76.2	90.1	107	145	171	209	225
NAH 40	40	4.98	7.88	13.0	19.1	25.1	36.3	65.3	80.0	92.3	109	130	176	200	247	265
NAH 50	50	6.22	9.85	16.2	23.9	31.4	45.4	81.6	100	115	137	162	219	250	309	331
NAH 60	60	7.47	11.8	19.5	28.7	37.7	54.5	98.0	120	138	164	195	263	300	370	397
NAH 70	70	8.71	13.8	22.7	33.5	44.0	63.6	114	140	161	192	227	307	350	432	464
NAH 80	80	10.0	15.8	26.0	38.3	50.3	72.7	131	160	185	219	259	351	400	494	530
NAH 90	90	11.2	17.7	29.2	43.1	56.6	81.7	147	180	208	246	292	395	450	556	596
NAH 100	100	12.4	19.7	32.4	47.9	62.9	90.8	163	200	231	274	324	439	500	617	662
NAH 110	110	13.7	21.7	35.7	52.6	69.1	100	180	220	254	301	357	483	550	679	728
NAH 120	120	14.9	23.6	38.9	57.4	75.4	109	196	240	277	328	389	527	600	741	795
NAH 130	130	16.1	25.6	42.2	62.5	81.9	119	211	256	291	343	399	517	583	704	734
NAH 145	145	18.0	28.6	47.1	69.7	91.3	132	235	286	325	382	445	577	651	785	818
NAH 155	155	19.2	30.6	50.3	74.5	97.6	141	252	306	347	409	475	616	696	839	875
NAH 170	170	21.1	33.5	55.2	81.7	107	155	276	335	381	448	521	676	763	920	959
NAH 185	185	23.0	36.5	60.1	88.9	116	169	300	365	415	488	567	736	830	1002	1044
NAH 210	210	26.1	41.4	68.2	101	132	191	341	414	471	554	644	835	942	1137	1185

NAH Range Cell Performance

At 20˚C ± 5˚C (+68˚F ± 9˚F)
Available amperes for fully charged cells after constant current charging to IEC 623

Final voltage : 1.10V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1.5	1	30	20	15	10	5	1	30	5	1
NAH 9	9	1.09	1.73	2.84	4.17	5.45	7.68	11.7	13.9	15.8	17.9	22.2	30.6	35.6	45.0	47.4
NAH 12	12	1.46	2.30	3.78	5.56	7.26	10.2	15.6	18.6	21.0	23.9	29.6	40.8	47.4	60.0	63.2
NAH 17	17	2.06	3.26	5.36	7.87	10.3	14.5	22.1	26.3	29.8	33.9	41.9	57.8	67.2	85.0	89.5
NAH 21	21	2.55	4.03	6.62	9.73	12.7	17.9	27.3	32.5	36.8	41.9	51.8	71.4	83.0	105	111
NAH 25	25	3.03	4.80	7.88	11.6	15.1	21.3	32.5	38.7	43.8	49.8	61.7	85.0	98.8	125	132
NAH 29	29	3.52	5.56	9.14	13.4	17.5	24.8	37.7	44.9	50.8	57.8	71.6	98.6	115	145	153
NAH 34	34	4.12	6.52	10.7	15.7	20.6	29.0	44.2	52.6	59.6	67.8	83.9	116	134	170	179
NAH 40	40	4.86	7.67	12.6	18.5	24.2	34.5	53.3	64.0	72.1	81.7	101	138	160	196	220
NAH 50	50	6.07	9.59	15.8	23.2	30.3	43.1	66.7	80.0	90.2	102	126	173	200	245	274
NAH 60	60	7.29	11.5	18.9	27.8	36.4	51.7	80.0	96.0	108	123	151	208	240	294	329
NAH 70	70	8.50	13.4	22.1	32.4	42.4	60.3	93.3	112	126	143	176	242	280	343	384
NAH 80	80	9.71	15.3	25.2	37.1	48.5	68.9	107	128	144	163	201	277	320	392	439
NAH 90	90	10.9	17.3	28.4	41.7	54.6	77.6	120	144	162	184	226	311	360	441	494
NAH 100	100	12.1	19.2	31.5	46.3	60.6	86.2	133	160	180	204	252	346	400	490	549
NAH 110	110	13.4	21.1	34.7	51.0	66.7	94.8	147	176	198	225	277	381	440	539	604
NAH 120	120	14.6	23.0	37.8	55.6	72.7	103	160	192	216	245	302	415	480	588	659
NAH 130	130	15.7	25.1	41.1	60.3	78.9	112	171	201	226	255	307	412	469	558	586
NAH 145	145	17.5	28.0	45.8	67.3	88.0	125	191	224	252	284	342	460	523	622	654
NAH 155	155	18.7	29.9	49.0	71.9	94.0	134	204	240	269	304	366	491	559	665	699
NAH 170	170	20.6	32.8	53.7	78.9	103	147	224	263	296	333	401	539	613	730	767
NAH 185	185	22.4	35.7	58.4	85.8	112	160	244	286	322	362	437	586	667	794	834
NAH 210	210	25.4	40.5	66.3	97.5	127	181	277	325	365	411	496	666	757	901	947

At 20˚C ± 5˚C (+68˚F ± 9˚F)
Available amperes for fully charged cells after constant current charging to IEC 623

Final voltage : 1.14V/cell

Cell type	Capacity (C_5 Ah)	Hours						Minutes						Seconds		
		8	5	3	2	1.5	1	30	20	15	10	5	1	30	5	1
NAH 9	9	1.05	1.67	2.72	3.81	4.85	6.37	9.32	11.1	12.7	14.6	17.9	24.6	28.7	34.9	41.9
NAH 12	12	1.40	2.22	3.62	5.08	6.47	8.50	12.4	14.9	16.9	19.4	23.9	32.8	38.3	46.5	55.8
NAH 17	17	1.99	3.15	5.13	7.20	9.16	12.0	17.6	21.0	23.9	27.5	33.9	46.4	54.2	65.9	79.1
NAH 21	21	2.45	3.89	6.34	8.89	11.3	14.9	21.7	26.0	29.5	34.0	41.9	57.4	66.9	81.4	97.7
NAH 25	25	2.92	4.63	7.55	10.6	13.5	17.7	25.9	30.9	35.1	40.5	49.9	68.3	79.7	96.9	116
NAH 29	29	3.39	5.37	8.75	12.3	15.6	20.5	30.0	35.9	40.8	47.0	57.8	79.2	92.4	112	135
NAH 34	34	3.97	6.29	10.3	14.4	18.3	24.1	35.2	42.1	47.8	55.1	67.8	92.9	108	132	158
NAH 40	40	4.69	7.39	12.1	17.7	22.9	30.5	41.6	49.6	55.6	63.0	77.1	111	128	160	168
NAH 50	50	5.87	9.23	15.2	22.1	28.7	38.1	52.0	62.0	69.5	78.7	96.3	138	160	200	210
NAH 60	60	7.04	11.1	18.2	26.6	34.4	45.7	62.5	74.4	83.4	94.5	116	166	192	240	252
NAH 70	70	8.21	12.9	21.2	31.0	40.1	53.3	72.9	86.8	97.3	110	135	194	224	280	294
NAH 80	80	9.39	14.8	24.2	35.4	45.9	60.9	83.3	99.1	111	126	154	221	256	320	336
NAH 90	90	10.6	16.6	27.3	39.9	51.6	68.6	93.7	112	125	142	173	249	288	360	378
NAH 100	100	11.7	18.5	30.3	44.3	57.3	76.2	104	124	139	157	193	277	320	400	420
NAH 110	110	12.9	20.3	33.3	48.7	63.1	83.8	115	136	153	173	212	304	352	440	462
NAH 120	120	14.1	22.2	36.4	53.1	68.8	91.4	125	149	167	189	231	332	384	480	504
NAH 130	130	15.3	24.1	39.4	55.4	70.3	92.2	135	161	181	205	250	329	377	443	459
NAH 145	145	17.1	26.9	43.9	61.8	78.4	103	151	180	202	228	279	366	420	494	512
NAH 155	155	18.2	28.7	46.9	66.0	83.8	110	161	192	216	244	299	392	449	528	547
NAH 170	170	20.0	31.5	51.5	72.4	91.9	121	177	211	236	268	327	430	493	580	600
NAH 185	185	21.8	34.3	56.0	78.8	100	131	193	229	257	291	356	468	536	631	653
NAH 210	210	24.7	38.9	63.6	89.5	114	149	219	260	292	331	405	531	608	716	741

NAH Range Cell Performance

At 20˚C ± 5˚C (+68˚F ± 9˚F)
Available amperes for fully charged cells after constant current charging to IEC 623

Final voltage : 0.65V/cell

Cell type	Capacity (C_5 Ah)	Minutes		Seconds			
	Ah	1.5	1	30	15	5	1
NAH 9	9	98.4	106	118	129	143	162
NAH 12	12	131	142	158	171	190	216
NAH 17	17	186	201	223	243	270	305
NAH 21	21	230	248	276	300	333	377
NAH 25	25	273	295	328	357	397	449
NAH 29	29	317	343	381	414	460	521
NAH 34	34	372	402	446	486	539	611
NAH 40	40	452	484	532	580	645	718
NAH 50	50	565	605	665	724	806	898
NAH 60	60	678	726	798	869	967	1078
NAH 70	70	791	847	931	1014	1129	1257
NAH 80	80	904	968	1064	1159	1290	1437
NAH 90	90	1017	1089	1197	1304	1451	1616
NAH 100	100	1131	1210	1330	1449	1612	1796
NAH 110	110	1244	1331	1463	1594	1773	1976
NAH 120	120	1357	1452	1596	1739	1935	2155
NAH 130	130	1391	1467	1602	1710	1883	2041
NAH 145	145	1552	1636	1786	1908	2101	2277
NAH 155	155	1659	1749	1909	2039	2246	2434
NAH 170	170	1819	1918	2094	2236	2463	2670
NAH 185	185	1980	2088	2279	2434	2680	2905
NAH 210	210	2247	2370	2587	2763	3042	3298

At 20˚C ± 5˚C (+68˚F ± 9˚F)
Available amperes for fully charged cells after constant current charging to IEC 623

Final voltage : 0.85V/cell

Cell type	Capacity (C_5 Ah)	Minutes		Seconds			
	Ah	1.5	1	30	15	5	1
NAH 9	9	69.5	76.0	84.4	99.2	111	121
NAH 12	12	92.6	101	113	132	148	162
NAH 17	17	131	143	160	187	210	229
NAH 21	21	162	177	197	231	259	283
NAH 25	25	193	211	235	276	309	337
NAH 29	29	224	245	272	320	358	391
NAH 34	34	262	287	319	375	420	458
NAH 40	40	319	343	383	441	494	539
NAH 50	50	398	429	478	551	617	673
NAH 60	60	478	515	574	661	741	808
NAH 70	70	558	601	669	771	864	943
NAH 80	80	637	687	765	882	988	1078
NAH 90	90	717	773	861	992	1111	1212
NAH 100	100	796	859	956	1102	1235	1347
NAH 110	110	876	944	1052	1212	1358	1482
NAH 120	120	956	1030	1148	1322	1482	1616
NAH 130	130	966	1028	1135	1253	1383	1507
NAH 145	145	1078	1146	1266	1398	1543	1681
NAH 155	155	1152	1225	1353	1494	1649	1797
NAH 170	170	1263	1344	1484	1639	1809	1971
NAH 185	185	1375	1463	1615	1783	1968	2145
NAH 210	210	1561	1660	1833	2024	2234	2435

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Made in Sweden

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