THE RUNWAY CONSTRUCTION

1. Introduction

A runway is a rectangular area of an aerodrome prepared for the landing and take-off of aircraft.

The runway is the most critical part of an airfield. An accident on a runway will affect the airport availability and any accident on a runway generally causes several reasons of damage and injuries in the real life.

2. Runway characteristics

A runway shall be characterized by the following parameters:

- Runway orientation
- Runway length and width
- Runway surface type
- Runway sections
- Runway strength

2.1. Runway orientation

Runways are named by a number between 01 and 36, which is generally the magnetic azimuth of the runway's heading in multiple of 10 degrees.

A runway numbered 09 points east (90°), runway 18 is south (180°), runway 27 points west (270°) and runway 36 points to the north (360° rather than 0°).

If there is more than one runway pointing in the same direction (parallel runways), each runway is identified by appending Left (L), Centre (C) and Right (R) to the number to identify its position (when facing its direction).

However, runways in North America that lie within the Northern Domestic Airspace of Canada are numbered relative to true north because proximity to the magnetic North Pole makes the magnetic declination large.

2.2. Runway sections

A runway can have different sections that can be used by aircraft for taxi, landing or taking-off operation.

The normal used portion of the runway is from threshold to opposite threshold, but does not include overrun, blast pad or stop way areas at both ends.

Example of a runway with number 09 R

2.2.1. Stop way or blast pad

Blast pad, overrun areas or stop ways are often constructed just before the start of a runway where jet blast produced by large planes during the take-off roll could otherwise erode the ground and eventually damage the runway.

Overrun areas are also constructed at the end of runways as emergency space to slowly stop planes that overrun the runway on a landing gone wrong, or to slowly stop a plane on a rejected take-off or a take-off gone wrong. Blast pads are often not as strong as the main paved surface of the runway and are marked with yellow chevrons.

Planes are not allowed to taxi, take-off or land on blast pads, except in an emergency.

2.2.2. Displaced threshold

A displaced threshold exists because obstacles just before the runway, runway strength, or noise restrictions may make the beginning section of the runway unsuitable for landings.

It is marked with white paint arrows that lead up to the beginning of the landing portion of the runway.

Displaced thresholds may be used for taxiing, take-off, and landing rollout, but not for touchdown and landing operations.

2.2.3. Runway closed

When a runway is closed, there is a permanent or temporary cross on the runway.

If you see a cross on the runway or in the charts, this runway is closed and it is forbidden to land on a closed runway (except for emergency purposes).

2.3. Surface types

The choice of material used to construct the runway depends on the use and the local ground conditions.

In the biggest airport, you will find long hard surface type runways (asphalt and concrete). In the smallest airport, you can find only a soft surface type runway (grass and gravel).

The most common surface types are.

- ASP Asphalt
- BIT Bituminous Asphalt or Tarmac
- BRI Bricks (no longer in use, covered with Asphalt or Concrete now)
- CLA Clay
- COM Composite
- CON Concrete
- COP Composite
- COR Coral (Coral reef structures)
- GRE Graded or rolled earth, Grass on graded earth
- GRS Grass or earth not graded or rolled
- GVL Gravel
- ICE Ice
- LAT Laterite
- MAC Macadam
- PEM Partially Concrete, Asphalt or Bitumen-bound Macadam
- PER Permanent Surface, Details unknown
- PSP Marsden Matting (Derived from Pierced/Perforated Steel Planking)
- SAN Sand
- SMT Summerfield Tracking
- SNO Snow
- U Unknown surface

Water runways do not have a type code as they do not have physical markings, and are thus not registered as specific runways.

3. Runway length

The runway length is generally:

- 500 to 1000 meters long and 25-45 meters wide for small airfields
- 2000 to 4200 meters long and 45-60 meters wide for the larger airfields

You can find normalized distances on charts.

3.1. TORA = Take Off Run Available

TORA is the length of runway declared available and suitable for the ground run of an airplane taking off. This means the maximum run distance for an aircraft during a take-off.

3.2. RESA = Runway End Safety Area

RESA is the length of the stop way.

3.3. CWY = Clearway

A clearway is an area beyond the paved runway, free of obstructions and under the control of the airport authorities. The length of the clearway may be included in the length of the take-off distance available (TODA).

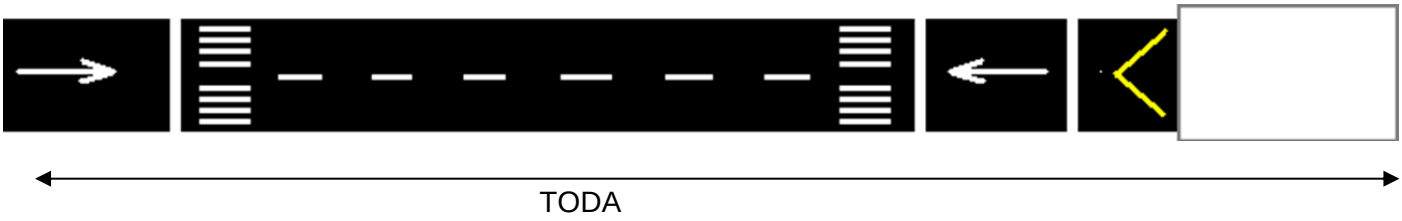
3.4. TODA = Take Off Distance Available

TODA is the length of the take-off run available plus the length of the clearway and stop band, if clearway or stop band is provided.

This distance is the take-off distance for an aircraft to reach the minimum 50ft.

Clearway is an area beyond the paved runway, free of obstructions. Clearway allows large airplanes to take off at a heavier weight than would be allowed if only the length of the paved runway is taken into account.

TODA = TORA + RESA + CWY



3.5. ASDA = Accelerate-Stop Distance Available

ASDA is the length of the take-off run available plus the length of the stop way, if stop way is provided

ASDA = TORA + RESA

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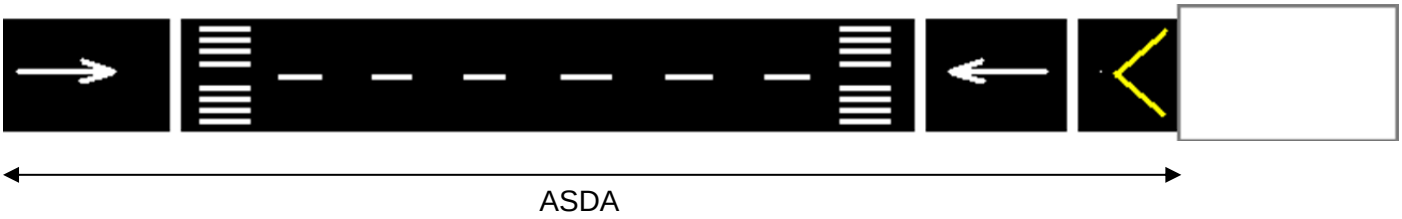
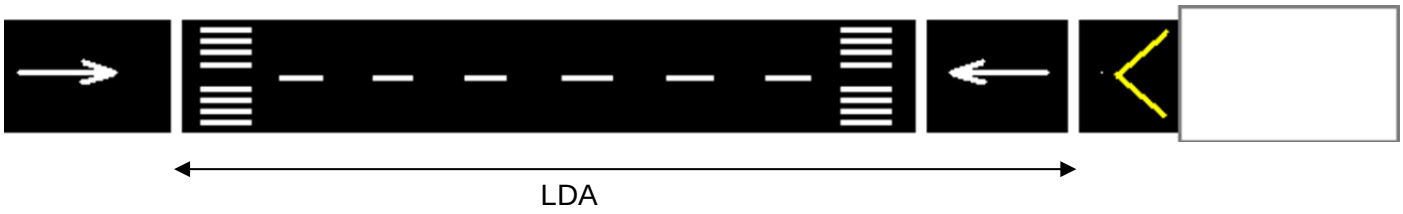


ASDA is the maximum run distance for an aircraft when performing a rejected take-off.

3.5.1. LDA = Landing Distance Available

LDA is the length of runway that is declared available and suitable for the ground run of an airplane landing.



LDA never includes runway section before displaced threshold before touchdown point.

3.5.2. EDA = Emergency Distance Available

EDA is the maximum length of runway available for an emergency landing.

EDA=LDA+RESA