

Operations & Performance



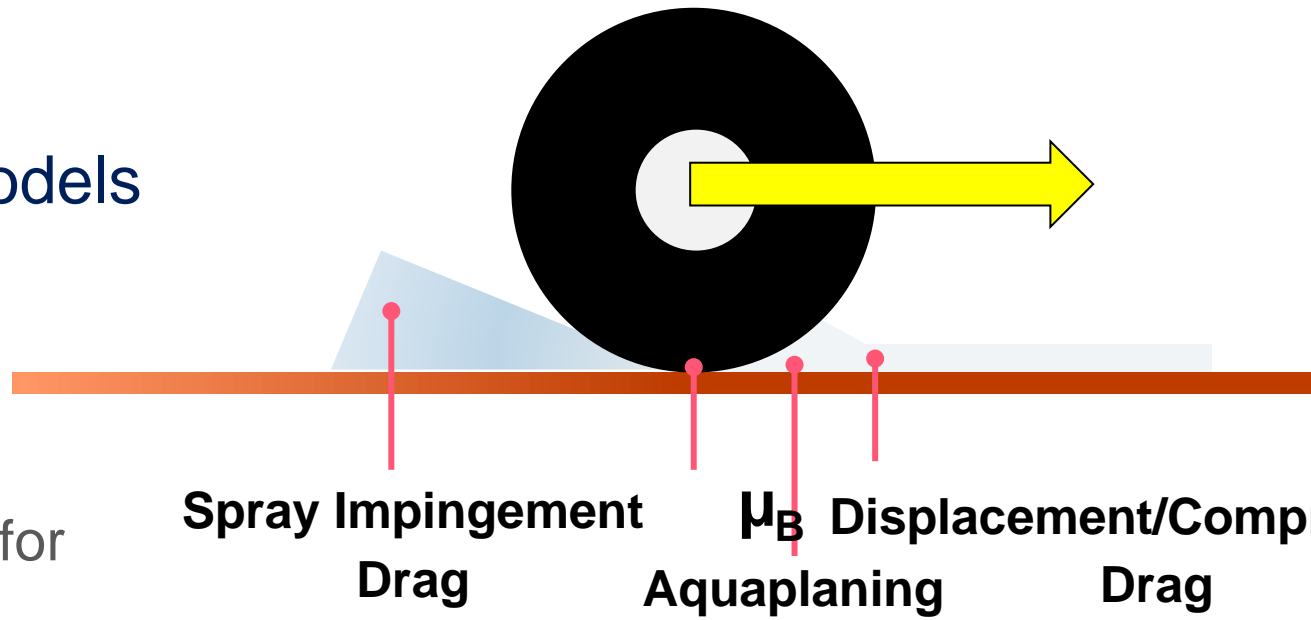
Prepared by Lars Kornstaedt / Rapporteur Friction Task Force – Annex 6/8
Subgroup
10 July 2019

AIRBUS

Effect of Runway Condition on Aircraft Performance




Effects in Performance Models




Braking Performance accounts for

| Effect | Dry/Wet | Hard Contaminants | Fluid Contaminants |
|------------------------------------|---------|-------------------|--------------------|
| Effective wheel to ground friction | Yes | Yes | Yes |
| Displacement Drag | - | - | Yes |
| Compression Drag | - | - | Yes |
| Impingement Drag | - | - | Yes |
| Aquaplaning | - | - | Yes |

Current Regulatory Dispatch Requirements




IR-OPS CAT.POL.
A.230(a)⁽¹⁾




FAR
121.195

$RLD_{dry} = ALD / 0.6$




IR-OPS CAT.POL.
A.235(a)⁽²⁾



FAR
121.195

$RLD_{wet} = 1.15 \times RLD_{dry}$



IR-OPS CAT.POL.
A.235(b)⁽²⁾

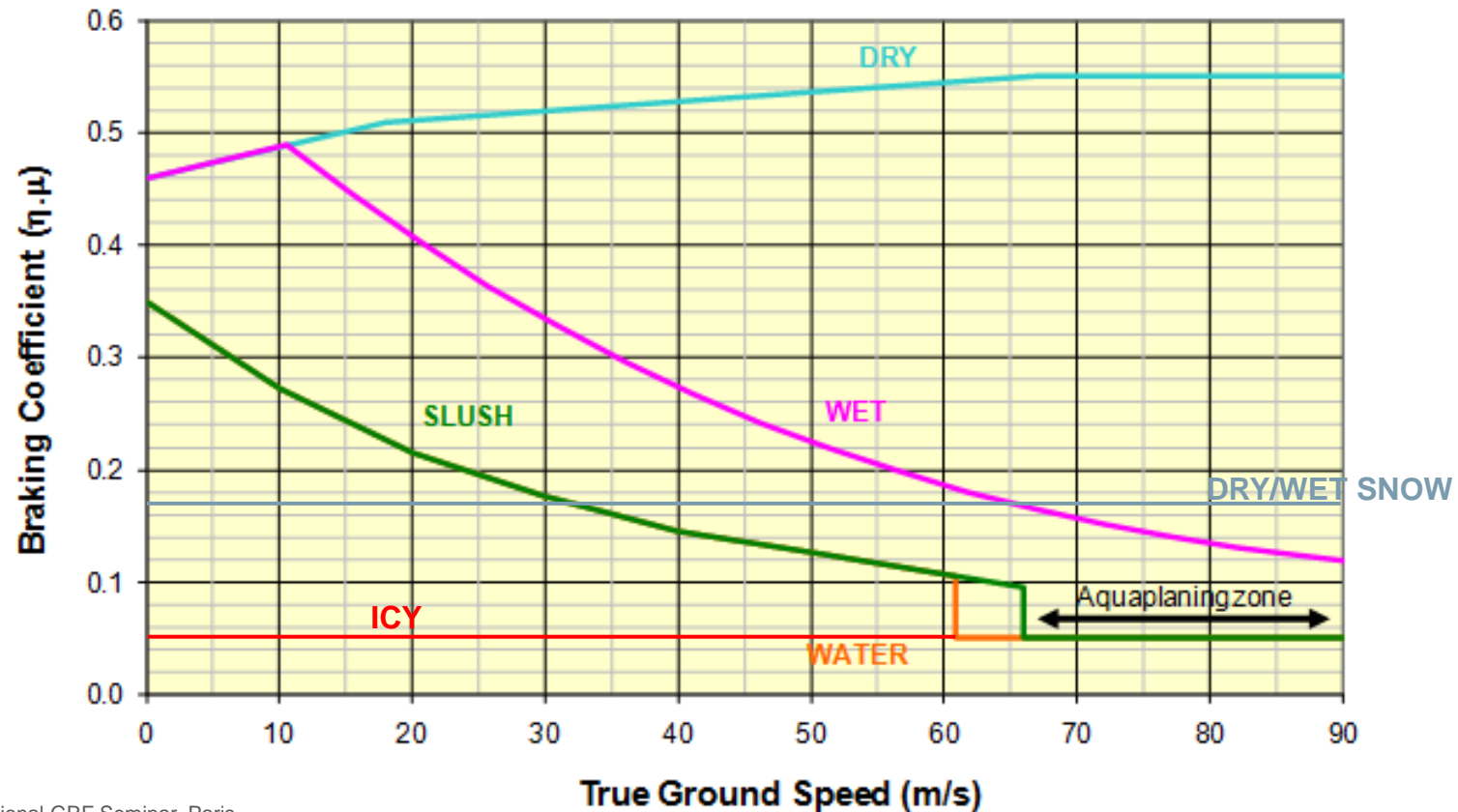
$RLD_{conta} =$
 Max of $\left\{ \begin{array}{l} 1.15 \times ALD_{conta} \\ RLD_{wet} \end{array} \right.$

RLD shorter than Landing Distance Available (LDA)

EASA Dispatch Requirements for contaminated runways



- Under EASA regulation CS25.1591 manufacturers may publish takeoff and landing performance for contaminated runways
- Associated AMC provides friction models for various contaminants



Current Regulatory In-Flight Requirements

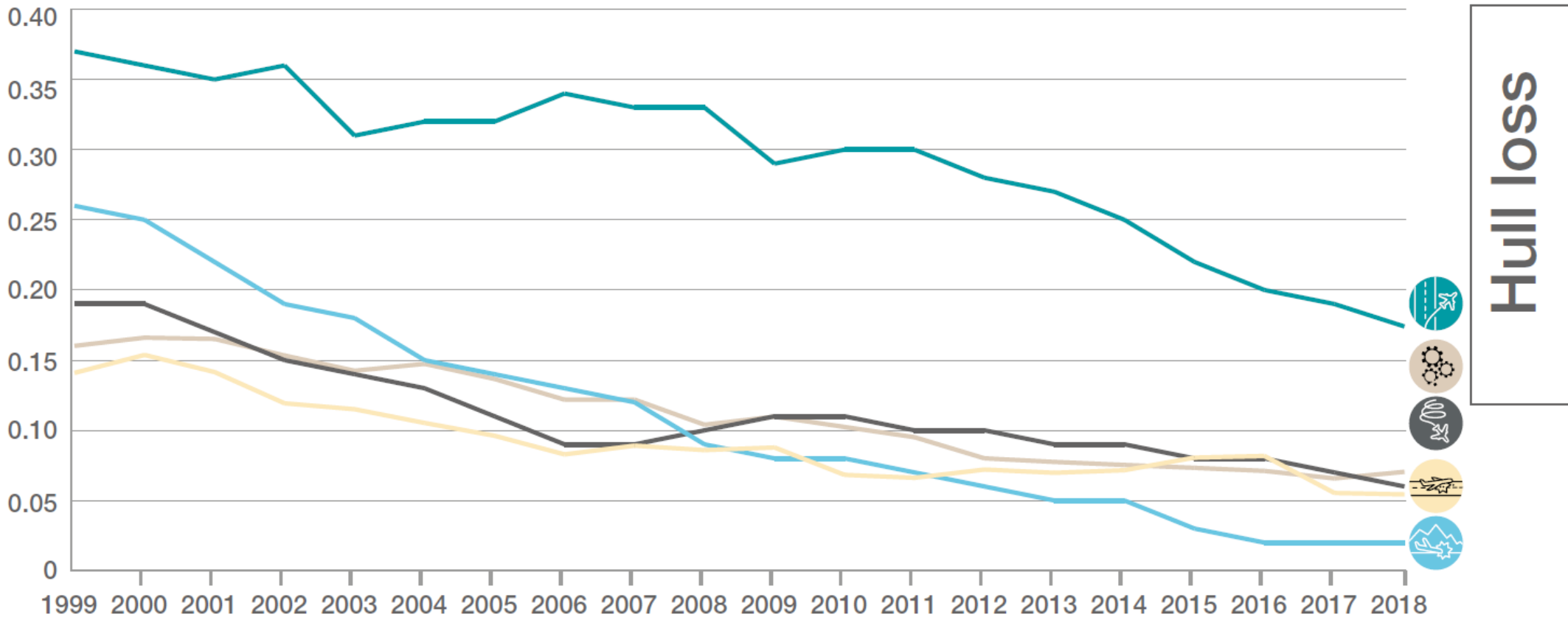


The flight crew must check that a safe landing can be performed in the expected conditions

(1) Former EU-OPS 1.400

Accident Statistics

10 year moving average hull loss rate by accident category per million flights



Situation of the Industry Today



Conta

Different terminology

Different contaminant types

Insufficient depth accuracy



Friction

No correlation with A/C performance

Not up to date



PIREP

Not objective



Perfo.



Def.



Proc.

Reporting NOT Performance-Relevant
AIRBUS

ICAO Friction Task Force Jobcard

| | | | | |
|--|---|----------------|----------------|------------------|
| PART I | | | | |
| Category | Safety | Sustainability | Implementation | Reference: AP001 |
| Title | Assessment and reporting of runway surface conditions | | | |
| Proposed by | Secretariat/WG-PDP | | | |
| Problem Statement | Runway surface conditions have contributed to many safety events and investigations have revealed shortfalls in the accuracy and timeliness of assessment and reporting methods currently provided for in ICAO provisions and guidance material | | | |
| Specific Details (including impact statements) | While techniques for the measurement of runway friction provide useful information for runway surface friction maintenance purposes, they are not suitable in all weather conditions when the runway is contaminated and the information when used in reports could be misleading to pilots. Reports used by pilots need to be performance of the aircraft. Both airport operators and pilots need to use it effectively. | | | |

...need reports that are directly related to the performance of the aircraft.

Runway surface conditions have contributed to many safety events and investigations have revealed shortfalls in the accuracy and timeliness of assessment and reporting methods currently provided for in ICAO provisions and guidance material

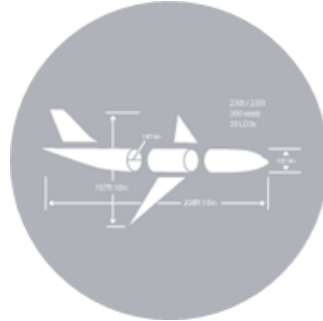
Runway surface conditions have contributed to many safety events and investigations have revealed shortfalls in the accuracy and timeliness of assessment and reporting methods currently provided for in ICAO provisions and guidance material

| | | | | |
|------------------------------------|--|---------|---|--------------------|
| Rationale for acceptance/rejection | | | | |
| Action already in progress | Current work programme | | | |
| Interdependencies/References | AN-WP/8571.PD | | | |
| Required Action | | | | |
| 1 | Develop provisions for the reporting of runway surface conditions | AP/PASG | Proposed amendments to Annex 14 Volume 1 and other related Annexes Proposed amendments to PANS-Aerodromes and PANS-ATM | Q2/2014 Q2/2015 |
| 2 | Develop guidance material for the assessment of runway surface conditions, including friction level and where contamination exists | AP/PASG | Proposed amendments to PANS-Aerodromes Proposed amendments to Doc 9137 | Q2/2015 Q1/2016 |
| 3 | Develop guidance material for the measurement and maintenance of runway friction | AP/PASG | Proposed amendments to PANS-Aerodromes Proposed amendments to Doc 9137 | Q2/2015 Q1/2016 |

End to End System



Aerodromes



Manufacturers



Operators

Common Language

Contaminant Types

Runway Condition Codes

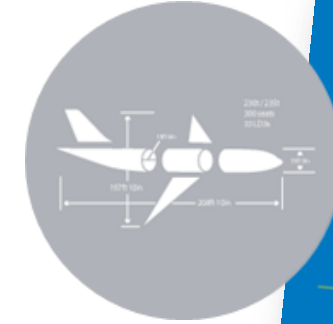
Direct Input to Performance Assessment

Performance Relevance

Depth Thresholds & Temperatures

Significant Changes

Airworthiness – Annex 8



- Option for takeoff performance on contaminated runway
- Mandate split of landing performance information into
 - At Time of Takeoff data (dispatch)
 - At Time of Landing data (in-flight)
- New At Time of Landing Distances shall reflect real operating practices
- Both types of landing distances may be provided for contaminated runways

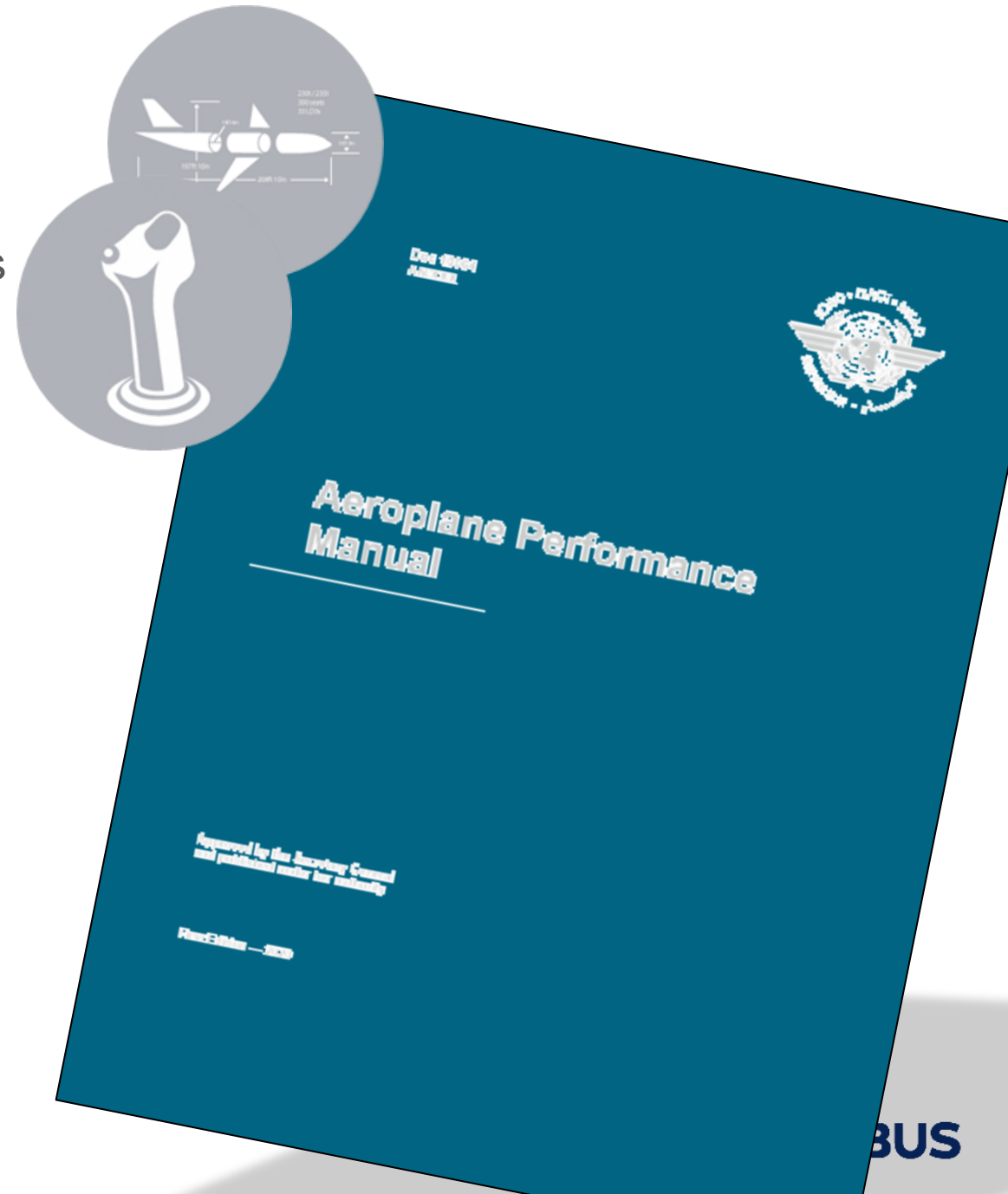
Operations - Annex 6



- For large and small airplanes
- Mandate AIREP when conditions worse than reported
- Mandate in-flight check with appropriate margin before starting approach

Aeroplane Performance Manual

- Introduction to Operations on Contaminated Runways
- 4 Flight-Phase oriented Chapters
 - Take-off
 - En-Route
 - Landing
 - Missed Approach
- **Clear Focus on GRF**
- Other information considered as non-controversial
- Based on existing national guidance and practices
- Still under Review by Ops Section



Chapter on Operations On Contaminated Runways

- Description of the RCR for Operators and Pilots
- Introduction to the Assessment Process applied by the Aerodrome
- Description and use of the RCAM and RWYCC
- Considerations for making AIREPs of Braking Action
- Training Syllabus

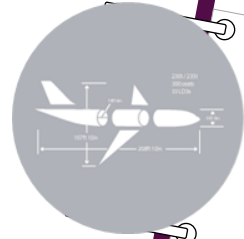


Chapter on Landing

- Derivation of Landing Performance Data for Time of Arrival
- Publication of Data and Limitations
- Fallback Generic Factors in case no Data is provided by the Manufacturer
- Regulatory background
- Considerations for Performance Assessment in Approach Preparation
- Considerations for Flight Crew
- Pilot Procedures for Landing on Length-Limited Runways

Guidance for Manufacturers

- Publish Operational Landing Distances
 - “Minimum” Compliance with principles
 - Cover all 6 friction levels
 - Introduce Accountability for
 - Temperature effect
 - Runway slope effect
 - Approach speed increment effect



AIRBUS
OPERATIONAL DATA

IN FLIGHT PERFORMANCE

REV. 1/4
28 MAR 11

LANDING DISTANCE - DRY

The Reference Distance (REF DIST) considers: Sea Level (SL), ISA, no wind, no CGR, no engine reverse thrust, manual landing, VAPP/VLO without APPR CR.

CONF FULL

Conditions as Landing Distance (m)

| Braking Mode | REF DIST (m) for 150t | WEIGHT | | SFD | ALT | WIND | TEMP | SLOPE | REV |
|-------------------------------|-----------------------|---------------------|---------------------|---------|--------------------|------------|--------------------|-------------------|------------------------------|
| | | For 150t BELOW 150t | For 150t ABOVE 150t | | | | | | |
| Maximum MANUAL | 1 210 | -10 | +140 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE MED | 1 810 | -10 | +140 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE LOW | 2 250 | -10 | +140 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| Overweight Ldg prog. Autoland | -180 m -200 m | | | | | | | | |

CONF 2

Conditions as Landing Distance (m)

| Braking Mode | REF DIST (m) for 150t | WEIGHT | | SFD | ALT | WIND | TEMP | SLOPE | REV |
|-------------------------------|-----------------------|---------------------|---------------------|---------|--------------------|------------|--------------------|-------------------|------------------------------|
| | | For 150t BELOW 150t | For 150t ABOVE 150t | | | | | | |
| Maximum MANUAL | 1 250 | -10 | +160 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE MED | 1 750 | -10 | +160 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE LOW | 2 250 | -10 | +160 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| Overweight Ldg prog. Autoland | -180 m -200 m | | | | | | | | |

LANDING DISTANCE - GOOD

The Reference Distance (REF DIST) considers: Sea Level (SL), ISA, no wind, no CGR, no engine reverse thrust, manual landing, VAPP/VLO without APPR CR.

CONF FULL

Conditions as Landing Distance (m)

| Braking Mode | REF DIST (m) for 150t | WEIGHT | | SFD | ALT | WIND | TEMP | SLOPE | REV |
|-------------------------------|-----------------------|---------------------|---------------------|---------|--------------------|------------|--------------------|-------------------|------------------------------|
| | | For 150t BELOW 150t | For 150t ABOVE 150t | | | | | | |
| Maximum MANUAL | 1 300 | -10 | +180 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE MED | 1 760 | -10 | +180 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE LOW | 2 250 | -10 | +180 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| Overweight Ldg prog. Autoland | -180 m -200 m | | | | | | | | |

CONF 2

Conditions as Landing Distance (m)

| Braking Mode | REF DIST (m) for 150t | WEIGHT | | SFD | ALT | WIND | TEMP | SLOPE | REV |
|-------------------------------|-----------------------|---------------------|---------------------|---------|--------------------|------------|--------------------|-------------------|------------------------------|
| | | For 150t BELOW 150t | For 150t ABOVE 150t | | | | | | |
| Maximum MANUAL | 1 400 | -10 | +200 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE MED | 1 860 | -10 | +200 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| AUTOGRADE LOW | 2 350 | -10 | +200 | For 50t | For 1000m above SL | For 5kt TW | For 10°C ABOVE ISA | For 1% Down Slope | For Thrust Reverse Operative |
| Overweight Ldg prog. Autoland | -180 m -200 m | | | | | | | | |

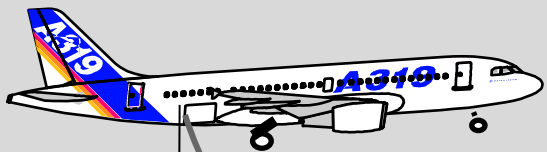
OPS DATA

OEB

MDA: 40-6453-ARCD: A11 M8N 0830

NO MARGIN

ACTUAL LDG DIST



DRY
WET
WATER
SLUSH
SNOW
ICE

V_{REF}

V_{TD}

STOP

Demo/Regul



ISA



IN-FLIGHT LDG DIST



15% MARGIN

DRY
GOOD
GOOD TO MEDIUM
MEDIUM
MEDIUM TO POOR
POOR

| Code | Weather Condition Description | Observation and Description of Observations | Decision Making Guide |
|------|---|---|-----------------------|
| 6 | DRY | | Dry |
| 5 | Light to 100' Snow + Fog + 100' Snow + 100' Snow | Light to moderate snow or rain on runway and taxiway. | Good |
| 4 | Light to 100' Snow + Fog + 100' Snow + 100' Snow | Light to moderate snow or rain on runway and taxiway. | Good |
| 3 | Light to 100' Snow + Fog + 100' Snow + 100' Snow | Light to moderate snow or rain on runway and taxiway. | Medium |
| 2 | Light to 100' Snow + Fog + 100' Snow + 100' Snow | Light to moderate snow or rain on runway and taxiway. | Medium to Poor |
| 1 | Light to 100' Snow + Fog + 100' Snow + 100' Snow | Light to moderate snow or rain on runway and taxiway. | Poor |
| 0 | Light to 100' Snow + Fog + 100' Snow + 100' Snow | Light to moderate snow or rain on runway and taxiway. | Very Poor |

V_{APP}

V_{TD}

%

STOP

Operational



OAT



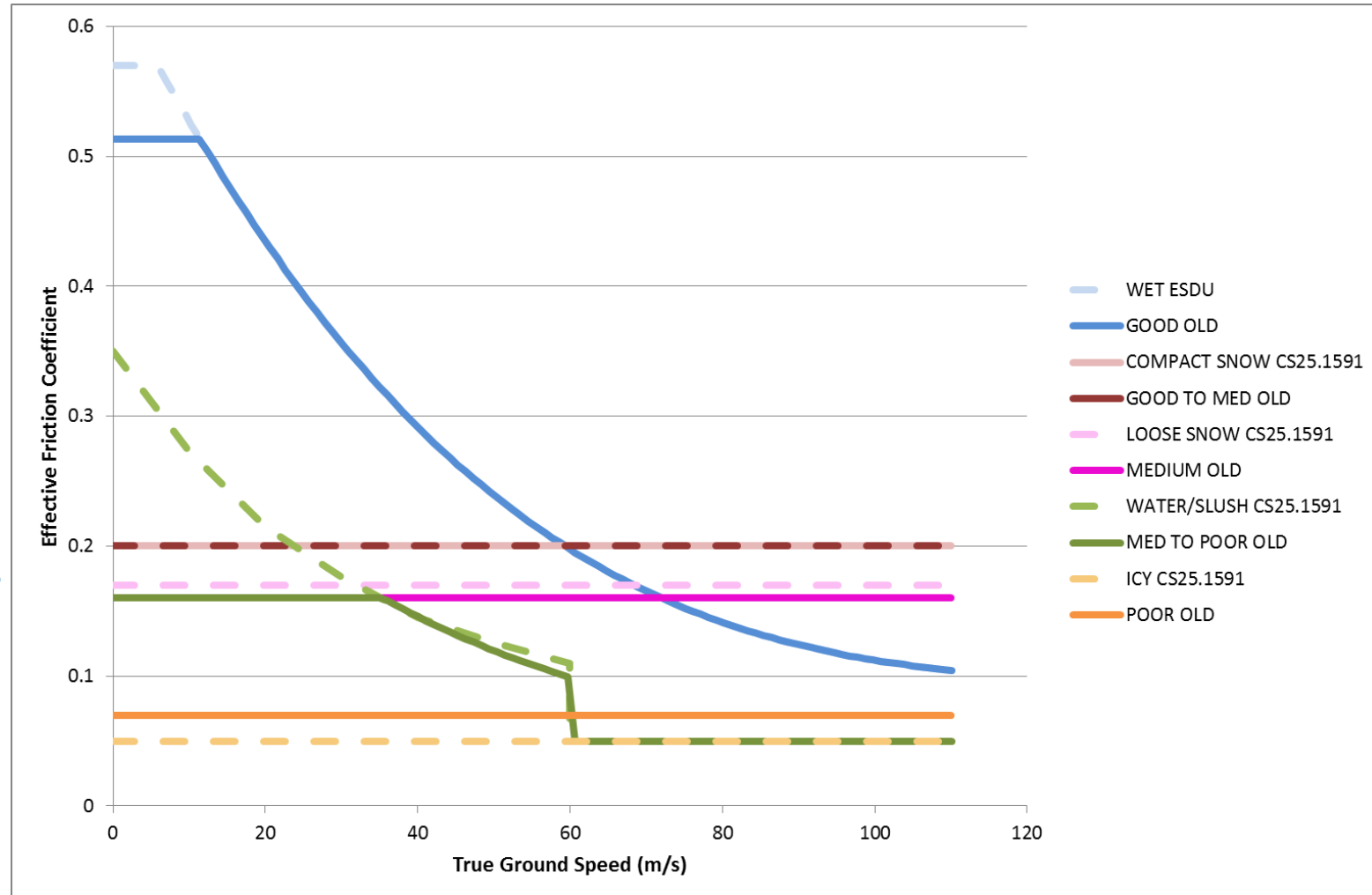
ICAO Doc 10064 Aeroplane Performance Manual

- Provides the **effective wheel to ground coefficient** for each **RWYCC**
- Not specific to an individual aeroplane
- Adaptable to the anti-skid system type
- Ensures harmonized **Landing Distances at Time for Arrival** between all types

| RWYCC | Runway Surface Condition Description | Pilot-Reported Braking Action | Wheel Braking Coefficient |
|-------|--|-------------------------------|---|
| 6 | DRY | — | 90 per cent of certified value used to comply with Annex 8 Part IIB 2.2.7 e) ¹ . |
| 5 | FROST WET (The runway surface is covered by any visible dampness or water up to and including 3mm deep.) SLUSH (up to and including 3mm depth) DRY SNOW (up to and including 3mm depth) WET SNOW (up to and including 3mm depth) | Good | Per method defined in Note 2 below. |
| 4 | COMPACTED SNOW (Outside air temperature minus 15 degrees Celsius or below) | Good to Medium | 0.20 ³ |
| 3 | WET (Slippery Wet) (except) DRY SNOW (more than 3mm depth) WET SNOW (more than 3mm depth) DRY SNOW ON TOP OF COMPACTED SNOW (Any depth) WET SNOW ON TOP OF COMPACTED SNOW (Any depth) COMPACTED SNOW (Outside air temperature above minus 15 degrees Celsius) | Medium | 0.16 ³ |
| 2 | STANDING WATER (more than 3mm depth) SLUSH (more than 3mm depth) | Medium to Poor | (1) For speeds below 85 per cent of the aquaplaning speed ³ : 50 per cent of the wheel braking coefficient determined for RWYCC=5, but no greater than 0.16; and (2) For speeds at 85 per cent of the aquaplaning speed ⁴ and above: 0.05 ³ . |
| 1 | ICE | Poor | 0.07 ³ |

ICAO Doc 10064 Aeroplane Performance Manual

- Provides the **effective wheel to ground coefficient** for each **RWYCC**
- Not specific to an individual aeroplane
- Adaptable to the anti-skid system type
- Ensures harmonized **Landing Distances at Time for Arrival** between all types
- Based on **existing** EASA guidance on contaminated runway friction from **historic** flight tests



Runway Condition Code – Direct Input to Landing Distance

Computation

| Runway condition code | 6 | 5 | 4 | 3 | 2 | 1 |
|-----------------------|---|---|---|---|---|---|
|-----------------------|---|---|---|---|---|---|

| | |
|---------------------------|---------------------------|
| 6 - DRY | 3 - MEDIUM |
| 5 - GOOD | 4 - GOOD TO MEDIUM |
| 4 - GOOD TO MEDIUM | 3 - MEDIUM |
| 3 - MEDIUM | 2 - MEDIUM TO POOR |
| 2 - MEDIUM TO POOR | 1 - POOR |

| IN FLIGHT PERFORMANCE | | PER-B | | IN FLIGHT PERFORMANCE | | PER-B | |
|-----------------------|--|-----------|--|-----------------------|--|-----------|--|
| AIR CANADA | | 22 MAR 17 | | AIR CANADA | | 22 MAR 17 | |
| 4210A310A320A327 | | | | 4210A310A320A327 | | | |

| 3 - MEDIUM | | | | | | | | | | | |
|-----------------------|----------|-----------------------|------------------|---------|---------------------|------------|--------------------|-------------------|-------------------------------|---------------------|--------|
| Landing Distance (ft) | | | | | | | | | | | |
| Braking Mode | LDG CONF | REF DIST (ft) for 63T | Per 1T above 63T | Per 5kt | Per 1000ft above SL | Per 5kt TW | Per 10°C above ISA | Per 1% Down Slope | Per Thrust Reverser Operative | if OVV PROC applied | OVV |
| Maximum MANUAL | FULL | 5 806 | +130 | +330 | +210 | +700 | +190 | +320 | -70 | | +1 800 |
| | 3 | 6 206 | +140 | +280 | +240 | +740 | +220 | +370 | -130 | | +2 400 |
| (MED) | FULL | 5 850 | +120 | +350 | +220 | +710 | +190 | +330 | -110 | | +1 730 |
| | 3 | 6 290 | +140 | +370 | +240 | +740 | +220 | +360 | -150 | | +1 730 |
| AUTOBRAKE LOW | FULL | 6 106 | +140 | +430 | +230 | +730 | +210 | +290 | -20 | | +800 |
| | 3 | 6 736 | +150 | +480 | +250 | +760 | +230 | +340 | -80 | | +800 |

(1) Automatic Landing correction: if CONF FULL, add 60ft; if CONF 3, add 75ft.
 (2) Weight correction: if CONF FULL, subtract 50ft per 1T below 63T; if CONF 3, subtract 70ft per 1T below 63T.

| 4 - GOOD TO MEDIUM | | | | | | | | | | | |
|-----------------------|----------|-----------------------|------------------|---------|---------------------|------------|--------------------|-------------------|-------------------------------|---------------------|--------|
| Landing Distance (ft) | | | | | | | | | | | |
| Braking Mode | LDG CONF | REF DIST (ft) for 63T | Per 1T above 63T | Per 5kt | Per 1000ft above SL | Per 5kt TW | Per 10°C above ISA | Per 1% Down Slope | Per Thrust Reverser Operative | if OVV PROC applied | OVV |
| Maximum MANUAL | FULL | 4 240 | +140 | +350 | +200 | +630 | +180 | +150 | | | +1 300 |
| | 3 | 4 730 | +160 | +380 | +240 | +700 | +210 | +170 | | | +1 300 |

| 3 - MEDIUM | | | | | | | | | | | |
|-----------------------|----------|-----------------------|------------------|---------|---------------------|------------|--------------------|-------------------|-------------------------------|---------------------|--------|
| Landing Distance (ft) | | | | | | | | | | | |
| Braking Mode | LDG CONF | REF DIST (ft) for 63T | Per 1T above 63T | Per 5kt | Per 1000ft above SL | Per 5kt TW | Per 10°C above ISA | Per 1% Down Slope | Per Thrust Reverser Operative | if OVV PROC applied | OVV |
| AUTOBRAKE LOW | 3 | 6 390 | +150 | +470 | +230 | +650 | +200 | +190 | | | +1 300 |

(1) Automatic Landing correction: if CONF FULL, add 60ft; if CONF 3, add 75ft.
 (2) Weight correction: if CONF FULL, subtract 40ft per 1T below 63T; if CONF 3, subtract 60ft per 1T below 63T.

| 4 - GOOD TO MEDIUM | | | | | | | | | | | |
|-----------------------|----------|-----------------------|------------------|---------|---------------------|------------|--------------------|-------------------|-------------------------------|---------------------|--------|
| Landing Distance (ft) | | | | | | | | | | | |
| Braking Mode | LDG CONF | REF DIST (ft) for 63T | Per 1T above 63T | Per 5kt | Per 1000ft above SL | Per 5kt TW | Per 10°C above ISA | Per 1% Down Slope | Per Thrust Reverser Operative | if OVV PROC applied | OVV |
| Maximum MANUAL | 3 | 5 540 | +130 | +330 | +210 | +630 | +190 | +200 | | | +1 300 |
| AUTOBRAKE MED | FULL | 5 090 | +110 | +320 | +190 | +600 | +170 | +200 | | | +1 300 |

| 1 - POOR | | | | | | | | | | | |
|-----------------------|----------|-----------------------|------------------|---------|---------------------|------------|--------------------|-------------------|-------------------------------|---------------------|--------|
| Landing Distance (ft) | | | | | | | | | | | |
| Braking Mode | LDG CONF | REF DIST (ft) for 63T | Per 1T above 63T | Per 5kt | Per 1000ft above SL | Per 5kt TW | Per 10°C above ISA | Per 1% Down Slope | Per Thrust Reverser Operative | if OVV PROC applied | OVV |
| Maximum MANUAL | 3 | 5 540 | +130 | +330 | +210 | +630 | +190 | +200 | | | +1 300 |
| AUTOBRAKE MED | FULL | 5 090 | +110 | +320 | +190 | +600 | +170 | +200 | | | +1 300 |

(1) Automatic Landing correction: if CONF FULL, add 60ft; if CONF 3, add 75ft.
 (2) Weight correction: if CONF FULL, subtract 50ft per 1T below 63T; if CONF 3, subtract 60ft per 1T below 63T.

RWY COND

Cancel

Select runway condition from list

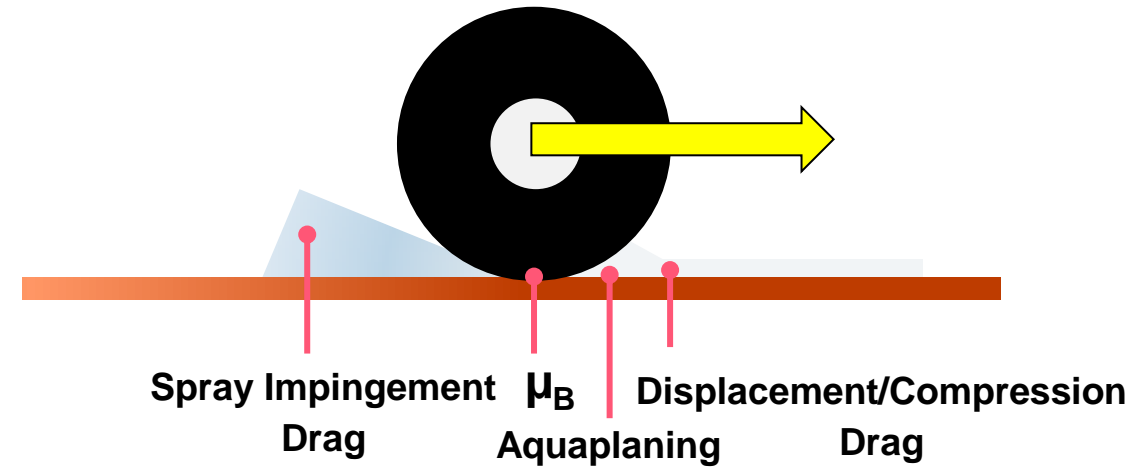
- 6-Dry
- 5-Good
- 4-Good to medium
- 3-Medium
- 2-Medium to poor
- 1-Poor

Page 20

10-11 July 2019 ICAO Regional GRF Seminar, Paris

Chapter on the Situation for Takeoff

- RWYCC provides information on friction only
- At takeoff fluid contaminants generate drag
 - Displacement
 - Compression
 - Impingement
- Takeoff can be limited by
 - Distance needed to accelerate to lift-off speed
 - Distance needed to accelerate to decision speed V_1 and come to full stop on available runway
- Contaminant drag must be accounted for in takeoff computations

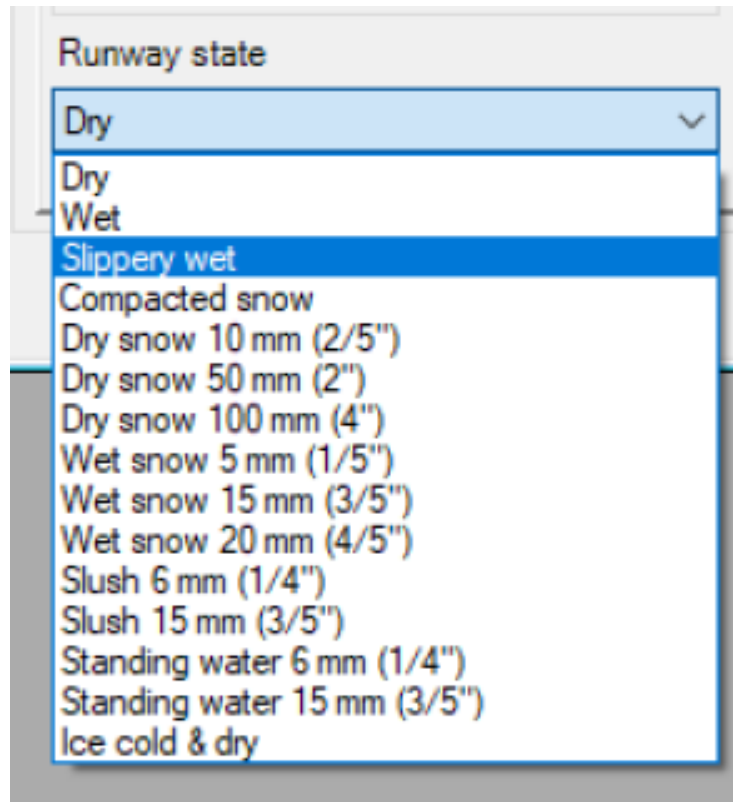


Takeoff computation must be done for prevailing contaminant!

Takeoff

Computation with Contaminant Type and Depth

- Takeoff performance presented for contaminant type and depth



Takeoff

Computation with Contaminant Type and Depth

- Typical manufacturer data certified to CS25 pre-Amdt 2 does not cover many contaminants in the RCAM
- Missing:
 - Frost
 - Dry Snow
 - Wet Snow
 - Compacted Snow at OAT above -15°C
 - Slippery When Wet
 - Ice Cold & Dry
- APM offers advice on how to compute for missing contaminants conservatively

| Runway condition assessment matrix (RCAM) | | | |
|---|--|---|---------------------------------------|
| Assessment criteria | | Downgrade assessment criteria | |
| Runway condition code | Runway surface description | Aeroplane deceleration or directional control observation | Pilot report of runway braking action |
| 6 | • DRY | --- | --- |
| 5 | <ul style="list-style-type: none"> • FROST • WET (The runway surface is covered by any visible dampness or water less than 3 mm deep) Less than 3 mm depth: <ul style="list-style-type: none"> • SLUSH • DRY SNOW • WET SNOW | Braking deceleration is normal for the wheel braking effort applied AND directional control is normal. | GOOD |
| 4 | -15°C and Lower outside air temperature: <ul style="list-style-type: none"> • COMPACTED SNOW | Braking deceleration OR directional control is between Good and Medium. | GOOD TO MEDIUM |
| 3 | <ul style="list-style-type: none"> • WET ("Slippery wet" runway) • DRY SNOW or WET SNOW (Any depth) ON TOP OF COMPACTED SNOW 3 mm and more depth: <ul style="list-style-type: none"> • DRY SNOW • WET SNOW Higher than -15°C outside air temperature ¹ : <ul style="list-style-type: none"> • COMPACTED SNOW | Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced. | MEDIUM |
| 2 | 3 mm and more depth of water or slush: <ul style="list-style-type: none"> • STANDING WATER • SLUSH | Braking deceleration OR directional control is between Medium and Poor. | MEDIUM TO POOR |
| 1 | • ICE ² | Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced. | POOR |
| 0 | <ul style="list-style-type: none"> • WET ICE ² • WATER ON TOP OF COMPACTED SNOW ² • DRY SNOW or WET SNOW ON TOP OF ICE ² | Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain. | LESS THAN POOR |

Takeoff

Computation with Downgraded RWYCC

METAR

PAMC 13^{09:53} Z AUTO 000°00^{KT} 10SM CLR M09/M12
A2972 RMK AO2 SLP073 T10891117 TSNO=

FICON

!MCG 03/104 MCG RWY 05 FICON 2/2/2 100 PCT
COMPACTED SN OBS AT 1803121907. 1803121907-
1803131907

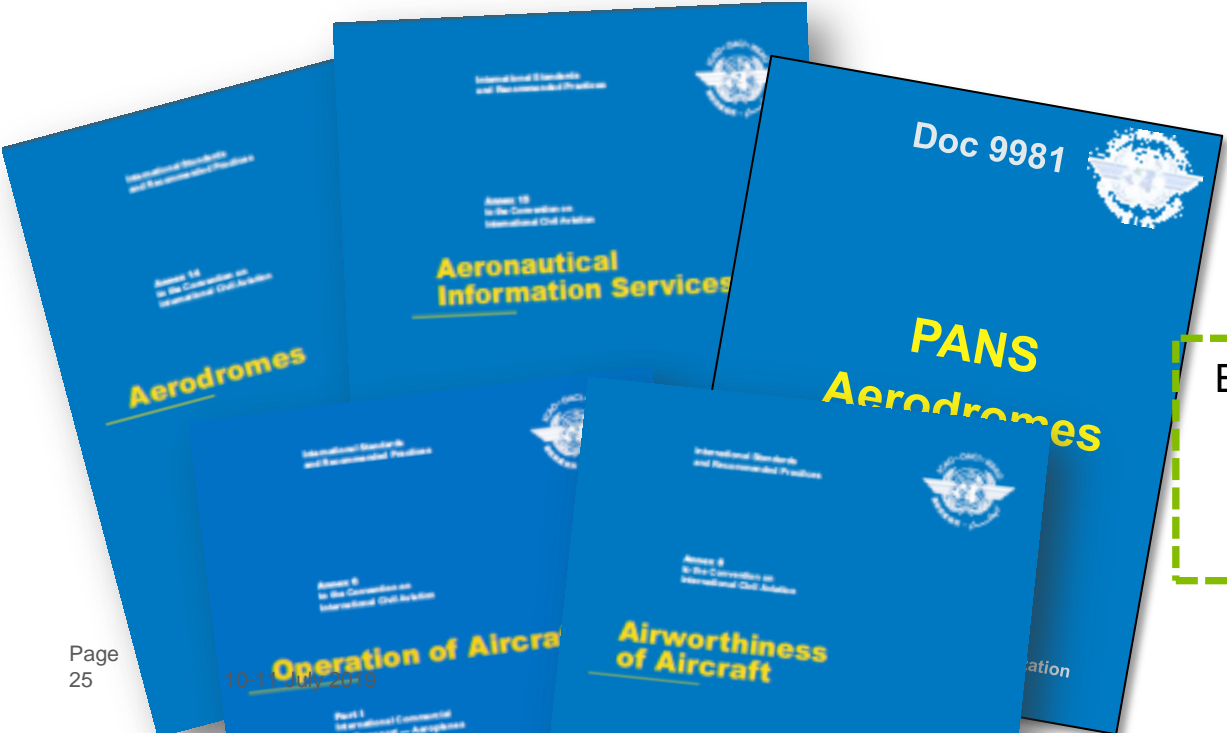
APM recommends “to delay take-off. However, [...], it may be sufficient to determine performance in nominal conditions and to adopt appropriate operational procedures such as considering reduced crosswind limits, using the full length of available runway and avoiding rolling take-off.”

| Runway condition assessment matrix (RCAM) | | | |
|---|--|---|---------------------------------------|
| Assessment criteria | | Downgrade assessment criteria | |
| Runway condition code | Runway surface description | Aeroplane deceleration or directional control observation | Pilot report of runway braking action |
| 6 | <ul style="list-style-type: none"> • DRY | --- | --- |
| 5 | <ul style="list-style-type: none"> • FROST • WET (The runway surface is covered by any visible dampness or water less than 3 mm deep) <p>Less than 3 mm depth:</p> <ul style="list-style-type: none"> • SLUSH • DRY SNOW • WET SNOW | Braking deceleration is normal for the wheel braking effort applied AND directional control is normal. | GOOD |
| 4 | <p>-15°C and Lower outside air temperature:</p> <ul style="list-style-type: none"> • COMPACTED SNOW | Braking deceleration OR directional control is between Good and Medium. | GOOD TO MEDIUM |
| 3 | <ul style="list-style-type: none"> • WET (“Slippery wet” runway) • DRY SNOW or WET SNOW (Any depth) ON TOP OF COMPACTED SNOW <p>3 mm and more depth:</p> <ul style="list-style-type: none"> • DRY SNOW • WET SNOW <p>Higher than -15°C outside air temperature:</p> <ul style="list-style-type: none"> • COMPACTED SNOW | Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced. | MEDIUM |
| 2 | <p>3 mm and more depth of water or slush:</p> <ul style="list-style-type: none"> • STANDING WATER • SLUSH | Braking deceleration OR directional control is between Medium and Poor. | MEDIUM TO POOR |
| 1 | <ul style="list-style-type: none"> • ICE ² | Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced. | POOR |
| 0 | <ul style="list-style-type: none"> • WET ICE ² • WATER ON TOP OF COMPACTED SNOW ² • DRY SNOW or WET SNOW ON TOP OF ICE ² | Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain. | LESS THAN POOR |

A) ENNK **S** **X** **AM**
 B) 11 JAN 2013 04:43
 C) 01 F) 379/379/379 G) XX/XX/XX H) 3/4/4
 N) C/CLSD ALL REMAINING TWYS/379
 R) APRON B/CLSD ALL REMAINING APRONS/379
 T) CONTAMINATION/100/100/100/PERCENT. SAND APPLIED.
 UUEE 050230Z 17004MPS 0900 R25R/P1500U +SHSN VV004
 M01/M01 Q1017 **75590230 25590230**
METAR M **X**

Landing Performance Level
 Direct input into At Time of Arrival Assessment

| RUNWAY CONDITION ASSESSMENT MATRIX FOR LANDING | | | | |
|--|-----------------|----------------------|---------------------------|-------|
| Runway Surface Conditions | Runway Friction | Runway Contamination | Landing Performance Level | |
| | | | Code | Value |
| Asphalt | 0.15 | None | 4 | 100 |
| Asphalt | 0.15 | Light | 3 | 80 |
| Asphalt | 0.15 | Medium | 2 | 60 |
| Asphalt | 0.15 | Heavy | 1 | 40 |
| Asphalt | 0.15 | Very Heavy | 0 | 20 |
| Asphalt | 0.15 | Unusable | - | - |
| Concrete | 0.15 | None | 4 | 100 |
| Concrete | 0.15 | Light | 3 | 80 |
| Concrete | 0.15 | Medium | 2 | 60 |
| Concrete | 0.15 | Heavy | 1 | 40 |
| Concrete | 0.15 | Very Heavy | 0 | 20 |
| Concrete | 0.15 | Unusable | - | - |
| Gravel | 0.15 | None | 4 | 100 |
| Gravel | 0.15 | Light | 3 | 80 |
| Gravel | 0.15 | Medium | 2 | 60 |
| Gravel | 0.15 | Heavy | 1 | 40 |
| Gravel | 0.15 | Very Heavy | 0 | 20 |
| Gravel | 0.15 | Unusable | - | - |
| Grass | 0.15 | None | 4 | 100 |
| Grass | 0.15 | Light | 3 | 80 |
| Grass | 0.15 | Medium | 2 | 60 |
| Grass | 0.15 | Heavy | 1 | 40 |
| Grass | 0.15 | Very Heavy | 0 | 20 |
| Grass | 0.15 | Unusable | - | - |



ENCN 09111400 09L **3/3/2** 25/50/50 05/05/02 DRY SNOW/WET
 SNOW/WET SNOW 30.
 DRIFTING SNOW. RWY 09L CHEMICALLY TREATED. TWY B
 POOR



Thank you