

## Airbus A320-232 Performance □ (IAE V2527-A5)

The information provided in this document is to be used during simulated flight only and is not intended to be used in real life. **Attention VA's** - you may post this file on your site for download. Please do not post this information as a web page on your site. **To all others: This information is provided for your personal use only.** Distribution of this information in any form is not permitted without my approval. Distribution of this information in any payware product, CD or otherwise is not permitted.

## ABBREVIATED CHARTS

### A320 Flight Planning Chart

#### FLIGHT PLANNING TABLE

When the trip length line (corrected for wind) intersects between the horizontal time-fuel lines, use the time and fuel shown in the blocks for the flight altitude.  
 Example: 1400 NM, 75 knot tailwind, altitude 27,000 ft. Time 2:56. Fuel 15.8.

Example: 1400 NM, 75 knot tailwind, altitude 27,000 ft. Time 2:56. Fuel 15.8.

When the trip length line (corrected for wind) intersects on a horizontal time-fuel line, interpolate.  
 Example: 2000 NM, 25 knot headwind, altitude 39,000 ft. Time 4:46, Fuel 24.6.

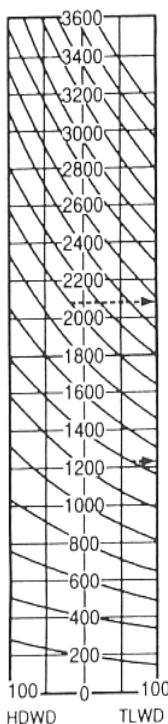
Based on following speed schedule:

CLIMB: 250 IAS to 10,000 feet; Cost Index = 35 climb speeds from 10,000 - 30,000 feet; Mach 0.80 above 30,000 feet

CRUISE: 250 IAS from SL to 10,000 feet; 290 IAS from 10,000 - 30,000 feet; Mach 0.80 above 30,000 feet

DESCENT: Mach 0.80 to 30,000 feet; Cost Index = 35 descent speed between 30,000 feet and 10,000 feet; 250 IAS below 10,000 feet

Trip Length (NM)



Pressure Altitude (Feet) / True Air Speed (Knots)																			
39,000/458		37,000/458		35,000/461		33,000/465		31,000/469		29,000/444		27,000/431		25,000/418		20,000/387		10,000/334	
Flight Time and Fuel Burnout																			
Time	Fuel	Time	Fuel	Time	Fuel	Time	Fuel	Time	Fuel	Time	Fuel	Time	Fuel	Time	Fuel	Time	Fuel	Time	Fuel
7:35	40.9	7:35	40.9	7:34	41.4	7:31	42.7	-	-	-	-	-	-	-	-	-	-	-	-
7:09	38.3	7:09	38.3	7:08	38.8	7:05	40.0	7:01	41.8	7:22	41.3	7:35	42.3	-	-	-	-	-	-
6:43	35.7	6:43	35.7	6:42	36.2	6:39	37.4	6:36	39.1	6:55	38.6	7:07	39.5	7:20	40.7	-	-	-	-
6:17	33.1	6:17	33.1	6:16	33.6	6:13	34.8	6:10	36.4	6:28	36.0	6:39	36.8	6:51	37.9	7:21	41.0	-	-
5:51	30.6	5:51	30.6	5:50	31.1	5:47	32.3	5:44	33.8	6:01	33.3	6:12	34.1	6:22	35.1	6:50	38.0	-	-
5:25	28.2	5:25	28.1	5:24	28.7	5:21	29.7	5:19	31.1	5:34	30.7	5:44	31.4	5:53	32.3	6:19	35.0	7:17	42.9
4:59	25.8	4:59	25.7	4:58	26.2	4:55	27.2	4:53	28.5	5:07	28.1	5:16	28.8	5:25	29.6	5:48	32.0	6:41	39.2
4:32	23.4	4:33	23.3	4:32	23.8	4:30	24.7	4:27	25.9	4:40	25.6	4:48	26.1	4:56	26.9	5:17	29.1	6:05	35.5
4:06	21.0	4:07	21.0	4:05	21.5	4:04	22.3	4:02	23.3	4:13	23.0	4:20	23.5	4:27	24.2	4:46	26.1	5:29	31.9
3:40	18.7	3:40	18.7	3:39	19.1	3:38	19.8	3:36	20.8	3:46	20.5	3:52	21.0	3:58	21.5	4:15	23.2	4:53	28.3
3:14	16.4	3:14	16.4	3:13	16.8	3:12	17.4	3:10	18.2	3:19	18.0	3:24	18.4	3:30	18.9	3:44	20.3	4:17	24.7
2:48	14.1	2:48	14.2	2:47	14.5	2:46	15.0	2:45	15.7	2:52	15.5	2:56	15.8	3:01	16.2	3:13	17.5	3:41	21.1
2:22	11.9	2:22	11.9	2:21	12.2	2:20	12.7	2:19	13.2	2:25	13.0	2:28	13.3	2:32	13.6	2:42	14.6	3:05	17.6
1:55	9.7	1:55	9.8	1:55	10.0	1:54	10.3	1:54	10.7	1:58	10.6	2:01	10.8	2:03	11.0	2:11	11.8	2:29	14.1
1:29	7.5	1:29	7.6	1:29	7.8	1:28	8.0	1:28	8.2	1:31	8.2	1:33	8.3	1:35	8.5	1:40	9.0	1:53	10.7
1:03	5.5	1:03	5.5	1:03	5.5	1:03	5.6	1:02	5.8	1:04	5.7	1:05	5.8	1:06	5.9	1:09	6.2	1:17	7.3
-	-	-	-	-	-	-	-	0:37	3.3	0:37	3.3	0:37	3.3	0:37	3.4	0:38	3.4	0:41	3.8
345 lbs/hr		280 lbs/hr		220 lbs/hr		175 lbs/hr		160 lbs/hr		160 lbs/hr		160 lbs/hr		160 lbs/hr		145 lbs/hr		125 lbs/hr	

**Adjustments:** Table valid only for landing weight of 120,000 pounds. For each 10,000 pounds deviation above (below) 120,000 pounds, add (subtract) fuel burnout correction shown above for each hour of flight time.

## POWER SETTING CHARTS

### A320 Takeoff Thrust Setting - EPR

EPR settings in shaded area are for FLEX EPR only.											
TAT (°F/°C)	Pressure Altitude (Feet)										
	-1000	SL	1000	2000	3000	4000	5000	6000	7000	8000	8500
158/70	1.295	1.294	-	-	-	-	-	-	-	-	-
154/68	1.303	1.303	1.301	-	-	-	-	-	-	-	-
151/66	1.312	1.311	1.310	1.307	-	-	-	-	-	-	-
147/64	1.320	1.320	1.318	1.316	1.323	-	-	-	-	-	-
144/62	1.329	1.329	1.327	1.325	1.332	1.339	-	-	-	-	-
140/60	1.337	1.337	1.336	1.334	1.341	1.348	1.354	-	-	-	-
136/58	1.346	1.346	1.345	1.343	1.351	1.358	1.364	1.363	-	-	-
133/56	1.355	1.355	1.354	1.352	1.360	1.367	1.374	1.372	1.371	-	-
129/54	1.364	1.364	1.363	1.362	1.369	1.377	1.383	1.382	1.381	1.379	-
126/52	1.374	1.373	1.372	1.371	1.379	1.386	1.393	1.392	1.391	1.389	1.388
122/50	1.378	1.383	1.381	1.380	1.388	1.396	1.403	1.402	1.401	1.399	1.398
118/48		1.390	1.391	1.390	1.398	1.405	1.413	1.412	1.411	1.409	1.408
115/46		1.397	1.400	1.399	1.408	1.415	1.423	1.422	1.421	1.419	1.418
111/44			1.409	1.409	1.418	1.426	1.433	1.432	1.431	1.429	1.428
108/42			1.413	1.419	1.428	1.436	1.444	1.442	1.441	1.440	1.438
104/40				1.429	1.438	1.446	1.454	1.453	1.451	1.450	1.448
100/38				1.430	1.448	1.456	1.464	1.464	1.462	1.460	1.459
97/36					1.455	1.466	1.474	1.474	1.473	1.471	1.469
93/34						1.476	1.485	1.484	1.483	1.482	1.480
90/32						1.479	1.495	1.494	1.493	1.492	1.491
86/30							1.504	1.505	1.504	1.503	1.501
82/28								1.514	1.515	1.513	1.512
79/26									1.524	1.525	1.523
75/24										1.534	1.533
72/22											1.537
68/20											
50/10											
32/0											
-4/-20											
-40/-40											
-76/-60	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.573

### **A320 Reduced Takeoff Thrust**

Reduced EPR is the minimum thrust required under normal conditions and is recommended since it results in reduced engine wear and fuel consumption.

Do not use reduced takeoff thrust when:

- Braking action is reported less than good
- The probability of windshear exists
- Takeoff runway is other than dry
- Headwind adjustment has been used to increase the allowable takeoff weight
- Takeoff is made with a tailwind
- EPR indications are inop
- A brake is deactivated

The FMGS automatically computes reduced takeoff thrust when a FLEX temp higher than ambient temp is entered on the MCDU TAKEOFF page. To determine FLEX (ASMD) temp, see the Takeoff Data provided by dispatch.

## A320 Maximum Climb Thrust - EPR

TAT (°C)	Pressure Altitude (Feet)										
	SL	2	5	8	12	17	20	25	31	35	39
58	1.180	-	-	-	-	-	-	-	-	-	-
54	1.192	1.197	-	-	-	-	-	-	-	-	-
50	1.205	1.210	1.210	-	-	-	-	-	-	-	-
46	1.219	1.223	1.224	-	-	-	-	-	-	-	-
42	1.234	1.238	1.238	1.234	1.219	-	-	-	-	-	-
38	1.251	1.255	1.254	1.249	1.235	-	-	-	-	-	-
34	1.267	1.272	1.271	1.265	1.251	1.243	-	-	-	-	-
30	1.269	1.289	1.290	1.283	1.269	1.261	1.258	-	-	-	-
26			1.308	1.303	1.289	1.279	1.278	-	-	-	-
22			1.313	1.323	1.310	1.299	1.297	1.275	-	-	-
18				1.333	1.331	1.321	1.318	1.295	1.288	-	-
14					1.340	1.343	1.341	1.316	1.309	-	-
10						1.366	1.364	1.340	1.330	-	-
6						1.372	1.387	1.365	1.353	1.349	1.345
2							1.395	1.389	1.379	1.371	1.367
-2								1.414	1.403	1.394	1.390
-6									1.428	1.419	1.414
-10									1.448	1.443	1.438
-14										1.466	1.461
-18										1.488	1.483
-22											1.497
-26											
-30											
-34											
-38											
-42											
-46	^	^	^	^	^	^	^	^	^	^	^
-50	1.269	1.289	1.313	1.333	1.340	1.372	1.395	1.414	1.448	1.488	1.497

## A320 EPR Mode Inoperative Takeoff Thrust and Maximum Climb Thrust - N1

If the EPR mode is unavailable, thrust control automatically reverts to the N1 mode (rated or unrated), and the autothrottle is not available. In the rated N1 mode, thrust limits for takeoff, maximum climb, maximum continuous and go-around are calculated by the FADEC. Maximum cruise thrust is the only limit not monitored by the FADEC.

If one engine reverts to the unrated mode (N1 value not displayed on ECAM), the N1 of the engine in the unrated mode must be aligned with the N1 of the engine in the rated mode. If both engines are in the unrated mode, use the following thrust setting tables.

EPR Mode Inoperative Takeoff Thrust N1											
OAT (°C)	Pressure Altitude (Feet)										
	1000	SL	1000	2000	3000	4000	5000	6000	7000	8000	9000
56	91.8	-	-	-	-	-	-	-	-	-	-
52	92.1	92.2	92.2	-	-	-	-	-	-	-	-
48	91.5	92.6	92.8	92.8	92.5	-	-	-	-	-	-
44	91.0	92.0	92.9	93.3	93.0	92.8	92.6	-	-	-	-
40	90.4	91.4	92.3	93.3	93.7	93.3	93.1	93.0	93.0	-	-
36	89.8	90.8	91.7	92.7	93.4	94.1	93.7	93.8	93.7	93.6	93.6
32	89.2	90.2	91.1	92.1	92.8	93.5	94.1	94.4	94.5	94.5	94.4
28	88.6	89.6	90.5	91.5	92.2	92.9	93.5	94.2	95.0	95.2	95.1
24	88.1	89.0	89.9	90.9	91.6	92.3	92.9	93.6	94.3	95.1	95.3
20	87.5	88.4	89.3	90.2	91.0	91.7	92.3	93.0	93.7	94.4	94.6
10	86.0	86.9	87.8	88.7	89.4	90.1	90.7	91.4	92.1	92.8	93.0
0	84.4	85.4	86.2	87.1	87.8	88.5	89.1	89.8	90.5	91.2	91.3
-20	81.3	82.2	83.0	83.9	84.6	85.2	85.7	86.4	87.1	87.8	87.9
-40	78.0	78.9	79.7	80.5	81.1	81.7	82.3	82.9	83.6	84.2	84.4
-60	74.6	75.4	76.2	75.9	77.6	78.2	78.7	79.3	79.9	80.5	80.7

EPR Mode Inoperative Climb Thrust N1											
OAT (°C)	Pressure Altitude (Feet)										
	SL	2	5	8	12	17	20	25	31	35	39
54	81.3	81.5	-	-	-	-	-	-	-	-	-
46	82.3	82.3	82.4	82.4	82.3	-	-	-	-	-	-
38	83.6	83.5	83.4	83.3	83.1	82.9	83.1	-	-	-	-
30	83.1	84.0	84.5	84.4	84.0	83.8	83.8	82.9	-	-	-
22	82.0	82.9	84.1	85.1	85.0	84.7	84.7	83.9	-	-	-
14	80.9	81.8	82.9	83.9	85.2	85.5	85.6	84.8	84.9	-	-
6	79.8	80.6	81.8	82.8	84.0	85.6	86.3	85.7	85.5	85.4	85.2
-2	78.6	79.5	80.6	81.6	82.8	84.4	85.3	86.3	86.5	86.1	85.9
-10	77.4	78.3	79.4	80.4	81.5	83.1	84.1	85.0	87.1	86.9	86.7
-18	76.3	77.1	78.2	79.1	80.3	81.8	82.8	83.7	85.8	88.2	87.9
-26	75.1	75.9	76.9	77.9	79.1	80.6	81.5	82.4	84.4	86.8	87.3

-34	73.8	74.5	75.7	76.6	77.8	79.2	80.1	81.1	83.1	85.4	85.9
-42	72.6	73.4	74.4	75.3	76.5	77.9	78.8	79.7	81.7	84.0	84.4
-50	71.3	72.1	73.1	74.0	75.1	76.5	77.4	78.3	80.2	82.5	83.0

## TAKEOFF CHARTS

### A320 Takeoff Vsports

<div> <b>FLAPS</b>   <b>1</b>   <b>V1 Adjustments:</b>  Altitude/Temperature,  Slope, Wind -  See Adjustments page.   <b>Vr Adjustments:</b>  Altitude/Temperature -  See Adjustments page. </div>	WT	V1	Vr	V2	F	S	Green Dot
	190	156	163	163	-	-	-
	188	155	162	162	-	-	-
	186	154	161	161	-	-	-
	184	153	160	160	-	-	-
	182	152	159	159	-	-	-
	180	151	158	158	-	-	-
	178	150	156	157	-	-	-
	176	149	155	156	-	-	-
	174	148	154	155	-	-	-
	172	147	153	154	-	-	-
	170	146	152	154	163	214	235
	168	145	151	153	162	213	233
	166	144	150	152	161	211	231
	164	143	149	151	160	209	229
	162	142	148	150	159	208	227
	160	141	147	149	158	206	225
	158	140	146	148	157	205	224
	156	139	145	147	156	204	222
	154	138	144	146	155	203	220
	152	137	143	145	154	201	218
	150	136	142	144	153	200	216
	148	135	141	143	152	199	214
	146	134	140	142	151	198	213
	144	133	139	141	150	196	211
	142	132	138	140	149	195	209

If speed is in shaded region, check Vmin and use higher.	140	131	136	139	148	194	207
	138	130	135	138	147	193	205
	136	129	134	137	146	191	203
	134	128	133	136	145	190	202
	132	126	132	135	144	188	200
	130	125	131	134	143	187	198
	128	124	129	132	141	185	196
	126	123	128	131	140	184	195
	124	122	127	130	139	182	193
	122	120	126	129	138	181	191
	120	119	124	128	137	179	189
	118	118	123	127	136	178	187
	116	117	122	126	135	176	185
	114	115	120	125	134	175	184
	112	114	119	123	133	173	182
	110	113	117	122	132	172	180
	108	111	116	121	130	170	178
	106	110	114	120	129	168	177
	104	108	113	119	128	166	175
	102	107	111	118	127	165	173
	100	105	110	116	125	163	171

<b>FLAPS</b>  <b>2</b>  <b>V1 Adjustments:</b> Altitude/Temperature, Slope, Wind - See Adjustments page.  <b>Vr Adjustments:</b> Altitude/Temperature - See Adjustments page.	WT	V1	Vr	V2	F	S	Green Dot
	190	162	162	164	-	-	-
	188	161	161	163	-	-	-
	186	160	160	163	-	-	-
	184	158	158	162	-	-	-
	182	157	157	161	-	-	-
	180	156	156	160	-	-	-
	178	155	155	159	-	-	-
	176	154	154	158	-	-	-



If speed is in shaded region, check Vmin and use higher.

174	153	153	157	-	-	-
172	152	152	156	-	-	-
170	151	151	156	163	214	235
168	150	150	155	162	213	233
166	149	149	154	161	211	231
164	148	148	153	160	209	229
162	148	148	152	159	208	227
160	147	147	151	158	206	225
158	146	146	150	157	205	224
156	145	145	149	156	204	222
154	144	144	148	155	203	220
152	143	143	147	154	201	218
150	142	142	146	153	200	216
148	141	141	145	152	199	214
146	140	140	144	151	198	213
144	139	139	143	150	196	211
142	138	138	142	149	195	209
140	137	137	141	148	194	207
138	135	135	140	147	193	205
136	134	134	139	146	191	203
134	133	133	138	145	190	202
132	132	132	137	144	188	200
130	131	131	136	143	187	198
128	130	130	134	141	185	196
126	129	129	133	140	184	195
124	127	127	132	139	182	193
122	126	126	131	138	181	191
120	125	125	130	137	179	189
118	124	124	129	136	178	187
116	122	122	128	135	176	185
114	121	121	127	134	175	184
112	119	119	125	133	173	182

	110	118	118	124	132	172	180
	108	116	116	123	130	170	178
	106	115	115	122	129	168	177
	104	113	113	121	128	166	175
	102	112	112	120	127	165	173
	100	110	110	118	125	163	171

<b>FLAPS</b>  <b>3</b>  <b>V1 Adjustments:</b> Altitude/Temperature, Slope, Wind - See Adjustments page.  <b>Vr Adjustments:</b> Altitude/Temperature - See Adjustments page.	WT	V1	Vr	V2	F	S	Green Dot
	190	156	156	157	-	-	-
	188	155	155	156	-	-	-
	186	154	154	155	-	-	-
	184	153	153	154	-	-	-
	182	152	152	153	-	-	-
	180	151	151	153	-	-	-
	178	150	150	152	-	-	-
	176	149	149	151	-	-	-
	174	147	147	150	-	-	-
	172	146	146	149	-	-	-
	170	145	145	148	163	214	235
	168	144	144	147	162	213	233
	166	143	143	146	161	211	231
	164	142	142	146	160	209	229
	162	141	141	145	159	208	227
	160	140	140	144	158	206	225
	158	139	139	143	157	205	224
	156	138	138	142	156	204	222
	154	137	137	141	155	203	220
	152	136	136	140	154	201	218
	150	135	135	139	153	200	216
	148	134	134	138	152	199	214
	146	133	133	137	151	198	213

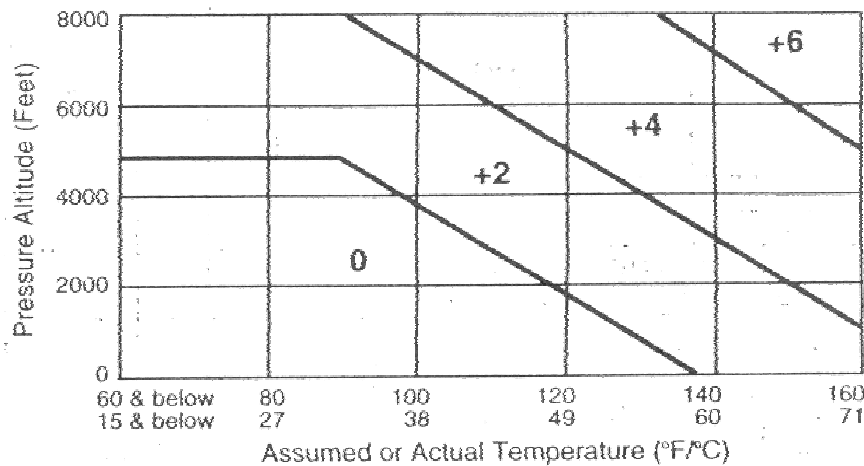
If speed is in shaded region, check Vmin and use higher.

144	132	132	136	150	196	211
142	131	131	135	149	195	209
140	130	130	134	148	194	207
138	129	129	133	147	193	205
136	128	128	132	146	191	203
134	127	127	131	145	190	202
132	126	126	130	144	188	200
130	125	125	129	143	187	198
128	123	123	128	141	185	196
126	122	122	127	140	184	195
124	121	121	126	139	182	193
122	120	120	125	138	181	191
120	118	118	124	137	179	189
118	117	117	123	136	178	187
116	116	116	122	135	176	185
114	115	115	121	134	175	184
112	113	113	120	133	173	182
110	112	112	118	132	172	180
108	110	110	117	130	170	178
106	109	109	116	129	168	177
104	107	107	115	128	166	175
102	106	106	114	127	165	173
100	104	104	113	125	163	171

## A320 V-Speed Adjustments

### TAKEOFF SPEEDS ADJUSTMENTS

$V_1$  &  $V_R$  Altitude and Temperature Adjustment



#### NOTE

If adjusted  $V_R$  exceeds  $V_2$ , increase  $V_2$  to equal  $V_R$ .

### Minimum $V_1$ / $V_R$ / $V_2$

Pressure Altitude (Feet)	Flaps 1	Flaps 2	Flaps 3
	$V_1$ , $V_R$ , $V_2$ Min	$V_1$ , $V_R$ , $V_2$ Min	$V_1$ , $V_R$ , $V_2$ Min
8000	108/112/112	106/110/113	106/110/113
6000	111/115/115	109/113/115	108/113/116
4000	114/118/119	112/116/119	111/116/119
2000	116/121/121	114/119/122	114/118/122
SL	117/122/122	115/120/123	115/119/123

### CRUISE CHARTS

#### A320 Enroute Weight Limitations - Engine Inoperative

All flights must plan a route and/or limit the MTOGW so that the airplane will have sufficient performance to clear enroute terrain if an engine fails. Other airplanes can either dump fuel to reduce weight or they have sufficient engine inoperative performance so that MTOGW is not restricted. Since the A320 is unable to dump fuel, MTOGW may be limited on routes over mountainous terrain.

#### A320 Recommended Step Climb Weight

This table provides a weight for a given step climb and windshear difference at which fuel burn will

be optimized. This weight will put the airplane above the optimum altitude initially. As fuel is burned off, the weight will approach optimum conditions and burn below the optimum weight until the weight reduces to the point for the next step climb.

#### 4000 Feet Step Climb - Mach .80

Headwind, Knots													
Flight Level Change	Headwind Stronger at Higher Altitude							Headwind Stronger at Lower Altitude					
	30	25	20	15	10	5	0	5	10	15	20	25	30
350 - 390	117.1	120.8	124.0	127.1	130.1	133.0	136.0	139.0	141.9	144.9	147.6	150.5	153.3
330 - 370	130.0	133.8	137.2	140.5	143.7	146.9	150.0	153.0	155.9	158.7	161.2	163.9	166.2
310 - 350	142.6	146.9	150.6	154.2	157.9	161.5	165.3	169.0	-	-	-	-	-
290 - 330	156.0	160.7	165.1	169.0	-	-	-	-	-	-	-	-	-
Tailwind, Knots													
Flight Level Change	Tailwind Stronger at Lower Altitude							Tailwind Stronger at Higher Altitude					
	30	25	20	15	10	5	0	5	10	15	20	25	30
350 - 390	121.8	124.2	126.8	129.1	131.6	133.9	136.1	138.6	141.0	143.3	145.7	148.0	150.3
330 - 370	135.2	138.0	140.6	143.1	145.8	148.1	150.6	153.0	155.2	157.3	159.4	161.3	163.0
310 - 350	148.8	151.7	154.6	157.5	160.5	163.3	166.3	169.2	-	-	-	-	-
290 - 330	162.9	166.1	169.3	-	-	-	-	-	-	-	-	-	-

#### A320 Optimum Cruise Weights, Mach .80

Optimum weight for the best NAM/1000 pounds of fuel at Mach.80	
Flight Level Standard TAT ( ° C)	Optimum Weight (Pounds)
390 -29	122,600
370 -29	135,000
350 -26	151,900
330 -22	166,000
310 -17	169,800
290 -13	169,800

## A320 Mach .78 Cruise

Flight Level Std TAT (°C)	IAS TAS	Gross Weight (1000 Pounds)										
		170	165	160	155	150	145	140	135	130	125	120
390 -30	241 447							1.43 89.8	1.40 93.3	1.38 96.6	1.36 100.0	1.34 103.4
380 -30	247 447						1.42 87.1	1.39 90.3	1.37 93.4	1.35 96.5	1.33 99.5	1.32 102.4
370 -30	252 447					1.40 84.6	1.38 87.5	1.36 90.3	1.35 93.1	1.33 95.8	1.31 98.5	1.30 100.9
360 -30	258 448			1.41 79.6	1.39 82.2	1.37 84.8	1.36 87.4	1.34 89.9	1.32 92.4	1.31 94.8	1.29 97.0	1.28 99.0
350 -28	264 450		1.40 77.5	1.38 79.8	1.36 82.2	1.35 84.5	1.33 86.8	1.32 89.1	1.30 91.2	1.29 93.1	1.28 95.0	1.27 96.8
340 -25	271 452	1.39 75.3	1.37 77.5	1.36 79.6	1.34 81.7	1.32 83.8	1.31 85.9	1.30 87.7	1.28 89.5	1.27 91.2	1.26 92.8	1.25 94.4
330 -23	277 454	1.36 75.3	1.35 77.2	1.33 79.1	1.32 81.0	1.30 82.8	1.29 84.5	1.28 86.1	1.27 87.6	1.26 89.1	1.25 90.5	1.24 91.8
320 -21	283 456	1.34 74.9	1.32 76.6	1.31 78.4	1.30 79.9	1.29 81.4	1.28 82.9	1.27 84.3	1.26 85.7	1.25 86.9	1.24 88.1	1.23 89.4
310 -19	289 458	1.31 74.3	1.30 75.8	1.29 77.2	1.28 78.6	1.27 79.8	1.26 81.1	1.25 82.3	1.25 83.4	1.24 84.6	1.23 85.7	1.22 86.9
300 -17	296 460	1.29 73.3	1.28 74.6	1.28 75.8	1.27 76.9	1.26 78.1	1.25 79.2	1.24 80.2	1.24 81.3	1.23 82.3	1.22 83.4	1.22 84.4

EPR  
NAM/1000 LBS

Adjustments:

- TAS (knots) is for standard temperature; add 1 knot/°C above standard, subtract 1 knot/°C below standard
- Fuel consumption (1000 pounds/hour) = TAS for actual temperature + NAM/1000 pounds

## A320 Mach .80 Cruise

Flight Level Std TAT (°C)	IAS TAS	Gross Weight (1000 Pounds)										
		170	165	160	155	150	145	140	135	130	125	120
390 -29	248 459							1.47 84.5	1.44 88.3	1.41 92.2	1.39 96.0	1.36 99.5
380 -29	254 459						1.45 82.2	1.43 85.7	1.40 89.2	1.38 92.6	1.36 95.8	1.34 98.7
370 -29	260 459					1.44 80.0	1.42 83.2	1.39 86.5	1.37 89.5	1.35 92.4	1.33 95.0	1.32 97.4
360 -29	266 459			1.45 75.2	1.43 78.0	1.41 80.9	1.38 83.8	1.36 86.6	1.35 89.2	1.33 91.4	1.32 93.6	1.30 95.7
350 -26	272 461		1.44 73.2	1.42 75.9	1.39 78.6	1.37 81.1	1.36 83.6	1.34 85.9	1.32 87.9	1.31 89.9	1.30 91.8	1.29 93.5
340 -24	278 463	1.42 71.5	1.40 73.9	1.38 76.3	1.36 78.6	1.35 80.8	1.33 82.8	1.32 84.6	1.31 86.4	1.30 88.1	1.28 89.7	1.28 91.1
330 -22	284 465	1.39 72.0	1.37 74.1	1.36 76.2	1.34 78.2	1.33 79.9	1.31 81.5	1.30 83.2	1.29 84.6	1.28 86.1	1.27 87.4	1.26 88.7
320 -20	291 467	1.36 72.1	1.35 73.9	1.33 75.5	1.32 77.1	1.31 78.6	1.30 80.1	1.29 81.4	1.28 82.7	1.27 83.9	1.26 85.1	1.26 86.1
310 -17	297 469	1.34 71.6	1.33 73.0	1.31 74.5	1.30 75.9	1.29 77.1	1.28 78.3	1.27 79.5	1.27 80.6	1.26 81.6	1.25 82.6	1.25 83.4
300 -15	304 471	1.32 70.7	1.31 72.0	1.30 73.2	1.29 74.3	1.28 75.5	1.27 76.5	1.26 77.5	1.26 78.4	1.25 79.3	1.25 80.0	1.24 80.7

EPR  
NAM/1000 LBS

Adjustments:

- TAS (knots) is for standard temperature; add 1 knot/°C above standard, subtract 1 knot/°C below standard
- Fuel consumption (1000 pounds/hour) = TAS for actual temperature + NAM/1000 pounds

## A320 290 Knot Cruise

Flight Level Std TAT (°C)	TAS	Gross Weight (1000 Pounds)										
		170	165	160	155	150	145	140	135	130	125	120
310 -19	459	1.32 74.0	1.30 75.6	1.29 77.0	1.28 78.4	1.27 79.6	1.26 80.9	1.26 82.1	1.25 83.2	1.24 84.4	1.23 85.5	1.23 86.6
300 -18	459	1.29 73.8	1.28 75.2	1.27 76.5	1.26 77.8	1.25 79.0	1.24 80.2	1.23 81.4	1.23 82.5	1.22 83.7	1.21 84.8	1.20 86.0
290 -16	445	1.27 73.1	1.26 74.5	1.25 75.7	1.24 76.9	1.23 78.1	1.22 79.2	1.21 80.4	1.21 81.6	1.20 82.7	1.19 83.9	1.19 85.0
280 -15	438	1.25 72.3	1.24 73.6	1.23 74.8	1.22 76.0	1.21 77.2	1.20 78.3	1.20 79.5	1.19 80.6	1.18 81.7	1.18 82.8	1.17 83.9
270 -14	431	1.23 71.4	1.22 72.6	1.21 73.9	1.20 75.1	1.19 76.2	1.19 77.4	1.18 78.5	1.17 79.6	1.17 80.7	1.16 81.8	1.15 82.9
260 -13	425	1.21 70.4	1.20 71.7	1.19 72.9	1.18 74.0	1.18 75.2	1.17 76.3	1.16 77.4	1.16 78.4	1.15 79.5	1.14 80.5	1.14 81.6
250 -11	418	1.19 69.5	1.18 70.7	1.18 71.8	1.17 73.0	1.16 74.1	1.16 75.2	1.15 76.2	1.14 77.2	1.14 78.3	1.13 79.3	1.12 80.3
200 -5	387	1.12 64.6	1.11 65.6	1.11 66.6	1.10 67.6	1.10 68.5	1.09 69.3	1.09 70.2	1.08 71.1	1.08 71.9	1.07 72.8	1.07 736
150 2	359	1.07 58.7	1.07 59.5	1.06 60.4	1.06 61.2	1.06 62.0	1.05 62.8	1.05 63.5	1.05 64.2	1.04 65.0	1.04 65.7	1.04 66.3
100 10	334	1.04 53.0	1.04 53.7	1.04 54.4	1.04 55.1	1.03 55.8	1.03 56.6	1.03 57.2	1.02 57.8	1.02 58.5	1.02 59.0	1.02 59.5

EPR  
NAM/1000 LBS

Adjustments:

- TAS (knots) is for standard temperature; add 1 knot/°C above standard, subtract 1 knot/°C below standard
- Fuel consumption (1000 pounds/hour) = TAS for actual temperature + NAM/1000 pounds



## A320 Two Engine Holding Speeds and Fuel Flow (Green Dot)

EPR  
LBS/HOUR  
IAS

Pressure Altitude (Feet)	Gross Weight (1000 Pounds)												
	170.0	165.0	160.0	155.0	150.0	145.0	140.0	135.0	130.0	125.0	120.0	115.0	110.0
30,000	1.29	1.27	1.26	1.25	1.23	1.22	1.21	1.19	1.18	1.17	1.16	1.14	1.13
	5914	5704	5494	5292	5094	4902	4726	4554	4384	4216	4030	3848	3672
	244	240	235	231	226	222	217	212	208	203	199	194	190
25,000	1.19	1.18	1.17	1.16	1.15	1.15	1.14	1.13	1.12	1.11	1.10	1.10	1.09
	5796	5622	5452	5278	5086	4900	4718	4538	4358	4178	3998	3820	3642
	239	235	230	226	221	217	212	207	203	198	194	189	185
20,000	1.13	1.12	1.12	1.11	1.10	1.10	1.09	1.09	1.08	1.08	1.07	1.07	1.06
	5784	5600	5416	5230	5046	4862	4680	4504	4334	4166	3996	3828	3662
	234	230	225	221	216	212	207	202	198	193	189	184	180
15,000	1.09	1.08	1.08	1.07	1.07	1.07	1.06	1.06	1.05	1.05	1.05	1.04	1.04
	5774	5586	5404	5230	5056	4884	4714	4544	4376	4214	4054	3896	3738
	234	230	225	221	216	212	207	202	198	193	189	184	180
10,000	1.06	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03
	5804	5628	5454	5282	5118	4956	4794	4632	4472	4310	4152	3996	3836
	234	230	225	221	216	212	207	202	198	193	189	184	180
5,000	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02
	5896	5730	5564	5400	5238	5078	4918	4760	4602	4440	4274	4108	3946
	234	230	225	221	216	212	207	202	198	193	189	184	180
1,500	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
	6000	5836	5674	5512	5352	5192	5032	4866	4698	4532	4372	4214	4060
	234	230	225	221	216	212	207	202	198	193	189	184	180

**Adjustments:** Total fuel flow is based on holding in a racetrack pattern with flaps and gear retracted; reduce fuel flow values by 7.5% for holding in straight-and-level flight

## LANDING CHARTS

### A320 Landing Reference Speeds - Flaps Full

WT	Vref
170	147
168	146
166	145
164	144
162	144
160	143
158	142
156	141
154	140
152	139
150	138
148	137
146	137
144	136
142	135
140	134
138	133
136	131
134	130
132	129
130	129
128	128
126	127
124	126
122	125
120	124
118	123
116	122
114	121
112	119
110	118
108	117
106	116
104	115
102	114
100	112

## **Landing Speed Definitions**

Vls (REF Speed) - The speed for a specific flap configuration which provides adequate stall margin for landing. Vls is computed by the FMGC to provide 1.23 Vs protection for the selected landing configuration. It is the basis for computing Vapp and threshold speeds. Vls is not modifiable by the crew.

Vref - Vls for configuration FULL.

Vapp (Target Speed) - The speed at which the approach is flown. Vapp, as computed by the FMGC, is  $Vls + 5$  knots plus  $1/3$  the headwind component, not to exceed  $Vls + 20$ . No additions are made for gusts.

Threshold Speed - The speed crossing the runway threshold. Since wind gusts are not considered in calculating Vapp, Threshold and Vapp are the same.

Minimum Groundspeed (Mini GS) - The speed, which is computed by the FMGC, that is equal to the Vapp minus the headwind component of the magnetic winds inserted by the crew on the PERF APPR page. If the headwind component is less than 10 knots, it defaults to 10 knots. MINI GS is the calculated managed approach speed expressed as an equivalent groundspeed.

Managed Approach Speed - The speed, which is computed by the FMGC, at which the approach is flown in managed speed. It is the minimum groundspeed (Mini GS) plus the actual wind component, and is never lower than Vapp. Managed speed is limited by both Vapp and Vfe.

When in managed speed, the FMGC maintains the minimum groundspeed by continuously adjusting the managed approach speed as the actual wind direction and/or velocity changes. When MINI GS is maintained, safe aerodynamic margins are provided by taking advantage of the airplane's inertia while flying through gusty or shear situations.

### **EXAMPLE:**

A Vapp of 120 knots minus the pilot-entered wind of 15 knots equals a MINI GS of 105 knots.

With an actual headwind of 20 knots:

Managed approach speed is 125 knots (to maintain MINI GS of 105 knots).

With an actual headwind of 50 knots:

Managed approach speed is 155 knots (to maintain MINI GS of 105 knots).

With an actual headwind of 5 knots:

Managed approach speed is 120 knots (to maintain MINI GS of 105 knots). In this case, managed approach speed is no lower than Vapp (120 knots).

With an actual tailwind of 20 knots:

Managed approach speed is 120 knots (to maintain MINI GS of 105 knots). In this case, managed approach speed is no lower than Vapp (120 knots).