

McDonnell Douglas DC-10-10/30 Limitations

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APPLICABILITY

The information contained in this section applies to all DC-10 airplanes (of the series shown below) unless otherwise specified by type, engine model, etc.

The following chart outlines the basic differences among the various configurations of the airplane.

Airplane	DC-10-10	DC-10-10	DC-10-10	DC-10-10	DC-10-30	DC-10-30	DC-10-30
Configuration	Domestic	Overwater Domestic		Domestic	Overwater		
Engine Model	CF6-6D				CF6-50C2		
Fuselage Type	Basic		Low Drag				
Max Takeoff Wt	410,000 lbs	430,000 lbs		410,000 lbs	580,000 lbs	555,000 lbs	580,000 lbs
Max Landing Wt	347,800 lbs				403,000 lbs		411,000 lbs

SELECTED LIMITATIONS

All references to airspeed or Mach Number relate to Indicated Airspeed or Indicated Mach Number, unless otherwise noted. All references to altitude relate to Pressure Altitude, unless otherwise noted.

STRUCTURAL WEIGHT LIMITS

The following weights may be further limited by other conditions and must not exceed those permitted by prescribed performance limitations.

MAXIMUM WEIGHT (1000 POUNDS)								
AIRPLANE	DC-10-10	DC-10-10	DC-10-30	DC-10-30 Center Gear Retracted	DC-10-30	DC-10-30 Center Gear Retracted	DC-10-30	DC-10-30 Center Gear Retracted
TAXI	413.0	433.0	583.0	443.0	583.0	433.0	558.0	443.0
TAKEOFF	410.0	430.0	580.0 *	440.0	580.0 *	440.0	555.0	440.0
INFLIGHT- Flaps Down in Landing Range (35 to 50)	366.5	366.5	406.0	406.0	424.0	424.0	424.0	424.0
LANDING	347.8	347.8	403.0	363.5	411.0	363.5	403.0	363.5
ZERO FUEL	310.5	335.0	368.0	350.0	368.0	350.0	368.0	350.0
OPERATING WEIGHT	242.0 or 245.8	244.1 or 246.4 249.6	269.6	269.6	273.7 **	273.7 **	269.6	269.6
* For takeoff weights above 555,000 lbs, 28 or higher ply tires must be installed on all main and centerline gear wheels.								
** Domestic Operating Weight 270,400 pounds.								

SPEEDS

Whenever both an airspeed and a Mach number are shown as a Limit or a Specification, use the slower of the two for the particular flight conditions.

Maximum Operating Limits (Vmo/Mmo)

ALTITUDE (Feet)	SL	10,000	24,800	28,380	30,000	35,000	40,000	42,000
VMO (KIAS)								
DC-10-10	350	350	350	350 (.88M)	.88M (337)	.88M (303)	.88M (270)	.88M (257)
DC-10-30	350	375	375 (.88M)	.88M (347)	.88M (337)	.88M (303)	.88M (270)	.88M (257)

Design Maneuvering Speed (Va)

The design maneuvering speed (Va) is the max speed at which application of full available aileron, rudder or elevator will not overstress the aircraft.

ALTITUDE (Feet)	SL	5,000	10,000	15,000	20,000	24,800	29,000	35,000	42,000
VMO (KIAS)									
DC-10-10	265	268	273	280	287	297	308	282	242
DC-10-30	310	315	321	328	334	344	322	288	245

Maximum Flaps Extended Speeds (Vfe)

	FLAP POSITION				
	0/EXT	15	22	35	50
DC-10-10	260 / .51M	250 / .51M	210 / .51M	185 / .51M	170 / .51M
DC-10-30	270 / .55M	250 / .51M	220 / .51M	185 / .51M	170 / .51M

Maximum Slats Extended Speeds

In normal operation, Slats Extended Speeds will not be exceeded if Flaps Extended Speeds listed above are not exceeded. In the event that one or more slats fail to retract, the max speed is:

	SLAT POSITION	
	TAKEOFF	LAND
DC-10-10	260 / .51M	210 / .51M
DC-10-30	270 / .55M	220 / .51M

If the slats extended automatically in flight, the max auto extend speed is:

DC-10-10: 260 KIAS / .75M

DC-10-30: 270 KIAS / .75M

Landing Gear Limit Speeds (V_{lo}/V_{le})

	NORMAL OPERATION	ALTERNATE GEAR EXTENSION LEVER
OPERATING (V _{lo} -KIAS) RETRACTION: EXTENSION:	230 / .70M 260 / .70M	230 / .70M
EXTENDED (V _{le} -KIAS)	300 / .70M	260 / .70M

Stall Speeds

DC-10-10												
FLAP POS.	SLAT POS.	STALL SPEED - KIAS										
		GROSS WEIGHT - 1000 LBS.										
		240	260	280	300	320	340	360	380	400	410	430
UP	RET	126	131	136	141	145	150	154	158	162	164	168
0	T.O.	107	111	116	120	124	127	131	134	137	139	143
5	T.O.	106	110	115	119	123	126	130	133	136	138	142
10	T.O.	103	107	111	115	119	122	125	128	131	133	137
15	T.O.	101	105	109	112	116	119	122	125	128	130	133
18	T.O.	99	103	107	111	114	118	121	124	126	128	132
22	T.O.	97	101	105	109	112	116	119	122	125	126	129
35	Land	93	96	100	103	107	110	113	115	118	120	123
50	Land	90	93	97	100	104	107	109	112	115	116	119

DC-10-30											
FLAP POS.	SLAT POS.	STALL SPEED - KIAS									
		GROSS WEIGHT - 1000 LBS.									
		280	320	360	400	440	480	520	560	580	590
UP	RET	136	146	155	163	171	179	186	193	196	198
0	T.O.	115	123	131	140	147	154	162	169	173	175
5	T.O.	112	121	130	138	147	155	164	172	176	178
10	T.O.	110	118	127	135	143	152	160	168	171	173
15	T.O.	108	116	125	133	141	148	156	163	167	169
20	T.O.	106	115	123	131	139	146	153	161	165	166
22	T.O.	106	114	122	130	138	145	152	160	164	165
35	Land	102	110	117	125	132	140	146	153	157	158
50	Land	99	106	114	122	129	137	144	151	154	156
ALTITUDE COR. KIAS		1	1	2	2	2	3	3	3	4	4
Adjustments: Above stall speeds are for a pressure altitude of 15,000 feet. Add (subtract) altitude correction for each 5,000 feet above (below) 15,000 feet. No correction necessary for UP/RET Flap/Slat configuration.											

Operating Speeds

CONDITION		KIAS	MACH
Maximum Operating Speed	Below 10,000 feet	250	--
Standard Climb Speed	10,000 feet and above DC-10-10	300	.83 *
	DC-10-30	300	.82 *
Best Climb Rate Speed	Three Engines	300	--
	Two Engines	275	
Best Climb Angle Speed	Three, Two or One Engine	240	--
Rough Air Speed	10,000 feet and above DC-10-10	280-287	.80-.85
	DC-10-30	290-310	
	Below 10,000 feet	250	
Standard Cruise Speed	Above FL320 DC-10-10	--	.83
	DC-30-30	--	.82
	10,000 feet to FL320	300	--
Standard Descent Speed	10,000 feet and above	280	.83
Optimum Climb Speeds for Minimum Trip Fuel Burnout (10,000 feet and above at indicated takeoff gross weight - 1000 pounds)	DC-10-10		
	Over - 390 lbs	310	.83
	360 - 390 lbs	300	.83
	330 - 360 lbs	290	.83
	300 - 330 lbs	280	.83
	Below - 300 lbs	270	.83
	DC-10-30		
	Over - 520 lbs	340	.82
	470 - 520 lbs	330	.82
	420 - 470 lbs	320	.82
	370 - 420 lbs	310	.82
	320 - 370 lbs	300	.82
	Below - 320 lbs	290	.82

* Use initial cruise Mach if less than this figure.

Maximum Tire Speed

DC-10-10: 195 knots ground speed

DC-10-30: 204 knots ground speed

AVIONICS

Autopilot

Do not engage the autopilot to CMD and/or engage a flight director when the airplane's rate of climb is in excess of 4000 fpm, or the rate of descent is in excess of 8000 fpm.

Do not automatically capture glide slope above 250 knots.

The autopilot must be disengaged for split flap/slat handle position.

Do not use autopilot GO-AROUND mode with an engine failure.

Do not use autopilot GO-AROUND mode during touch and go landings.

Autoland mode is not approved.

Minimum Altitudes with Autopilot Engaged in CMD

En route (including climb/descent): 500 feet AGL

Non-precision Approaches: 50 feet below MDA

Coupled Approaches: 62 feet AGL

Autothrottles

Do not use during touch and go landings.

Do not use during takeoff.

ENGINES

Engine Temperature

THRUST SETTING	TIME LIMIT	MAX EGT °C	
		DC-10-10	DC-10-30
Takeoff	2 Minutes	925	960
	3 Minutes	910	945
Takeoff and Go-Around (In Flight)	5 Minutes	910	945
Max. Continuous	Continuous	880	910
Max. Cruise	Continuous	845	885
Starting		750	750

Engine RPM

	RED RADIAL	
	DC-10-10	DC-10-30
Maximum N1	111%	118.5%
Maximum N2	101%	109.5%

Reverse Thrust

Do not move reverse thrust levers out of forward idle in flight.

Do not use to taxi airplane in reverse.

FUEL

General

The weight of fuel in the tanks must not exceed the fuel tank structural capacity.

Fuel density must be within the range of 6.3 to 7.1 pounds/gallon.

DC-10-10

Load all tanks equally to quantity desired or until tanks 1 and 3 are full, then add any necessary fuel to tank 2. When fuel is required to maintain CG limits, the fuel will be added to tank 2.

DC-10-30

If full wing tanks are not required, load MAINs equally to quantity desired or until MAIN tanks 1 and 3 are full, then load remainder into MAIN tank 2.

For empty AFT AUX tank, steps 1,2,4 and 5 only apply.

When fuel loads greater than full wing tanks are required:

1. Load all three MAINs equally until MAIN tanks 1 and 3 are full, then load fuel into MAIN tank 2 until it is full.
2. Load UPR AUX tank until aux fuel quantity indicates a minimum of 14,500 pounds or total fuel load exceeds approximately 165,000 pounds.
3. Load AFT AUX tank to approximately 10,000 pounds (some -30s).
4. Continue filling UPR AUX tank until full.
5. Fill LWR AUX tank.
6. Load remaining required fuel in AFT AUX tank (some -30s).

Fuel Usage

If any FUEL QTY indicator indicates 5000 pounds or less, all associated TANK PUMP switches must be on. A missed approach is not recommended if fuel in any tank is 1500 pounds or less.

Fuel Tank Capacity

	DC-10-10			DC-10-30				DC-10-30			
	1M	2M	3M	1M	2M	3M	AUX	1M	2M	3M	AUX
Maximum Structural Fuel Capacity (1000 Pounds) (Obtained only with fuel density in excess of 7.0 lbs/gal)	42.5	68.9	42.5	43.2	69.4	43.2	127.8	43.2	69.4	43.2	102.5
Typical Usable Fuel Capacity (1000 Pounds) (Fuel density of 6.7 lbs/gal)	40.1	64.9	40.1	40.7	65.4	40.7	120.3	40.7	65.4	40.7	98.1
The fuel manifold contains approx 400 pounds (6.7 lbs/gal) of usable and undumpable fuel that is available from manifold piping upon completion of crossfeeding.											

Operational Values

FUEL	POUNDS	
	DC-10-10	DC-10-30
Taxi Per Minute (Not in Takeoff Weight)	62	62
Minimum Dispatch	15,000	18,000
FAR Domestic Reserve	See FAR RESERVE FUEL table	
Contingency (Domestic Only)	1200	1400
FAR Overwater/International Reserve	See FAR RESERVE FUEL table	
Minimum Alternate	3700	4500
Holding Per Hour	12,000	14,000
Dump Rate Per Minute (Approx)	5000	5800
Undumpable	39,900	39,900

FAR Reserve Fuel, DC-10-10

ZERO FUEL WEIGHT (1000 Pounds)	DOMESTIC 45 MINUTE FAR	OVERWATER/INTERNATIONAL 1500 X estimated flight hours plus value below
320	11300	7500
300	10700	7100
280	10100	6700
260	9400	6300
240	8900	5900
Low drag airplanes will be approximately 2% less.		

FAR Reserve Fuel, DC-10-30

ZERO FUEL WEIGHT (1000 Pounds)	DOMESTIC 45 MINUTE FAR	OVERWATER/INTERNATIONAL 1500 X estimated flight hours plus value below
360	11300	7900
340	10800	7500
320	10300	7200
300	9800	6800
280	9100	6400

Minimum Fuel For Landing

Fuel at Touchdown: 3700

Execute a Go-Around: 3000

Fuel Indicator Error: 800

Minimum Desired Landing Fuel (Indicated), Total: 7500

(See 767 Limitations for explanation of above.)

ICE AND RAIN

Engine Anti-Ice

Engine anti-ice will be turned ON prior to and used during takeoff and initial climb when OAT is below 6°C and either of the following conditions exist:

- Visible moisture is present (such as fog restricting visibility to less than one mile, rain or snow), or
- OAT and DEW POINT are within 3°C of each other.

In flight, consider using engine anti-ice when the TAT is 6°C or below and visible moisture is present.

FLIGHT LOAD ACCELERATION LIMITS

Flaps Up/Slats Retracted: +2.5G to -1.0G

Flaps and Slats Extended: +2.0G to 0.0G

Flaps or Slats Extended: +2.0G to 0.0G

OPERATIONAL LIMITS - TAKEOFF AND LANDING

Runway Slope: $\pm 2\%$

Tailwind: 10 knots

TEMPERATURE AND ALTITUDE LIMITS

	TAKEOFF AND LANDING		EN ROUTE	
	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT
Altitude Limits	-1000	8500	SL	42000
Temperature Limits	-54° C between -1000 and 8500 feet	50° C between -1000 and 2500 feet to 38° C at 8500 feet	-54° C at SL to -82° C at 42,000 feet	50° C at SL to -33° C at 42,000 feet

DEMONSTRATED CROSSWIND

Maximum demonstrated crosswind with normal hydraulic systems or with one hydraulic system inoperative: 31 knots