SAFETY INFORMATION 11/2024

1st June 2024

UNDERSTANDING TURBULENCE RISKS IN AVIATION AND ENSURING PASSENGER SAFETY

1 Purpose

1.1 This Safety Information (SI) aims to remind all aircraft operators, air traffic controllers and aerodrome operators of the need for heightened vigilance and enhanced safety measures in order to prevent injuries caused by turbulence.

2 Background

2.1 Turbulence in aviation poses various risks, including potential harm to passengers and crew, aircraft structural damage, and operational disruptions. Ensuring passenger safety amidst these challenges is paramount for airlines and regulatory bodies.

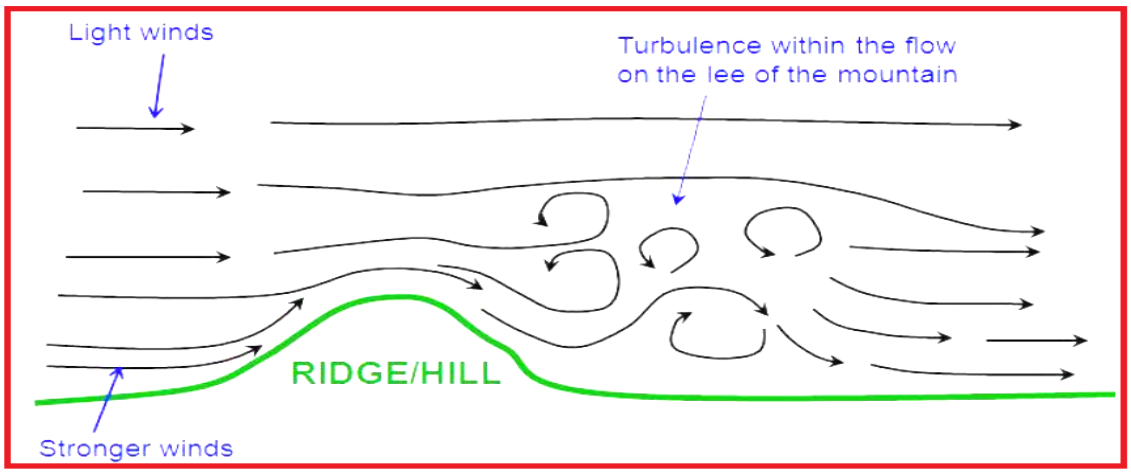
2.2 Turbulence refers to irregular and unpredictable air movements that can affect the stability, control, and comfort of an aircraft during flight.

a) Types of turbulence

1) Thunderstorm Turbulence: Turbulence associated within and in the vicinity of thunderstorms or cumulonimbus clouds. A cumulonimbus cloud with hanging protuberances is usually indicative of severe turbulence.

2) Clear Air Turbulence (CAT): High level turbulence (above 15000 ft) not normally associated with cumuliform cloudiness, typically wind-shear turbulence even when in cirrus clouds.

3) Mountain Wave Turbulence: Turbulence because of air being blown over a mountain range or a sharp bluff causing a series of updrafts and downdrafts.



2.3 The International Civil Aviation Organization (ICAO) provides definitions and classifications of turbulence to help pilots, air traffic controllers, and aviation meteorologists understand its nature and intensity. Turbulence can be categorized based on its origin, such as thermal, mechanical, or mountain wave turbulence, and its intensity, such as light, moderate, severe, or extreme.

2.4 **Significant Meteorological Information (SIGMET)** information from weather offices provides a short, clear description about potential weather hazards for aircraft safety and how these hazards are developing.

a) SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

b) Validity of a SIGMET message shall be not more than 4 hours.

c) SIGMET messages for volcanic ash cloud and tropical cyclones, the period of validity shall be extended up to 6 hours.

2.5 **Airmen's Meteorological Information (AIRMET)** info is provided by weather offices based on regional agreements, focusing on areas below flight level 100 where there's significant air traffic. It offers brief, clear details about specific weather events not covered in certain forecasts that could impact low-level flight safety and how these events are evolving.

a) AIRMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

b) The period of validity of an AIRMET message shall be not more than 4 hours.

2.6 Statistics show that turbulence accounted for more than a third of such aircraft accidents from 2009 to 2018, according to a report from the National Transportation Safety Board (NTSB). Most of those accidents resulted in one or more serious injuries but no aircraft damage. However, there have been 146 passengers and crew seriously injured by turbulence from 2009 till date.

2.7 As per ICAO safety report 2023, the total number of accidents related to turbulence represented more than half of total accidents in 2022.

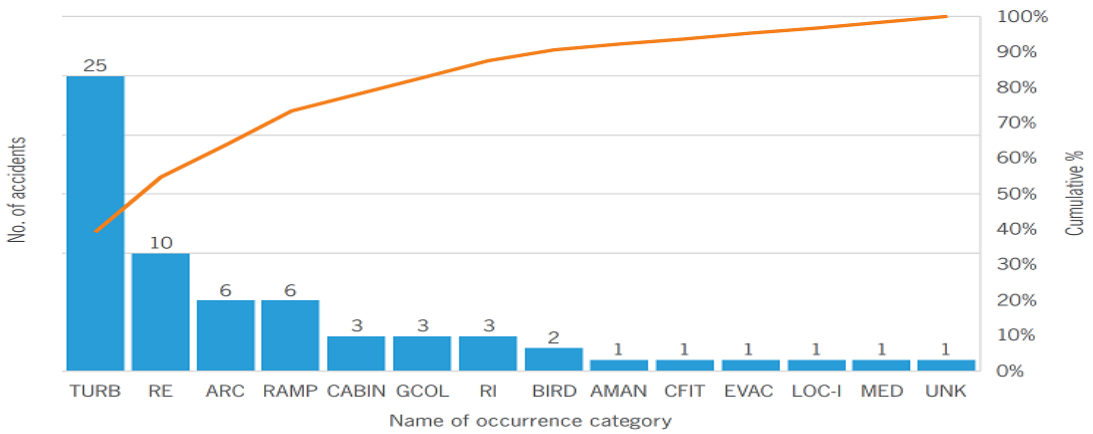


Chart 8. | Total accidents by occurrence category in 2022

3 Recommended Actions

3.1 All aircraft operators, air traffic controllers and aerodrome operators are reminded to:

a) Provide all information about your flight conditions.

1) Notify air traffic controller of turbulence encountered when transferred or transitioned to a new duty controller.

2) Inform the respective company via Aircraft Communication Addressing and Reporting System (ACARS) or dispatch frequency so that following flights/ aircrafts will be aware of the flight conditions or be prepared to plan for another route.

3) Inform other aircrafts operating in the area on a common frequency.

b) When provided with the information of turbulent flight conditions.

1) Prior to departure, always seek alternate routing to avoid the affected areas or delay departure until conditions improve.

2) Change en-route altitudes or routes to avoid turbulence.

3) Reduce/Select the aircraft speed to the manufacturer's recommended turbulence penetration speed as per Flight Crew Training/Techniques Manual (FCTM).

4) Prior or during the descent, always seek alternate routing to avoid the affected areas or, if severity dictates, hold or divert to alternate.

5) Attempt to evade convective activity (cumulonimbus clouds) en-route.

6) Use the weather radar to detect and avoid convective weather.

3.2 Additionally, **efficient communication between the cockpit and the cabin is key**. If flight into forecast turbulence is unavoidable, providing timely notifications to the cabin crew is crucial for their safety and the safety of the passengers on board.

a) Captain to **brief** the cabin crew either prior to the flight or in-flight via the interphone.

b) Provide sufficient **warning** to seat the passengers and for the cabin crew to perform their duties.

c) Sudden, unexpected or imminent turbulence requiring **immediate action** to protect cabin crew and passengers.

3.3 The Civil Aviation Authority of Malaysia (CAAM) reminds all operators that reporting occurrences is of paramount importance in the aviation industry as it helps to identify potential hazards, reduce risks, and improve safety standards and its passengers.

3.4 All aviation stakeholders can make both Mandatory Occurrence Reporting (MOR) and Voluntary Occurrence Reporting (VOR) through CAAM Aviation Reporting System (CAReS).

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for Civil Aviation Authority of Malaysia
1 June 2024