Example Time-of-Arrival Landing Distance Calculations Decision Process

Runway 25: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind

Dispatch Landing Distance

Flap A – Dry Runway = 1895 m

Wet Runway = 2180 m

Flap B – Dry Runway = 1785 m

Wet Runway = 2053 m

Dispatch Dry is Part 25 demonstrated dry *1.67

Dispatch Wet/Slippery is Dispatch Dry * 1.15 or Part 25 demonstrated dry * 1.67 * 1.15

No slope, ISA temperature and no speed additive

- Runway 25: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF:
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1585	1780	2415	1497	1659	2239	Dry
5	2015	2055	2450	1883	1923	2269	Good
4	2205	2243	2485	2073	2111	2309	Good to Med
3	2350	2400	2560	2218	2268	2384	Medium
2	2718	2748	2763	2537	2572	2582	Med to Poor
1	3550	3570	3585	3363	3389	3409	Poor

- Runway 25: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
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What Flap/Autobrake Setting is usable – Dry Runway?

- Runway 25: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF:
- Data available

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2	2718	2748	2763	2537	2572	2582	Med to Poor
1	3550	3570	3585	3363	3389	3409	Poor

What Flap/Autobrake Setting is usable – Dry Runway? RWYCC = 5, Flap A and B, AB Max and Med

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF: `KXXX 02170225 07 5/5/5 100/100/100 NR/NR/NR WET/WET/WET`
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1585	1780	2415	1497	1659	2239	Dry
5	2015	2055	2450	1883	1923	2269	Good
4	2205	2243	2485	2073	2111	2309	Good to Med
3	2350	2400	2560	2218	2268	2384	Medium
2	2718	2748	2763	2537	2572	2582	Med to Poor
1	3550	3570	3585	3363	3389	3409	Poor

What if it is a wet runway?

Note: Wet Runway GRF report is only required when runway was contaminated but now it is wet. If the runway has significant Slippery Wet section.

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF: KXXX 02170225 **07** 5/5/5 100/100/100 NR/NR/NR WET/WET/WET
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1585	1780	2415	1497	1659	2239	Dry
5	2015	2055	2450	1883	1923	2269	Good
4	2205	2243	2485	2073	2111	2309	Good to Med
3	2350	2400	2560	2218	2268	2384	Medium
2	2718	2748	2763	2537	2572	2582	Med to Poor
1	3550	3570	3585	3363	3389	3409	Poor

What Flap/Autobrake Setting is usable – Wet Runway? RWYCC = 5, Flap A and B, AB Max and Med

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF: `KXXX 02170225 07 3/5/5 100/100/100 NR/NR/NR SLIP WET/WET/WET`
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1585	1780	2415	1497	1659	2239	Dry
5	2015	2055	2450	1883	1923	2269	Good
4	2205	2243	2485	2073	2111	2309	Good to Med
3	2350	2400	2560	2218	2268	2384	Medium
2	2718	2748	2763	2537	2572	2582	Med to Poor
1	3550	3570	3585	3363	3389	3409	Poor

What Flap/Autobrake Setting is usable?

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF: `KXXX 02170225 07 3/5/5 100/100/100 NR/NR/NR SLIP WET/WET/WET`
- Data available
- For rwy 25 must Reverse information

  `5/5/3`

  `100/100/100`

  `NR/NR/NR`

  `WET/WET/SLIP WET`

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1585	1780	2415	1497	1659	2239	Dry
5	2015	2055	2450	1883	1923	2269	Good
4	2205	2243	2485	2073	2111	2309	Good to Med
3	2350	2400	2560	2218	2268	2384	Medium
2	2718	2748	2763	2537	2572	2582	Med to Poor
1	3550	3570	3585	3363	3389	3409	Poor

What Flap/Autobrake Setting is usable? RWYCC 3 Flap A, AB Max Flap B AB Max/Med

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, **one rev inop**
- Landing distance is in M and factored by 1.15
- GRF: KXXX 02170225 **07** 5/5/5 100/100/100 NR/NR/NR WET/WET/WET
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1605	1785	2415	1517	1664	2239	Dry
5	2085	2130	2450	1953	1998	2269	Good
4	2305	2348	2505	2173	2216	2329	Good to Med
3	2485	2540	2625	2353	2408	2449	Medium
2	2943	2973	2988	2762	2797	2807	Med to Poor
1	4065	4090	4105	3878	3909	3929	Poor

Rev inop increases Time of Arrival landing distance from 0 to 500+ m

Does the dispatch distance change with reverser inop?

What Flap/Autobrake Setting is usable?

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, one rev inop
- Landing distance is in M and factored by 1.15
- GRF: KXXX 02170225 **07** 5/5/5 100/100/100 NR/NR/NR WET/WET/WET
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1605	1785	2415	1517	1664	2239	Dry
5	2085	2130	2450	1953	1998	2269	Good
4	2305	2348	2505	2173	2216	2329	Good to Med
3	2485	2540	2625	2353	2408	2449	Medium
2	2943	2973	2988	2762	2797	2807	Med to Poor
1	4065	4090	4105	3878	3909	3929	Poor

Does the dispatch distance change with reverser inop? No, reverse thrust does not affect dispatch distance

What Flap/Autobrake Setting is usable? Flaps A, AB Max and Med Flap B, AB Max and Med

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF: `KXXX 02170225 07 5/5/5 100/100/100 NR/NR/NR WET/WET/WET`
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1585	1780	2415	1497	1659	2239	Dry
5	2015	2055	2450	1883	1923	2269	Good
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3	2350	2400	2560	2218	2268	2384	Medium
2	2718	2748	2763	2537	2572	2582	Med to Poor
1	3550	3570	3585	3363	3389	3409	Poor

What if heavy rain exists?

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, No wind, all rev operative
- Landing distance is in M and factored by 1.15
- GRF: KXXX 02170225 **07 2/2/2** 100/100/100 NR/NR/NR WET/WET/WET
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1585	1780	2415	1497	1659	2239	Dry
5	2015	2055	2450	1883	1923	2269	Good
4	2205	2243	2485	2073	2111	2309	Good to Med
3	2350	2400	2560	2218	2268	2384	Medium
2	***2718***	***2748***	***2763***	***2537***	***2572***	***2582***	***Med to Poor***
1	3550	3570	3585	3363	3389	3409	Poor

What if heavy rain exists? If heavy rain is in the area it is possible the runway friction capability will be degraded, the runway can become contaminated with water. RWYCC 2 goes with standing water.

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, **10 kt TW**, all rev op
- Landing distance is in M and factored by 1.15
- GRF: `KXXX 02170225 07 5/5/5 100/100/100 NR/NR/NR WET/WET/WET`
- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
6	1795	2020	2750	1707	1899	2574	Dry
5	2350	2390	2790	2218	2258	2609	Good
4	2565	2598	2835	2433	2466	2659	Good to Med
3	2730	2780	2950	2598	2648	2774	Medium
2	3213	3248	3263	3032	3072	3082	Med to Poor
1	4255	4275	4290	4074	4099	4109	Poor

Dry runway ? Wet runway?

- Runway **25**: 2400 m, 0.5 downhill slope, 2000’ Pressure Alt., 30 C, **10 kt TW**, all rev op
- Landing distance is in M and factored by 1.15
- GRF: `KXXX 02170225 07 5/5/5 100/100/100 NR/NR/NR WET/WET/WET`
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Dry runway ?

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- Data available

	Flap A			Flap B			
RWYCC	Max Manual Braking	AB Max	AB MED	Max Manual Braking	AB Max	AB MED	Braking Action
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1	4255	4275	4290	4074	4099	4109	Poor

Wet runway?

Generic Factors

- Generic factors are provided in APM for the case where the manufacturer does not provide appropriate data or guidance.

	Runway Condition Code						
Braking Action	6 (Dry)	5 Grooved /PFC Good	5 Smooth Good	4 Good to Medium	3 Medium	2 Medium to Poor	1 Poor
Turbojet, No Reverse	1.67	2.3	2.6	2.8	3.2	4.0	5.1
Turbojet, With Reverse	1.67	1.92	2.2	2.3	2.5	2.9	3.4
Turboprop Note 1	1.67	1.92	2.0	2.2	2.4	2.7	2.9
Reciprocating	1.67	2.3	2.6	2.8	3.2	4.0	5.1

Generic Factors

- Generic factors are applied to unfactored AFM dry landing distance
- Factors created based on study of eight part 25 aircraft.

  Assumptions were reasonable and not the most conservative. By nature of the study they should be conservative for most airplanes and conditions but not necessarily all airplanes and conditions.

Unfactored dry runway landing distance from AFM – 999 m

RWYCC	Turbojet with Reverse using generic factor	Operational performance data for same aircraft following APM recommendations*
6	1668 m	1497 m
5	2298 m	1883 m
4	2298 m	2073 m
3	2497 m	2218 m
2	2897 m	2537 m
1	3396 m	3363 m

*2000’ PA, 30 C, 0.5% DH slope, VREF+5