EASA
European Union Aviation Safety Agency

# ANNUAL SAFETY REVIEW 2025

Safety Management, Sustainability &
Global Outreach Directorate

Safety Intelligence & Performance Department

EASA
European Union Aviation Safety Agency

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# Annual Safety Review 2025

Safety Management, Sustainability & Global Outreach Directorate

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# Foreword

Aviation safety is built on a long history of learning from accidents. Proactive Safety Management Systems have made the industry safer through effective risk management. However the accidents since the end of 2024 remind us of the need to do everything in our power to keep passengers and crew members safe whenever they take to the skies.

The EASA team, our colleagues in the Member States and industry stakeholders work relentlessly to identify and manage the safety risks to the aviation system. In addition to reactive learning from accidents and serious incidents, the Agency collects and analyses a vast amount of data to enable us to better anticipate new and emerging risks. We are continuously expanding our safety intelligence capabilities by improving and optimising the available dataset, integrating new data sources and relevant information to help our decision making.

Our ability to process this increasing volume of data and information and turn it into meaningful intelligence for the whole industry is becoming more important. EASA has partnered with national aviation authorities, operators, airports, ATM organisations and staff representatives to invest in a Big Data programme known as 'Data4Safety'. This is boosting our ability to fuse multiple data sources together and generate new insights to support our decision making. To highlight one example: we can cross-correlate cybersecurity and safety events, so as to better understand complex risks that span different operational domains. This gives us insights on how to manage multifaceted risk in a challenging and unstable geopolitical environment.

This edition of the EASA Annual Safety Review (ASR) provides an analysis of the general safety situation of the EU civil aviation system in 2024 and compares it to previous years. In 2024, the industry has seen a further increase in the number of flights, continuing the upward trend since the recovery from the COVID-19 pandemic. In the EU, there were more than 7 000 commercial aeroplanes in operation for the first time since 2019, operated by 623 AOC holders conducting over 7.7 million flights.

In 2024, Europe saw three fatal accidents leading to three fatalities. This is its highest number of fatal accidents in recent years. Outside of Europe, there were 11 fatal accidents with a total of 301 fatalities.

The ASR gives an insight into key statistics on accidents and serious incidents, and trends over the past 10 years, and covers all areas of aviation, from commercial airline operations to general aviation and rotorcraft, from gliders to balloons and even drones. It provides further domain-specific analysis into these accidents and serious incidents and a description of the relative safety risks per type of operation and domain. This is derived by applying a risk classification to each event and extrapolating this to assess the maximum severity of each occurrence and its likelihood. While this methodology is still quite new, and for now only a limited set of data is available, it already offers pointers to the higher key risk areas in a domain.

If you are reading this as a member of the travelling public, I hope the report provides an interesting insight into the level of safety and where we see the main risks, and also reassures you of our dedication to maintain a high level of safety. If you are involved in the industry in any way, I encourage you to read the ASR and ask yourself how it compares with your own risk picture, so you can best play your part in keeping our industry safe.

Florian Guillermet

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# Introduction

## ANNUAL SAFETY REVIEW 2025

EASA would like to welcome you to the 2025 edition of the EASA Annual Safety Review (ASR)[1]. This review provides aviation safety statistics for Europe in 2024, a comparison with the past, and an analysis of the general safety situation.

To that end, the ASR provides both a statistical summary of aviation safety in the EASA Member States and an identification of the most important safety challenges faced by EU aviation today, outlining the safety risks per aviation and operational domain.

The ASR also serves as the data-driven input to the European Safety Risk Management (SRM) process by identifying potential new safety issues and/or increased safety risks, which are then further assessed using the expertise and experience of EASA Member States and the aviation industry (via the Network of aviation safety analysts (NoA) and Collaborative Analysis Groups (CAGs)), and feeding the European Plan for Aviation Safety (EPAS).

# How the safety review is produced

## Information sources

The data presented in the ASR are based on the occurrences collected up to April 2025 by the Agency under Regulation (EU) 996/2010 on accident and serious incident investigation, and under Regulation (EU) 376/2014 on occurrence reporting, analysis, and follow-up, and complemented through the active search of those events from other official sources. This data collection enables the analysis of two specific data sources:

- **EASA's occurrence database:** The main source of data is the Agency's own database, which covers occurrences and other safety-related information reported to the Agency in its role as the competent authority, and accidents and serious incidents notified to the Agency by Safety Investigation Authorities worldwide. This is augmented by information collected by the Agency from other sources.
- **European Central Repository:** The European Central Repository (ECR) is the central database of all occurrences and other safety-related information reported to the competent authorities in accordance with Regulation (EU) 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation.

The figures and analyses presented in the ASR may differ from safety reports prepared by other organisations and regulators, which is due to differences in collection methods, the definitions of the data collected and the subsequent analyses. It is important to identify and understand these differences when comparing safety reports and to keep in mind that each report has its own merits.

Unless otherwise specified, and unlike past editions of the ASR, the data presented for the domain-specific chapters are solely based on the accidents collected in the EASA's occurrence database. Only the chapters on complex aeroplanes involved in commercial air transport, helicopters, and Unmanned Aircraft Systems (UAS) provide data that include serious incidents. The data presented in the Chapter 9 on occurrence reporting and risk classification are based on all classes of occurrences collected in the ECR. For this chapter, the values 'significant incident', 'major incident', 'occurrence with no flight intended' and 'observation' of the occurrence class attribute were consolidated into 'incident'.

1 Publication of the Annual Safety Review is mandated by Article 72(7) of REGULATION (EU) 2018/1139 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency.

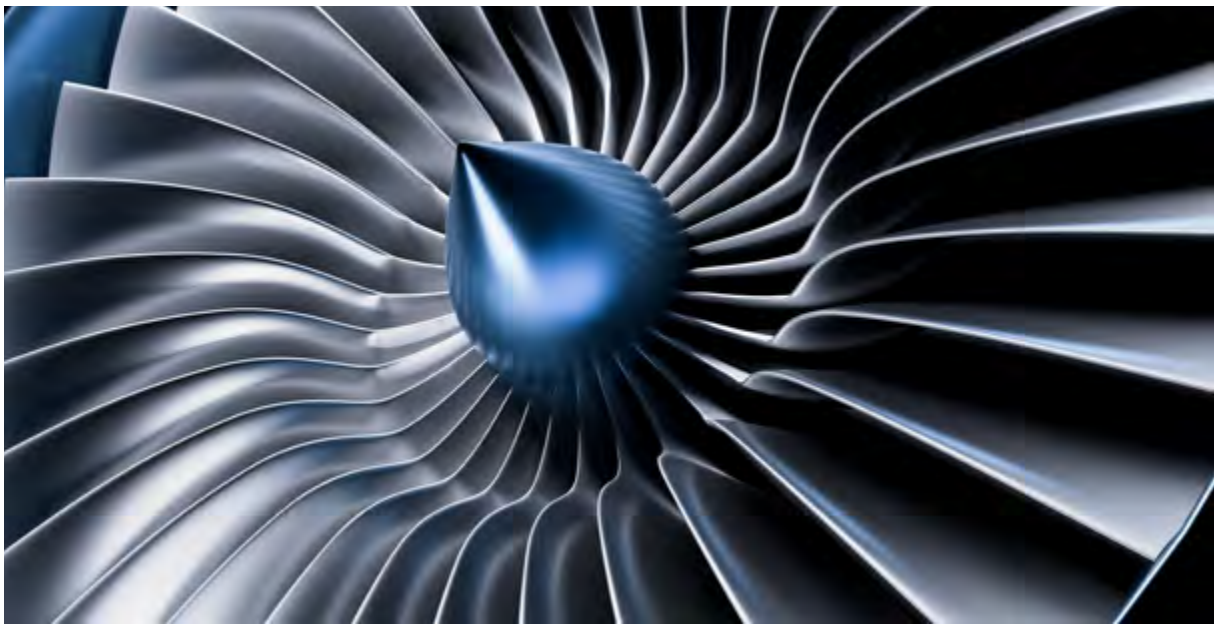
## European Risk Classification Scheme (ERCS)

Regulation (EU) 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation introduced the requirement for a common risk classification of occurrences at the national and EASA levels. As a result, the ERCS was developed to measure the risk using a 2-dimensional matrix. The ERCS is part of the legal framework of Regulation (EU) 376/2014, through a Commission Delegated Regulation[2] issued in 2020 and later a Commission Implementing Regulation[3], issued in 2021. The application of the ERCS is mandatory since January 1, 2023.

Within the ERCS safety risk matrix, the severity is addressed by identifying the worst likely accident outcome that would have occurred if the occurrence being scored had escalated into an accident, which considers both the size of the aircraft involved and the most likely type of accident. Secondly, the probability is measured, by looking at how close the occurrence was to that worst likely accident outcome, based on a weighted barrier model.

For the 2025 edition, where the presented data make use of the ERCS, the ASR solely relies on the risk classification performed by the competent authorities in 2023 and 2024, and includes all classes of occurrences.

The ERCS provides an additional, useful insight because the classification of occurrences into accidents, serious incidents, or incidents does not necessarily provide an accurate picture of the risk of those occurrences. For example, a very close near mid- air collision would be classified as a serious incident, while a collision between a ground handling vehicle and an aircraft leading to substantial damage to the latter would be classified as an accident. In terms of risk, the serious incident in this example would be of a higher risk category than that of the accident. In addition, the combination of probability and severity would differ significantly. For each domain, an analysis using ERCS-applied occurrence data provides an overview of the risks that were present during the analysed period; however, it does not predict the future risks, which will change due to changing circumstances and the remedial effects of safety mitigating actions.



2 COMMISSION DELEGATED REGULATION (EU) 2020/2034 of 6 October 2020 supplementing Regulation (EU) No 376/2014 of the European Parliament and of the Council as regards the common European risk classification scheme.

3 COMMISSION IMPLEMENTING REGULATION (EU) 2021/2082 of 26 November 2021 laying down the arrangements for the implementation of Regulation (EU) No 376/2014 of the European Parliament and of the Council as regards the common European risk classification scheme.

# Chapter overview

This document is split into nine chapters. Chapters 2 to 8 cover one operational domain within the European aviation system. Unless otherwise specified, the scope of each domain in Chapters 2 to 6 is the EASA Member State, either as the state of operator or the state of registry. For the Aerodromes and Ground Handling and Air Traffic Management and Air Navigation Services (ATM/ANS) chapters, the scope is the EASA Member State as the state of occurrence. Chapter 9 reviews the reporting rates and risk classification in the ECR, and Chapter 10 provides an overview of EASA's monitoring of the Member State's oversight capabilities.

The chapters of this ASR cover the following areas:

**Chapter 1 – Safety overview**

- Review of global airline safety: This provides a review of global safety for large commercial air transport aeroplanes.
- Cross-domain safety overview of EASA Member State: This provides an overview of the most important statistics across all the different operational domains. It helps to identify which domains are likely to need the greatest focus in the EPAS.

**Chapter 2 – Aeroplanes**

- Commercial air transport complex aeroplanes: This covers all commercial air transport operations (passenger and cargo) involving aeroplanes with a maximum certificated take-off mass exceeding 5 700 kg, or aeroplanes equipped with turbofan engine(s) or more than one turboprop engine (e.g., airline, air taxi, air ambulance).
- Commercial air transport other than complex aeroplanes: This covers all commercial air transport operations (passenger and cargo) involving aeroplanes other than complex aeroplanes (e.g., airline, air taxi, air ambulance, sightseeing).
- Non-commercial operations complex aeroplanes: This covers non-commercial operations involving aeroplanes with a maximum certificated take-off mass exceeding 5 700 kg, or aeroplanes equipped with turbofan engine(s) or more than one turboprop engine (e.g., business, demonstration, flight training/instructional, relocation).
- Specialised operations: This covers all aerial work/Part SPO operations involving aeroplanes and includes a wide range of different operational activities (e.g., agriculture, aerial advertisement, or photography operations) conducted by EASA Member State registered aeroplanes or EASA Member State Air Operator Certificate (AOC) Aeroplanes holders.
- Non-commercial operations other than complex aeroplanes: This covers all non-commercial operations involving other than complex aeroplanes and includes analysis of leisure flights as well as flight training and other general aviation activities. Additional information regarding microlights and aircraft registered in third countries has also been included.

**Chapter 3 – Helicopters**

- All helicopter operations: This covers an analysis of all EASA-certified or validated helicopter operations, except for Nationally Regulated Operations (NRO).
- Commercial air transport: This covers all commercial air transport operations involving EASA-certified or validated helicopters such as Helicopter Emergency Medical Service (HEMS), air taxi or sightseeing, as well as flights to offshore oil, gas and renewable energy installations.

- Specialised operations: This covers all aerial work/Part SPO operations involving EASA-certified or validated helicopters such as sling load, advertisement, or photography with an EASA Member State as the state of operator or state of registry.
- Non-commercial operations: This covers all non-commercial operations involving EASA-certified or validated helicopters with an EASA MS as state of operator or state of registry. Training flights are included within the non-commercial operations definition.

**Chapter 4 – Balloons**

This chapter covers all operations involving hot air balloons.

**Chapter 5 – Sailplanes**

This chapter covers all operations involving sailplanes.

**Chapter 6 – Unmanned Aircraft Systems (UAS)**

This chapter covers operations involving UAS within the EASA Member States; therefore, the scope for this chapter is EASA Member State as the state of occurrence. This chapter covers both accidents and serious incidents to give continuity with last year.

**Chapter 7 – Aerodromes and ground handling**

This chapter covers aerodrome and ground handling operations that occur in the EASA Member States; therefore, the scope for this chapter is EASA Member State as the state of occurrence. Notably, the ASR covers also occurrences at aerodromes outside of the scope of Regulation (EU) 2018/1139 (the EASA Basic Regulation) and includes also accidents at locations to which Regulation (EC) No 1008/2008 of the European Parliament and of the Council apply[4].

**Chapter 8 – Air Traffic Management/Air Navigation Services (ATM/ANS)**

This chapter covers ATM/ANS occurrences within the EASA Member States; therefore, the scope of the chapter is EASA Member State as the state of occurrence.

**Chapter 9 – ECR reporting and risk classification**

This chapter reviews the reporting rates in the ECR over 2016-2024, and ERCS level of completion for 2023 and 2024.

**Chapter 10 – Standardisation**

This chapter provides an overview of EASA's standardisation activities which entail assessing the National Competent Authorities' (NCAs) ability to discharge their safety oversight responsibilities on a continuous basis, as well as verifying the implementation of the rules. It provides a summary of information about the application by each Member State of the EASA Basic Regulation and of the delegated and implementing acts adopted on the basis thereof[5].

4 See Art. 4.6(e) and (g) of Regulation (EU) 376/2014 on occurrence reporting, follow-up, and analysis, regarding the persons who perform a function connected with the safety management of an airport or a person who performs a function connected with the ground handling of aircraft, including fuelling, load-sheet preparation, loading, de-icing and towing at an airport covered by Regulation (EC) No 1008/2008 of the European Parliament and of the Council of 24 September 2008 on common rules for the operation of air services in the Community.

5 Article 85, paragraph 7 of Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency.

# Typical structure for each domain-specific chapter

Each of the domain chapters in this ASR contains specific information that is useful in understanding the analysis of that domain. The structures of the chapters, as described below, are as similar as possible across the domain chapters to afford the ability to compare information in each domain.

- **Key statistics:** Every chapter begins with a set of key statistics that provide information on the Tier 1 Safety Performance Indicators (SPIs) for that domain, which includes details on the number of fatal accidents, non-fatal accidents and serious incidents (if applicable). The key statistics part also outlines the number of fatalities and serious injuries in the domain. In all cases, the figures for 2024 are followed by a comparison with the annual averages over the past 10 years that helps to provide a reference on how this year's performance relates to historical trends; this information is also provided in a graphical format. The key statistics are then complemented with a figure outlining the occurrence categories[6] assigned to the accidents and serious incidents (if applicable) in the past five years.
- **Domain-specific analysis:** As every domain is different, a further analysis of useful domain-specific information is included; for example, within the areas of special operations it is considered useful to provide information on the type of operation involved in safety events, while some chapters include an analysis of the type of propulsion.
- **Safety risks:** Each domain-specific chapter ends with a description of the safety risks, that have been identified from the risk classification of the occurrences collected in the European Central Repository (ECR). It outlines per type of operation the relative safety risk level and frequency of each key risk area (KRA). The KRA is the most likely type of accident that would have resulted if an occurrence had escalated into an accident. It is one element of the European Risk Classification Scheme (ERCS). In terms of safety performance, they are the Tier 2 safety performance indicators for the domain. The KRAs are prioritised based on their aggregated risk contribution using the ERCS, as applied by the competent authorities from 2023 onwards in accordance with the Commission Implementing Regulation (EU) 2021/2082. The timespan of the 2025 edition is, therefore, limited to two years (i.e., 2023, the first year of ERCS implementation, and 2024) and will be expanded on a yearly basis until a five-year timespan is achieved. The frequency of occurrences and the related aggregated ERCS numerical equivalent scores are determined per KRA, considering accidents, serious incidents and incidents, where the KRA and the ERCS safety risk score have been completed by the competent authority. An ERCS completion rate per domain and operation type as necessary, complements therefore the presented data for the contextualisation.

6 In accordance with the ICAO Accident/Incident Data Reporting (ADREP) taxonomy. Each category has a unique name and identifier to permit common, a text definition, and usage notes to clarify the category and aid in coding occurrences.

# The link with the European Plan for Aviation Safety (EPAS)

The EPAS constitutes the Regional Aviation Safety Plan (RASP) for EASA Member States in the ICAO EUR region and sets out the strategic safety priorities and objectives for the European aviation system, presents the main risk affecting that system and defines the necessary actions to mitigate those risks, to further improve aviation safety in Europe. The plan is prepared by EASA, in close collaboration with Member States and relevant stakeholders. More information on the EPAS can be found on the EASA website: https://www.easa.europa.eu/easa-and-you/safety-management/european-plan-aviation-safety. The EPAS looks at aviation safety in a systemic manner, in which the main risks and their mitigation actions are identified through the European SRM process

## The European SRM Process

The European SRM is defined in five specific steps as described below:


**Identification of safety issues:** The identification of safety issues is the first step in the SRM process and is performed by the analysis of occurrence data and other safety-related information. EASA may be supported in this analysis by the Network of Analysts (NoA) and Collaborative Analysis Groups (CAGs). Once a candidate safety issue is identified it will be formally captured by the Agency and subject to a preliminary risk assessment; this assessment then informs the decision on whether a candidate safety issue poses a main safety risk as per Art. 6 of Regulation (EU) 2018/1139; if that is the case it will be included within the relevant safety risk portfolio and listed in Volume III of the EPAS. The outputs of this step in the process are the domain safety risk portfolios. Within the portfolios, both the key risk areas and safety issues are prioritised.

**Assessment of safety issues:** The safety issues assessed as posing the highest risk to aviation safety are subject to a more detailed Safety Issue Assessment (SIA). The assessment process is led by EASA and is supported by the NoA and the CAGs. The SIA proposes potential mitigating actions.

**Definition and programming of safety actions:** The impacts of the proposed mitigation actions will be assessed with the aim of identifying the best option(s) to mitigate. The SIA and the assessment of the impacts of the proposed actions are documented in the Best Intervention Strategy (BIS) document. The best intervention strategy informs the decision whether and which mitigation action(s) to take. In this process EASA consults the draft BIS with the EASA advisory bodies. In consideration of their feedback EASA takes a decision on which mitigation action shall be taken. Once the resources required to implement the action are secured, these actions are then included in the next edition of the EPAS. Other actions decided by EASA may only be programmed in subsequent editions of the EPAS. The EPAS is adopted by the EASA Management Board, and it is updated at least on a yearly basis.

Sometimes actions that are low-cost or require more rapid intervention are taken immediately and are not subject to a wider planning exercise. Naturally, these are not included within EPAS. Such actions could include the publication of a Safety Information Bulletin (SIB) or take the form of immediate Safety Promotion activities.

**Implementation and follow-up:** The next step in the process involves the implementation and follow-up of the actions that have been planned in the EPAS. There are different types of actions within the EPAS, including research tasks, rulemaking, implementation support (to new or major amendment to existing Regulations), Member State tasks, safety promotion, and evaluation.

**Safety performance measurement:** The final stage in the process is the measurement of safety performance; this serves two purposes. Firstly, to monitor the changes that have resulted from the implementation of safety actions. Secondly, it also serves to monitor the aviation system so that new safety issues can be identified. To ensure that there is a systematic approach to the work in this step of the SRM process, a Safety Performance Framework (SPF) has been developed that identifies different tiers of SPIs. Tier 1 transversally monitors all the domains and the overview of the performance in each domain. Tier 2 covers the KRAs at domain level, while Tier 2+ monitors the safety issues. The ASR is the annual review of the SPF and identifies safety trends and highlights priority domains, KRAs and safety issues. From this step, the SRM process begins again.

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Chapter 1

# Safety overview

ANNUAL SAFETY REVIEW 2025

# Global airline fatal accidents

This section covers large aeroplane passenger and cargo operations worldwide[7].

Figure 1.1 shows the number of global fatal accidents and fatalities, and identify how many of those involved EASA Member State operators.

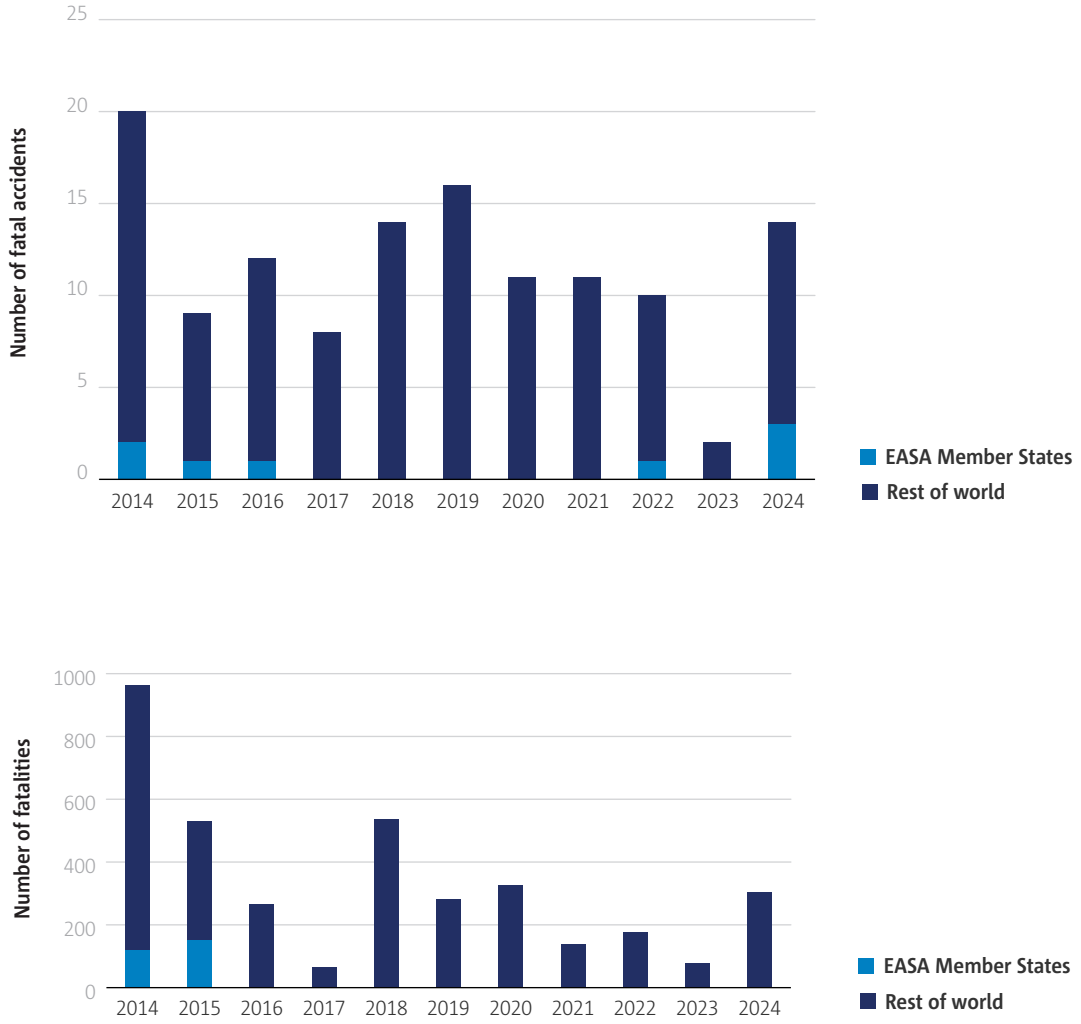



**Figure 1.1** Fatal accidents and fatalities involving large aeroplane passenger and cargo operations, EASA Member States and the rest of the world

7 Large aeroplane commercial air transport, is defined as aircraft with a maximum take-off mass (MTOM) above 5 700 kg, carrying passengers or cargo. Under EASA regulations, commercial air transport includes all flights carrying passengers or cargo for remuneration or hire.

The number of fatal accidents worldwide stabilised between 2020 and 2022 around the number of 10, while 2023 saw only two commercial large aeroplanes' accidents worldwide, the lowest number of the decade. In 2024, however, the number of fatal accidents rose again to the level of the pre-COVID-19 pandemic, with a total of 14 fatal accidents. Of these 14 fatal accidents, three involved EASA Member State operators, namely:

- A person was sucked up into a running engine of an Embraer ERJ190 at Schiphol Airport in Netherlands, reported suicide of an airport employee, on May 29, commercial air transport of passengers, one fatality.
- A Boeing B737-400 freighter impacted the ground short of runway on approach to Vilnius International Airport in Lithuania, on November 25, commercial air transport of cargo, one fatality.
- Smoke entered the passenger cabin and cockpit area of an Airbus A220-300, followed by an immediate diversion to Graz Airport in Austria, and emergency evacuation, on December 23, commercial air transport of passengers, one fatality.

Despite the third highest number of fatal accidents in the last decade, the number of fatalities in 2024 remained in the medium range of the same period in time, with a total of 304 fatalities. Three accidents (none of which involved an EASA Member State operator) accounted for most of the total number of fatalities (279 out of 304) namely:

- An ATR72 crashed into the ground near Sao Paulo in Brazil after encountering icing conditions in cruise flight and subsequent loss of control, on August 09, commercial air transport of passengers, 62 fatalities.
- An Embraer ERJ190 crashed near Aktau Airport in Kazakhstan after having declared an emergency, suspected physical and technical external interference, on December 25, commercial air transport of passengers, 38 fatalities.
- A Boeing B737-800 belly-landed without its landing gear deployed, overran the runway at high speed, and crashed into a berm encasing a concrete structure that supported an antenna array for the instrument landing system (ILS) and thereafter bursting into flames, at Muan International Airport in South Korea, on December 29, commercial air transport of passengers, 179 fatalities.

In 2024, there were three fatalities involving an EASA Member State operator, including one reported suicide. Over the previous years, this number has fluctuated between none and two per year since the two major fatal accidents that occurred in 2014 and 2015.

For the context of these figures, it is to be noted that after two years of severe traffic reductions in 2020 and 2021 the aviation industry in Europe experienced a strong recovery in terms of traffic since summer 2022 but did not recover fully the level of pre-COVID-19 pandemic traffic yet. Indeed, the overall passenger traffic for the full year of 2024 was at 96% of the 2019 level for the European region. The statistics indicate that there has been again a substantial recovery in 2024, particularly for the States located in Southern Europe. The resilience of demand for air transport is evident despite various challenges such as inflationary pressures and higher airfares.

Figure 1.2 shows the portion of fatalities resulting from unlawful acts and involving large aeroplane passenger and cargo operations worldwide. The definition of an accident, set out in EU law[8] and in Annex 13 to the Convention on International Civil Aviation (Chicago Convention), excludes unlawful acts (such as stowaway, hijacking, bombs, shot down, etc.). They have however often been investigated by safety investigation authorities and are therefore presented here. Whereas accidents have reduced markedly since 1970 and then more slowly in

8 Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC

recent years, fatalities related to unlawful acts have re-emerged since 2014. When focusing on the period 2014-2024, the fatalities caused by unlawful acts represent a fifth of the total number of fatalities. Although there has been an improvement over the last three years, with no civil aviation accidents caused by unlawful acts, the crash of the Embraer ERJ190 in Kazakhstan in December 2024 is a tragic reminder.

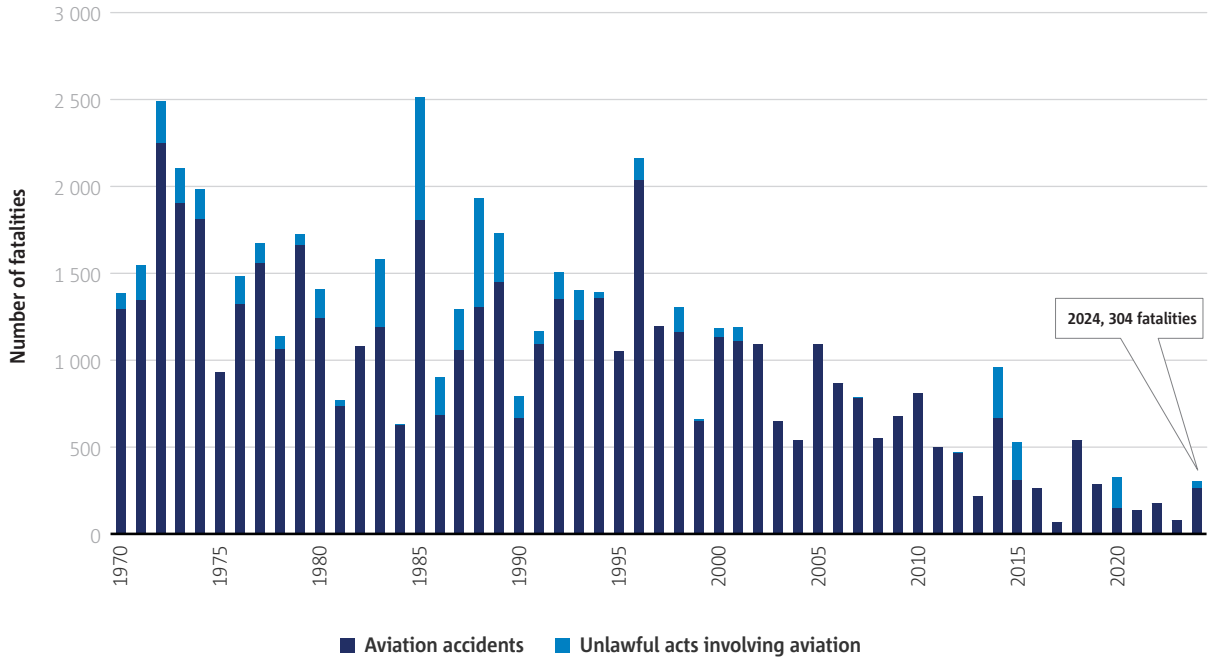



**Figure 1.2** Fatalities involving large aeroplane passenger and cargo operations worldwide

Based on the information from accident reports and from preliminary information where the investigations are ongoing, the fatal accidents between 2020 and 2024 had the following characteristics:

- The most common underlying cause of these accidents is associated to flight crews' errors or confusion and/or flight crews' management of challenging circumstances created by technical failures or poor weather conditions, including heavy rains and thunderstorms, during approach.
- Aircraft upset, runway excursion and terrain collision remain as the most common accident outcomes.
- The design of safe and effective human-machine interfaces remains a challenge and although progress continues to be made in this area, many aircraft continue to operate with older designs that do not take account of lessons learned from previous accidents.
- Cargo accidents continue to be slightly disproportionately represented in fatal accidents, at approximately 30% of the accidents over the past five years.

# EASA Member States cross domain safety overview

The numbers of fatal accidents and fatalities for 2024, and the preceding ten years (2014-2023), are collected and summarised here from the different chapters, in order to provide a cross-domain safety overview.

In almost all domains, the number of fatal accidents and fatalities was close to the minimum of the preceding decade. The exceptions to this are the complex aeroplanes commercial air transport operations and the helicopters non-commercial operations, as identified in Table 1.1.

| AIRCRAFT DOMAIN | FATAL ACCIDENTS 2024 | FATAL ACCIDENTS 2014-2023 MIN - MAX | FATALITIES 2024 | FATALITIES 2014-2023 MIN - MAX | FATALITIES 2014-2023 MEDIAN |
|---|---|---|---|---|---|
| **AEROPLANES** | | | | | |
| CAT operations with complex aeroplanes | 3 | 0 - 2 | 3 | 0 - 150 | 1 |
| CAT operations with aeroplanes other than complex | 0 | 0 - 1 | 0 | 0 - 4 | 3 |
| Non-commercial operations with complex aeroplanes | 0 | 0 - 2 | 0 | 0 - 10 | 0 |
| Specialised operations | 2 | 3 - 11 | 2 | 3 - 31 | 9 |
| Non-commercial operations with aeroplanes other than complex | 27 | 6 - 40 | 44 | 12 - 77 | 60 |
| **HELICOPTERS** | | | | | |
| Overall | 7 | 5 - 11 | 14 | 9 - 37 | 16 |
| CAT operations | 2 | 0 - 4 | 4 | 1 - 27 | 6 |
| Specialised operations | 1 | 0 - 2 | 3 | 0 - 3 | 1 |
| Non-commercial operations | 4 | 2 - 8 | 7 | 1 - 20 | 6 |
| **BALLOONS** | 1 | 0 - 3 | 1 | 0 - 3 | 1 |
| **SAILPLANES** | 10 | 12 - 27 | 12 | 13 - 30 | 22 |
| **UNMANNED AIRCRAFT SYSTEMS (UAS)** | 0 | 0 - 1* | 0 | 0 - 1 | 0 |

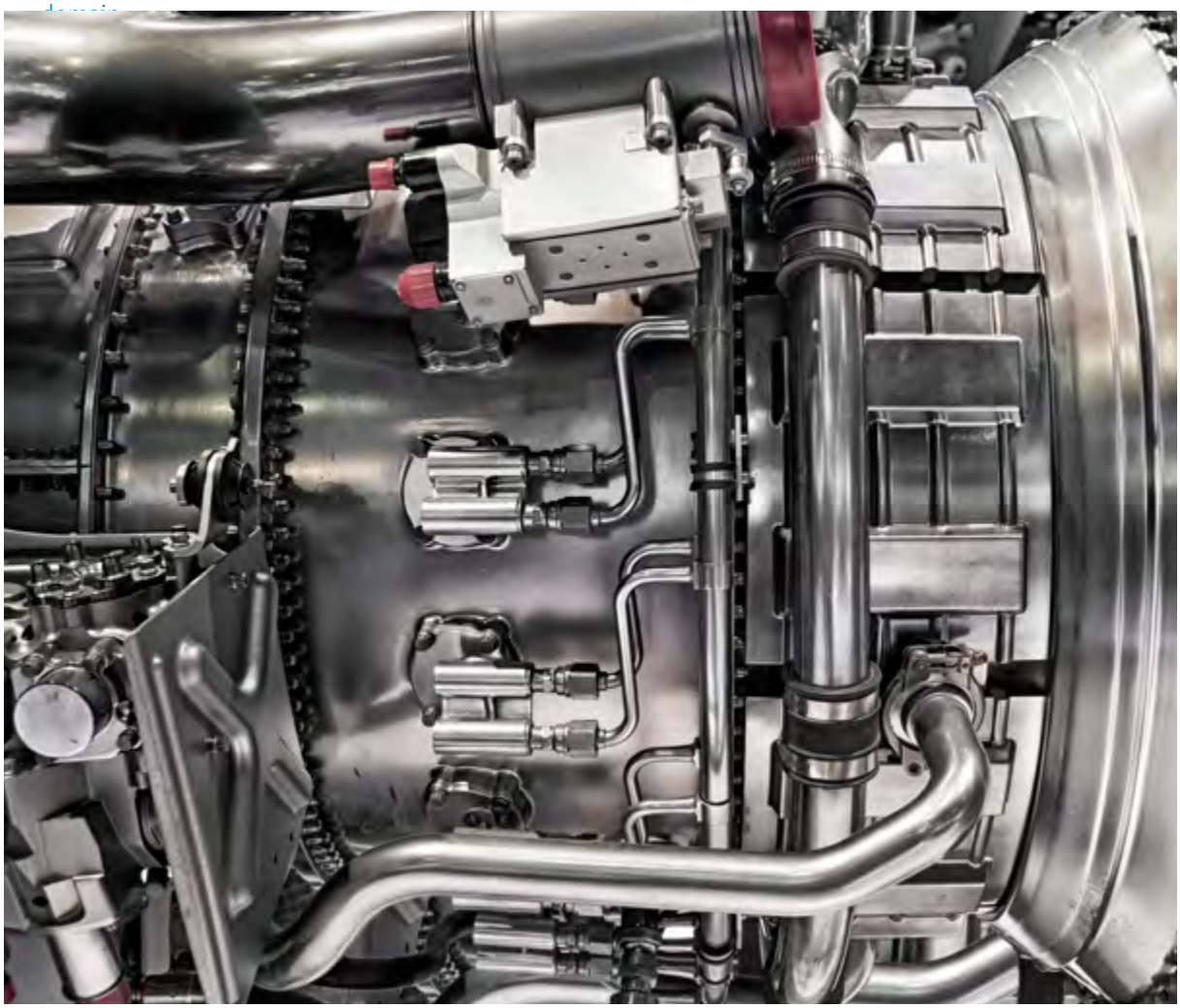
* Based on the year 2023 only, as the UAS domain was covered for the first time in that year.

**Table 1.1** Cross-domain comparison of EASA Member States fatal accidents and fatalities per aircraft domain

Table 1.2 identifies all fatal accidents and fatalities that happened at aerodromes or in airspace in an EASA Member State.

| INFRASTRUCTURE DOMAIN | FATAL ACCIDENTS 2024 | FATAL ACCIDENTS 2014-2023 MIN - MAX | FATALITIES 2024 | FATALITIES 2014-2023 MIN - MAX | FATALITIES 2014-2023 MEDIAN |
|---|---|---|---|---|---|
| AERODROME AND GROUND HANDLING | 0 | 0 | 0 | 0 | 0 |
| AIR TRAFFIC MANAGEMENT AND AIR NAVIGATION SERVICES | 0 | 0 | 0 | 0 | 0 |

**Table 1.2** Cross domain comparison of EASA Member States fatal accidents and fatalities per infrastructure domain



The following graphs (Figures 1.3 to 1.6) show the number of fatal accidents and non-fatal accidents for different aircraft domains while providing a visual comparison. There is no graph specific to the ATM/ANS domain, as there are no fatal accidents in 2024 and the preceding period 2014-2023, where ATM/ANS was recorded as a contributing factor.

Please note that the scale of the Y-axis is not the same for each chart, although they have in some cases been adjusted to make a comparison easier.

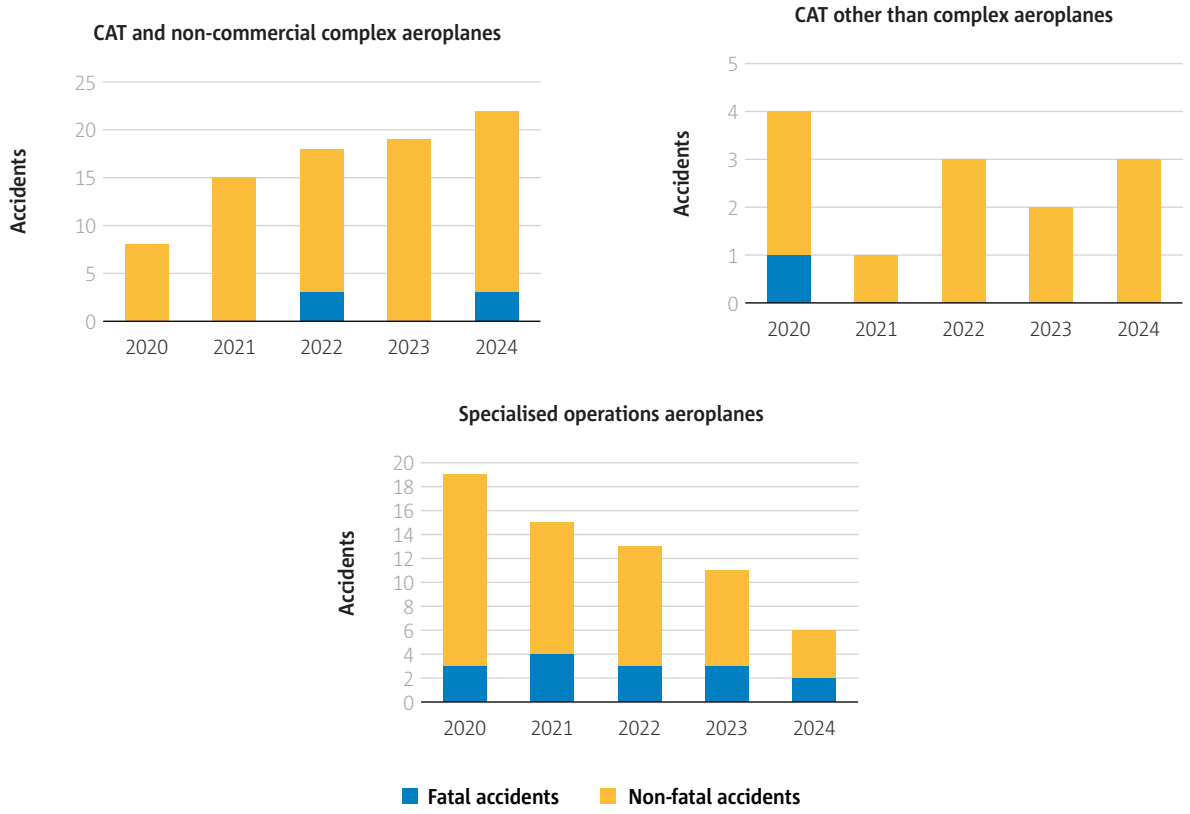



**Figure 1.3** EASA Member States accidents per year for complex CAT aeroplanes and non-commercial complex aeroplanes, CAT other than complex aeroplanes, SPO aeroplanes, CAT helicopters and SPO helicopters

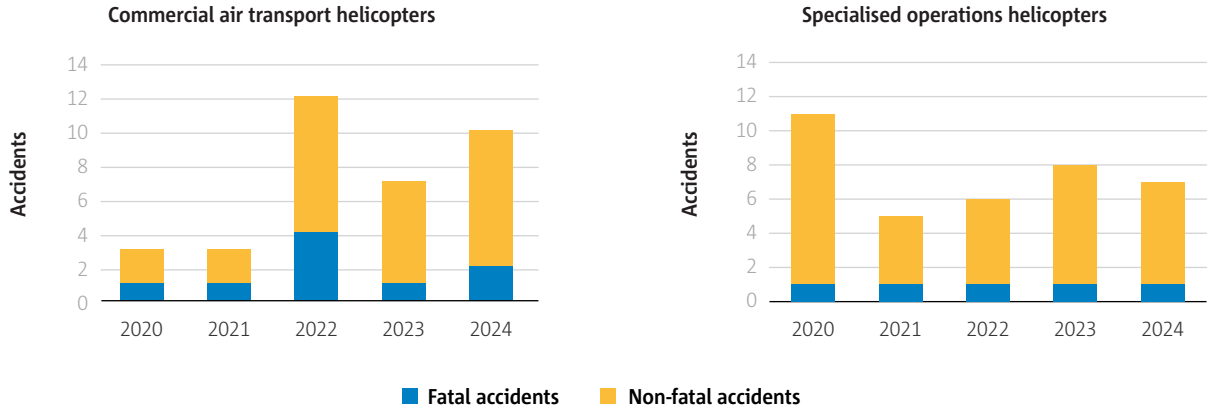


**Figure 1.4** EASA Member States accidents per year for CAT helicopters and SPO helicopters

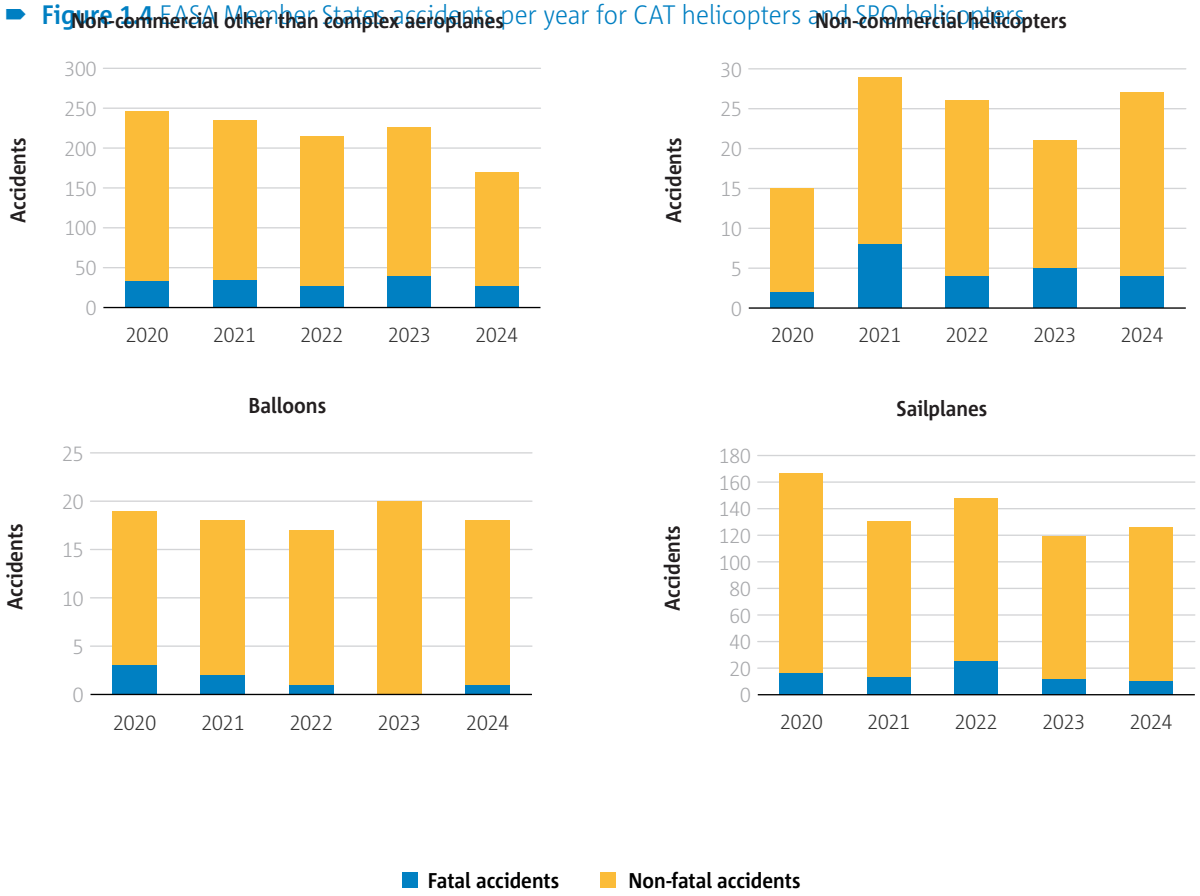
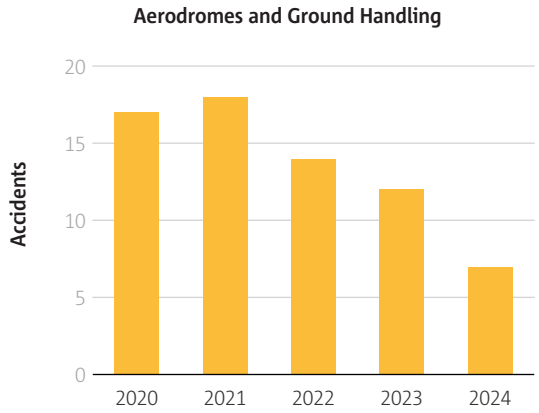



**Figure 1.5** EASA Member States accidents per year for NCO other than complex aeroplanes and helicopters, and all sailplane and balloon operations



EASA
European Union Aviation Safety Agency

# Chapter 2
# Aeroplanes

**ANNUAL SAFETY REVIEW 2025**

➡ **Figure 1.6** EASA Member States infrastructure related accidents per year

This chapter covers aeroplane operations. The chapter is divided into five main sections:

- **Commercial air transport (CAT[9]) passenger and cargo operations conducted by EASA Air Operators Certificate (AOC) holders with complex aeroplanes** with a maximum certificated take-off mass exceeding 5 700 kg or equipped with (a) turbofan engine(s) or more than one turboprop engine. Examples include airline, air taxi, air ambulance, etc.
- **CAT passenger and cargo operations conducted by EASA AOC holders with non-complex aeroplanes**, having a maximum take-off mass below 5 700 kg or not equipped with (a) turbofan engine(s) or more than one turboprop engine. Examples include airline, air taxi, air ambulance, sightseeing, etc.
- **EASA Member State registered or operated complex aeroplanes carrying out non-commercial complex (NCC) operation** with a maximum certificated take-off mass exceeding 5 700 kg or equipped with (a) turbofan engine(s) or more than one turboprop engine. Examples include business, demonstration, flight training/instructional, relocation, etc.
- **Specialised operations (SPO)** conducted by EASA Member State registered aeroplanes or EASA Member State AOC holders. Examples include agriculture, aerial advertisement, photography, etc.
- **Non-commercial operations (NCO) conducted by EASA Member State registered non-complex aeroplanes**, having a maximum take-off mass below 5 700 kg or not equipped with (a) turbofan engine(s) or more than one turboprop engine, and not covered in the sections above.

The data presented are based on the accidents collected by the Agency under Regulation (EU) 996/2010 on accident and serious incident investigation, except for complex aeroplanes involved in commercial air transport that include serious incidents, and Regulation (EU) 376/2014 on occurrence reporting, follow-up, and analysis, and through the active search of those events from other official sources.

For each section, the key statistics, occurrence categories and safety risks are presented in the core document. The overview of the safety risks is solely derived from occurrence data from the ECR.

The list of fatal accidents associated with the scope of this chapter is provided in Appendix 1, as is a list of fatal accidents involving non-certified aeroplanes (Annex I lists aircraft, the operation of which involves low risk for aviation safety).

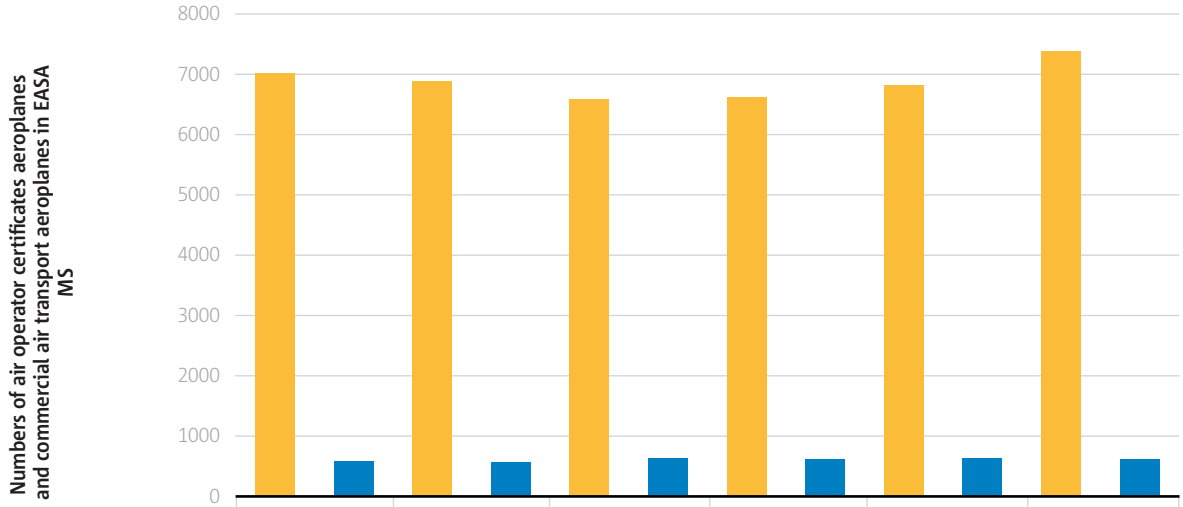
9 As per REGULATION (EU) 2018/1139 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, 'commercial air transport' means an aircraft operation to transport passengers, cargo or mail for remuneration or other valuable consideration.

# 2.1 Commercial Air Transport (CAT) - complex aeroplanes

This section covers the CAT passenger and cargo operations conducted by EASA AOC holders with complex aeroplanes with a maximum certificated take-off mass exceeding 5 700 kg or equipped with (a) turbofan engine(s) or more than one turboprop engine. Examples include airline, air taxi, air ambulance, etc.

## Numbers of AOC holders and AOC aeroplanes

Figure 2.1 shows the number of AOC holders and the number of commercial air transport aeroplanes within EASA Member States. It shows that in 2024, the number of AOC aeroplane holders has slightly decreased in comparison to the previous year and has dropped to the third highest number in the reference period. The number of CAT aeroplanes, with slight increase in 2022 and 2023 has further increased in 2024 and has exceeded the numbers of the year 2019.




| | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|
| Aeroplanes (CAT ops) | 7 017 | 6 883 | 6 593 | 6 623 | 6 817 | 7 387 |
| AOC (A) | 585 | 575 | 635 | 615 | 639 | 623 |

**Figure 2.1** Numbers of AOC aeroplanes and CAT aeroplanes in EASA Member States

# Key statistics

The key statistics for this domain are depicted in Table 2.1 and Table 2.2 and include a comparison of the number of accidents (fatal and non-fatal) and serious incidents for the last year and the previous 10-year period[10]. They also include a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe. In 2024 there were three fatal accidents involving EASA CAT AOC holders. One involved a cargo aircraft that crashed near the airport on private house, the second involved a person on ground that was sucked into the engine (reported suicide), and the third involved a death of a cabin crew member six days after the smoke in the cabin, emergency evacuation via slides (cause of the death to be determined). In 2024 the number of fatal and non-fatal accidents is higher than the yearly average in the previous 10-year period, while the number of serious incidents is lower.

12 out of 18 non-fatal accidents in 2024 had resulted in substantial damage to an aircraft. These cases encompassed four tail strike accidents, collision between two aircraft while taxiing, aircraft collision with high loader due to strong winds, vehicle collisions with an aircraft, damage during towing, bird strike and tyre burst on landing, hard and bounced landings.

| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **6** | **3** | ↑ |
| **Non-fatal accidents** | **153** | **18** | ↑ |
| **Serious incidents** | **634** | **46** | ↓ |

**Table 2.1** Key statistics for CAT complex aeroplanes

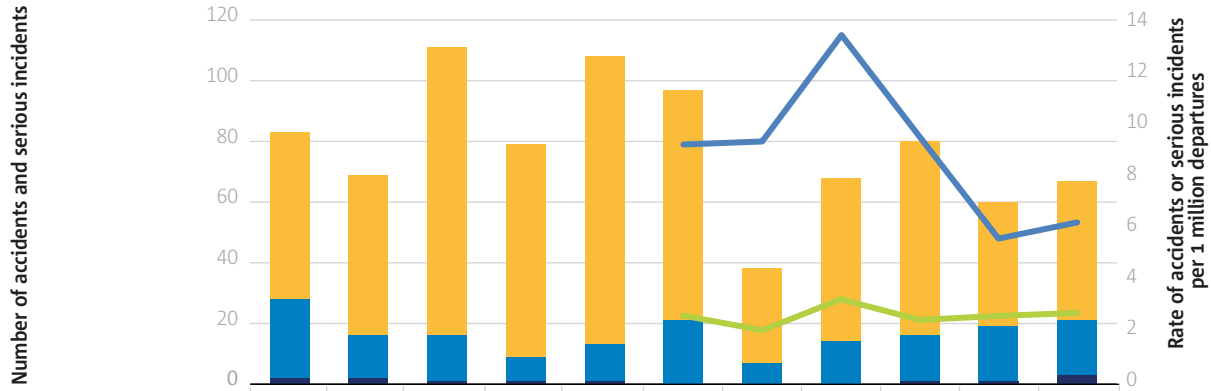
| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **277** | **80** |
| **Yearly max number over 2014-2023** | **150** | **15** |
| **Yearly min number over 2014-2023** | **0** | **3** |
| **Total number in 2024** | **3** | **18** |

**Table 2.2** Fatalities and serious injuries involving CAT complex aeroplanes

10 On 4 August 2018, a Junker-52 crashed in the Swiss Alps while performing a sightseeing flight resulting in 20 fatalities. Due to the type of aircraft involved (not certified by EASA and an 'Annex I aircraft' of Regulation (EU) 2018/1139) and the specific type of operation being carried, this accident has not been included in the statistics of this chapter.

Figure 2.2 shows that the number of fatal accidents in 2024 has increased in comparison to the previous years. The number of non-fatal accidents had slightly reduced when compared to 2023. The number of serious incidents has increased in comparison with the previous year and was the third lowest of the period. The air traffic in 2024 had further recovered and reached approximately 93% of the 2019 traffic level[11]. These figures should be considered in the context of the impact of the Russian Federation's invasion of Ukraine, conflicts in the Middle East and other conflict zones leading to the rerouting of the affected traffic.

Figure 2.2 also shows that the rate of accidents has increased by 0.1 and serious incidents have increased by 0.4 occurrences per 1 million flights in 2024 compared to the previous year. The rates are displayed for years 2019 onwards due to a change in exposure data (number of flights) structure by the data provider. The rate of accidents in 2024 was the second highest in the period and slightly above the result of 2019. The rate of serious incidents, which at times bear a higher risk than accidents, was the second lowest in the reference period.

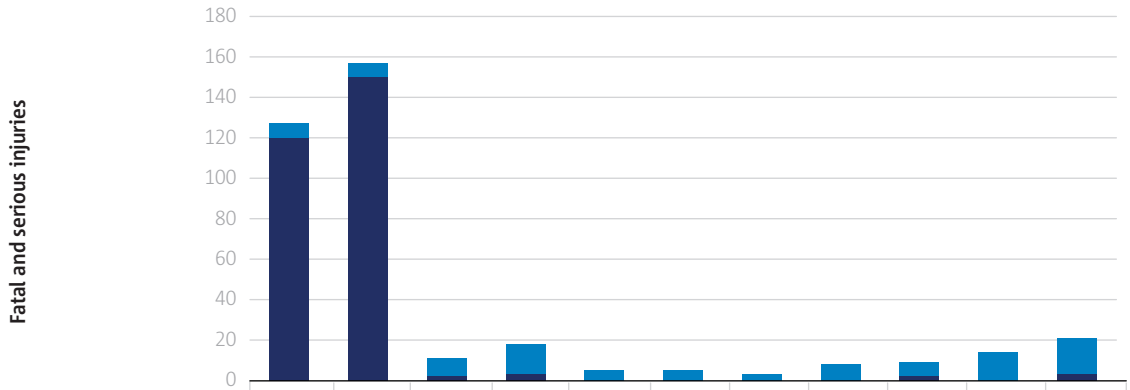



| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious incidents | 55 | 53 | 95 | 70 | 95 | 76 | 31 | 54 | 64 | 41 | 46 |
| Non-fatal accidents | 26 | 15 | 15 | 8 | 13 | 21 | 7 | 14 | 15 | 19 | 18 |
| Fatal accidents | 2 | 1 | 1 | 1 | | | | | 1 | | 3 |
| Serious incident rate | | | | | | 9.2 | 9.3 | 13.3 | 9.8 | 5.6 | 6.0 |
| Accident rate | | | | | | 2.5 | 2.1 | 3.4 | 2.4 | 2.6 | 2.7 |

**Figure 2.2** Numbers and rates of fatal accidents, non-fatal accidents, and serious incidents per million departures involving CAT complex aeroplanes

11 Source: EUROCONTROL

There were three fatalities and four serious injuries sustained in three fatal accidents in 2024. The number of serious injuries, increased in 2024 and reached the highest number, when compared to the previous 10-year period. Six non-fatal accidents in 2024 resulted in serious injuries. This included injuries to cabin crew because of an abrupt stop, injuries due to severe turbulence, a passenger falling down the stairs, a passenger injury during disembarkation, a member of ground handling personnel getting trapped by nose landing gear, and a flight coordinator getting injured, while walking behind the running engine.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 7 | 7 | 9 | 15 | 5 | 5 | 3 | 8 | 7 | 14 | 18 |
| Fatalities | 120 | 150 | 2 | 3 | 0 | 0 | 0 | 0 | 2 | 0 | 3 |

**Figure 2.3** Fatal and serious injuries per year involving CAT complex aeroplanes

## Occurrence categories

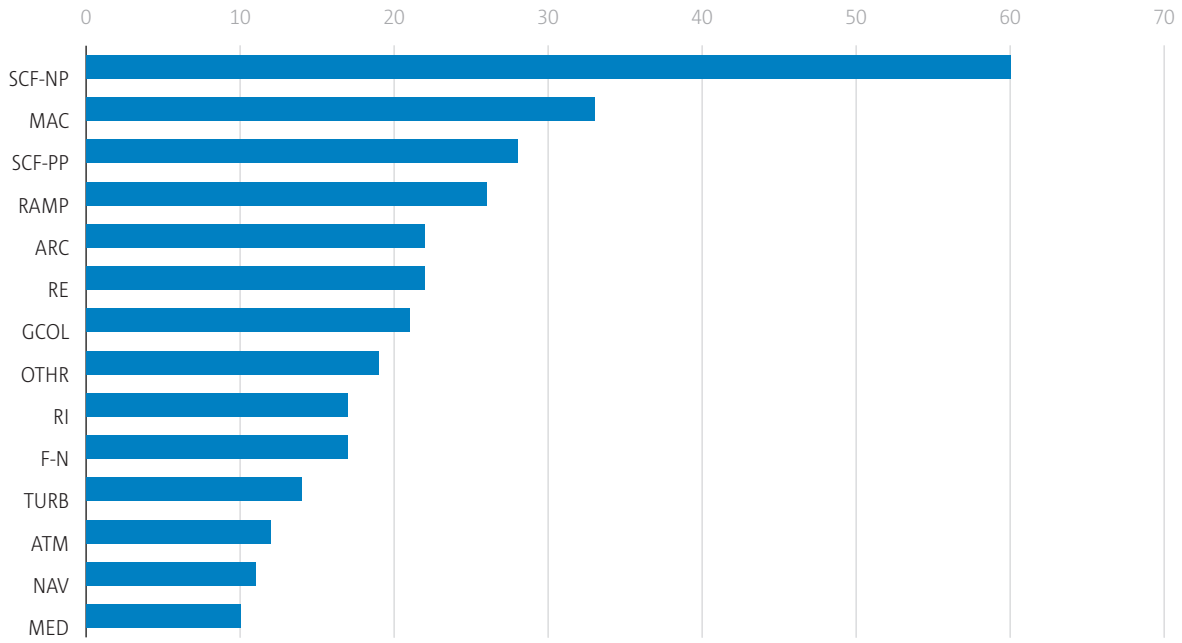
Figure 2.4 outlines the top occurrence categories assigned to the accidents and serious incidents in the past five years. Occurrences are categorised using the ICAO Accident/Incident Data Reporting (ADREP) taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed.

Categories are of different natures, for example:

- Operational such as low altitude operations (LALT);
- Environmental such as turbulence encounter (TURB);
- Technical such as system/component failure or malfunction [non-powerplant] (SCF-NP):
- Consequential such as fire/smoke resulting from impact (F-POST); etc.

Multiple categories may therefore be assigned to a single occurrence. For example, if an engine failure occurred, and loss of control followed, the occurrence would be coded in both categories, i.e., SCF-PP: powerplant failure or malfunction and LOC-I: loss of control in flight. The sum of the numbers of occurrences per category may therefore be greater than the total number of occurrences that were realised in the period.

In the period of 2020-2024, the highest number of accidents and serious incidents were non-powerplant system/component failure related, followed by mid-air collision, and powerplant failure or malfunction categories. In 2024 the most accidents and serious incidents were related to mid-air collision, abnormal runway contact, and non-powerplant system/component failure occurrence categories.

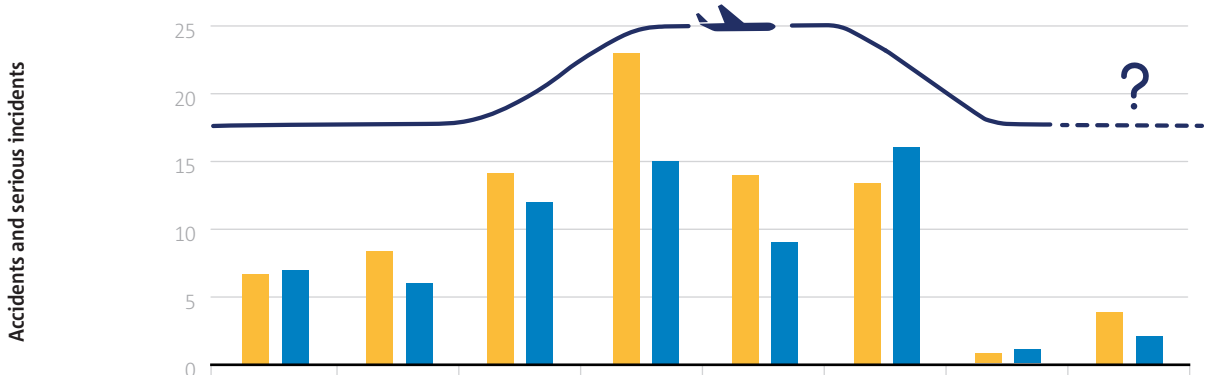



*SCF-NP: System/component failure or malfunction [non-powerplant]; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; SCF-PP: powerplant failure or malfunction; RAMP: Ground Handling; ARC: Abnormal runway contact; RE: Runway excursion; GCOL: Ground Collision; OTHR: Other; RI: Runway incursion - vehicle, aircraft or person; F-NI: Fire/smoke (non-impact); TURB: Turbulence encounter; ATM: ATM/CNS; NAV: Navigation error; MED: Medical*

**Figure 2.4** Numbers of occurrences by occurrence category involving commercial air transport complex aeroplanes

# Phase of flight

The numbers for 2024 in Figure 2.5 show a distribution of accidents and serious incidents per flight phase with a greater number during landing, en-route, and take-off. The number of accidents and serious incidents during landing, critical phase of flight, in 2024 was higher than the previous 10-year average . The unknown/blank flight phase corresponds to those occurrences where no data was available, and it normally relates to the second aircraft in some of the occurrences.

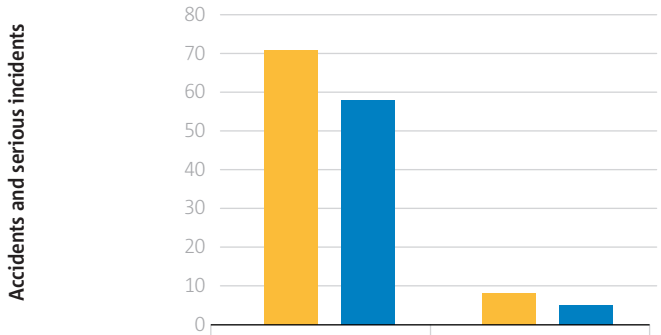



| | Standing | Taxi | Take-off | En route | Approach | Landing | Tow | Unknown/ Blank |
|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 6.7 | 8.4 | 14.1 | 23 | 13.9 | 13.3 | 0.7 | 3.8 |
| 2024 | 7 | 6 | 12 | 15 | 9 | 16 | 1 | 2 |

**Figure 2.5** Accidents and serious incidents by phase of flight involving CAT complex aeroplanes

# Operation type

Figure 2.6 compares the number of accidents and serious incidents per operation type (passenger and cargo), showing the figures for the year 2024 compared with the previous 10-year average. In 2024, like in 2020, 2021, 2022, and 2023, the number of occurrences for passenger flight operations remained below the 10-year average. The number of accidents and serious incidents for cargo flights was also lower than the previous 10-year average.

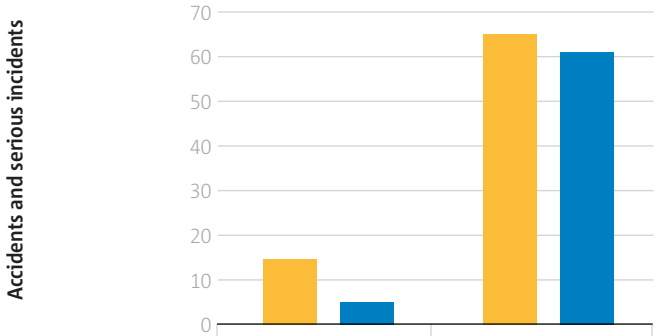



| | Passenger | Cargo |
|---|---|---|
| Average 2014-2023 | 70.9 | 8.2 |
| 2024 | 58 | 5 |

**Figure 2.6** Accidents and serious incidents by operation type involving CAT complex aeroplanes

## Propulsion type

Figure 2.7 shows the distribution by propulsion type for the last year compared with the previous 10-year average. The figure shows a similar pattern between the 2024 figures and the previous 10-year average figure for turbofan propulsion, although the absolute numbers are lower in 2024 compared with the 10-year average (2014-2023). The split between turbofan and turboprop is consistent with the aircraft fleet sizes and utilisation.




| | Turboprop | Turbofan |
|---|---|---|
| Average 2014-2023 | 14.7 | 65.1 |
| 2024 | 5 | 61 |

**Figure 2.7** Accidents and serious incidents by propulsion type involving CAT complex aeroplanes

## Safety risks

CAT operations with complex aeroplanes, and NCC aeroplanes operations, are combined into one data risk picture due to the similarity of the safety risks for these operation types, as well as the limited amount of data available for the NCC segment.

The safety risks identified hereafter are derived from occurrences data recorded in the ECR, covering the two-year period of 2023-2024. From more than 141 000 occurrences, only around 65 000 occurrences were completed with the KRA and ERCS safety risk score, representing an ERCS completion rate of 45.9% for the domain. The hereafter information is solely based on this restricted dataset.

The relative comparison between KRAs for this domain is highlighted in Figure 2.8. KRAs and occurrence categories (refer to Figures 2.4 and 2.16) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the introduction of the ASR document.

As illustrated in Figure 2.8, the higher-risk KRAs are:

- **Aircraft upset** includes an undesired aircraft state characterised by unintentional divergences from parameters normally experienced during operations, which might ultimately lead to an uncontrolled impact with terrain.

- **Airborne collision** includes all occurrences involving actual or potential airborne collisions between aircraft, while both aircraft are airborne, and between aircraft and other airborne objects (excluding birds and wildlife). This KRA is mainly managed through safety issues identified in the ATM/ANS safety risk portfolio.
- **Collision on runway** includes occurrences involving collisions or near-collisions between an aircraft and another object (other aircraft, vehicles, etc.) or person that occurs on a runway of an aerodrome or other predesignated landing area. It does not include collisions with birds or wildlife. This KRA is mainly managed through safety issues identified in the ATM/ANS and the Aerodromes and Ground handling safety risk portfolios.

Since the last year's ASR, aircraft upset has become the highest KRA, airborne collision retained the second position, and collision on runway has moved to the third position. This can be explained by both, data completion for the ERCS scores and KRA, as well as by types of occurrences that were reported in the ECR.

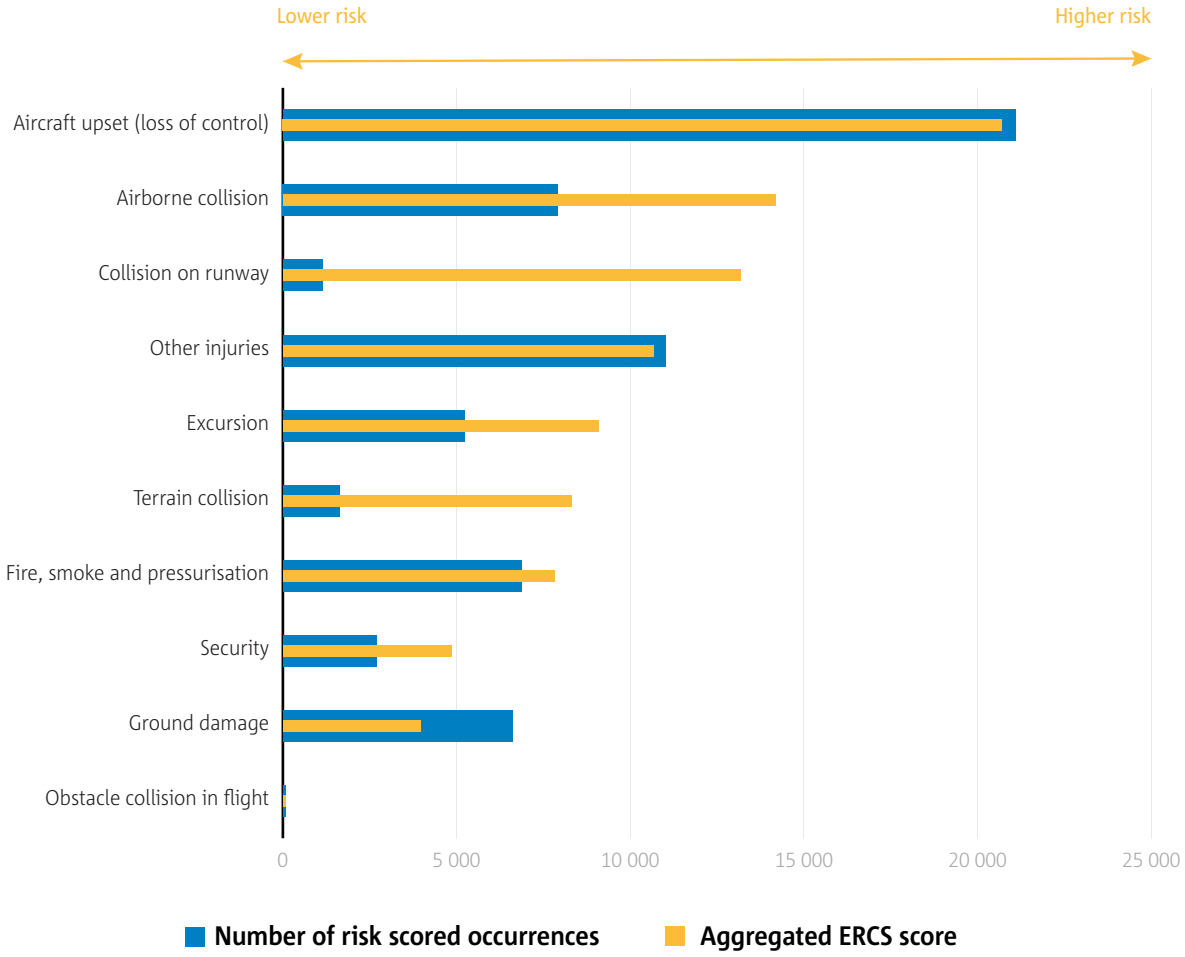



**Figure 2.8** KRAs by aggregated ERCS score and number of risk-scored occurrences involving CAT complex aeroplanes and NCC aeroplanes

# 2.2 Commercial Air Transport (CAT) - other than complex aeroplanes

This section covers the safety performance of CAT passenger and cargo operations conducted by EASA AOC holders with non-complex aeroplanes, having a maximum take-off mass below 5 700 kg or not equipped with (a) turbofan engine(s) or more than one turboprop engine. Examples include airline, air taxi, air ambulance, sightseeing, etc.

## Key statistics

The key statistics for this domain are in the tables below and include a comparison of the number of accidents (fatal and non-fatal) for the last year and the previous 10-year period. Also included is a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

Table 2.3 shows that in 2024 there was no fatal accident involving EASA CAT AOC holders operating other than complex aeroplanes. And that there were three non-fatal accidents in 2024: one emergency landing after engine power drop, one person getting injured after falling from a cargo door, and a failure to lift off leading to a runway overshoot/ excursion and coming to a stop outside the aerodrome. Overall, the number of non-fatal accidents was higher than the average of the previous 10-year period.

| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **2** | **0** | ↓ |
| **Non-fatal accidents** | **18** | **3** | ↑ |

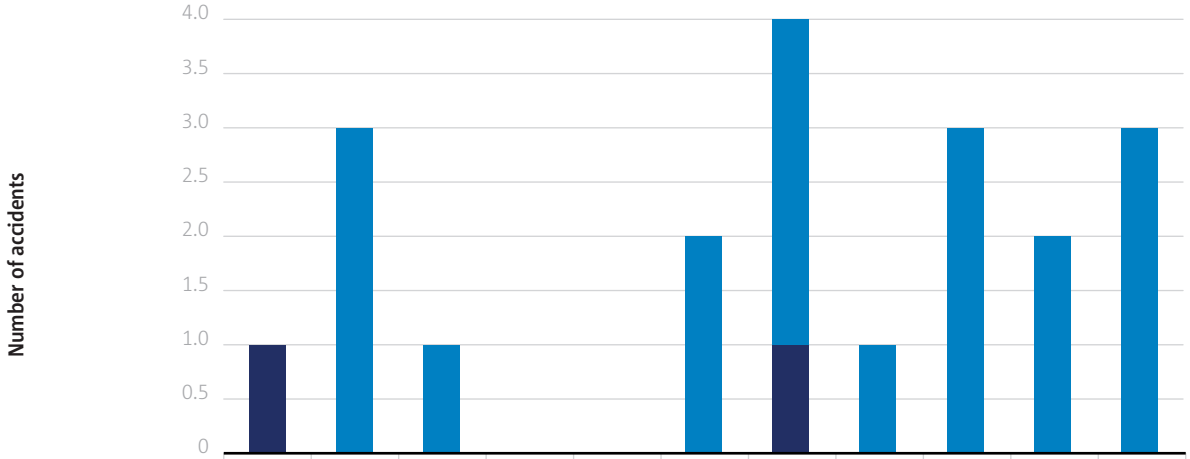
**Table 2.3** Key statistics for CAT other than complex aeroplanes

As shown in table 2.4, the number of serious injuries, in 2024 remained the same as in the previous year. One serious injury in 2024 was attributable to a person falling from a cargo door.

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **6** | **7** |
| **Yearly max number over 2014-2023** | **4** | **4** |
| **Yearly min number over 2014-2023** | **0** | **0** |
| **Total number in 2024** | **0** | **1** |

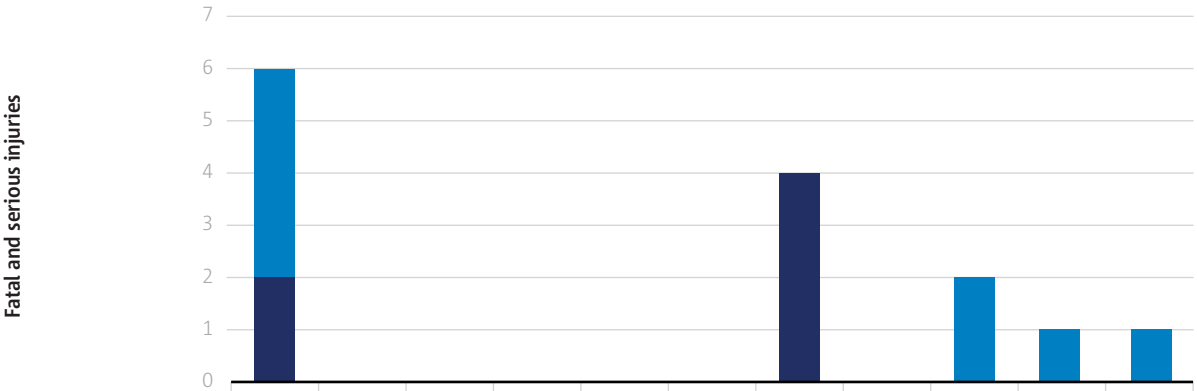
**Table 2.4** Fatalities and serious injuries involving CAT other than complex aeroplanes

Figure 2.9 shows that the number of non-fatal accidents in 2024 has slightly increased, when compared with the previous year and reached the number of years 2022, 2020 and 2015.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | | 3 | 1 | | | 2 | 3 | 1 | 3 | 2 | 3 |
| Fatal accidents | 1 | | | | | | 1 | | | | |

**Figure 2.9** Number of fatal accidents and non-fatal accidents involving CAT other than complex aeroplanes




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious injuries | 4 | | | | | | | | 2 | 1 | 1 |
| Fatalities | 2 | | | | | | 4 | | | | |

**Figure 2.10** Fatal and serious injuries per year involving CAT other than complex aeroplanes

## Occurrence categories

Figure 2.11 outlines the top occurrence categories assigned to the accidents in the past five years. Occurrences are categorised using the ICAO ADREP taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed.

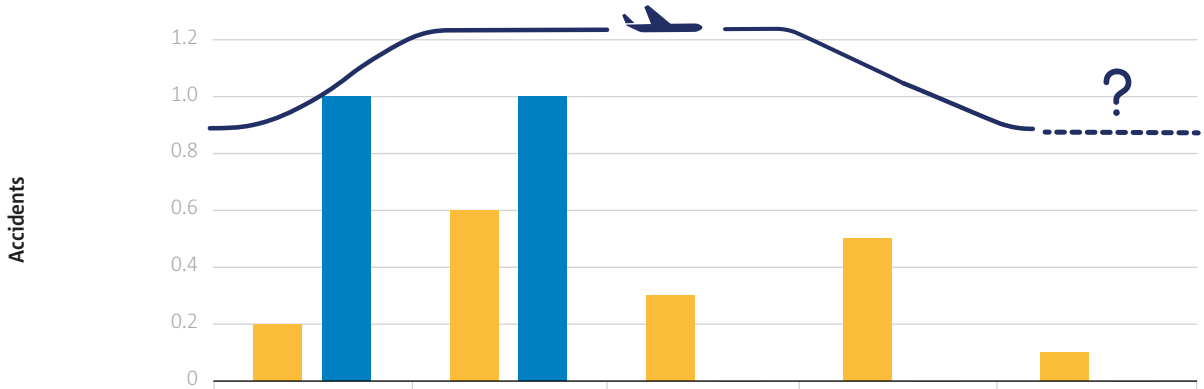
In the period of 2020-2024 the highest number of accidents were powerplant failure or other malfunctions, as well as airprox and midair collisions, windshear and thunderstorm related occurrences and undershoot/ overshoot related occurrences


*SCF-PP: powerplant failure or malfunction; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; UNK: Unknown or undetermined; WSTRW: Windshear or thunderstorm; SCF-NP: System/component failure or malfunction [non-powerplant]; USOS: Undershoot overshoot*

**Figure 2.11** Numbers of occurrences by occurrence category involving CAT other than complex aeroplanes

# Phase of flight

The low numbers in this domain do not allow any comparison in terms of flight phase. However, the data are still presented for information in Figure 2.12.

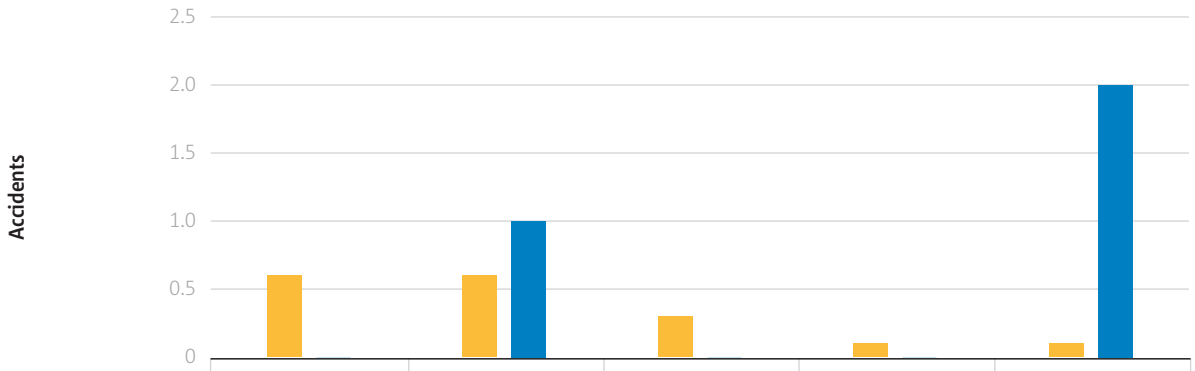



| | Take-off | En route | Approach | Landing | Unknown |
|---|---|---|---|---|---|
| Average 2014-2023 | 0.2 | 0.6 | 0.3 | 0.5 | 0.1 |
| 2024 | 1 | 1 | 0 | 0 | 0 |

**Figure 2.12** Accidents by phase of flight involving CAT other than complex aeroplanes

# Operation type

Figure 2.13 compares the number of accidents per operation type (passenger and cargo), showing the figures for the last year compared with the previous 10-year average.

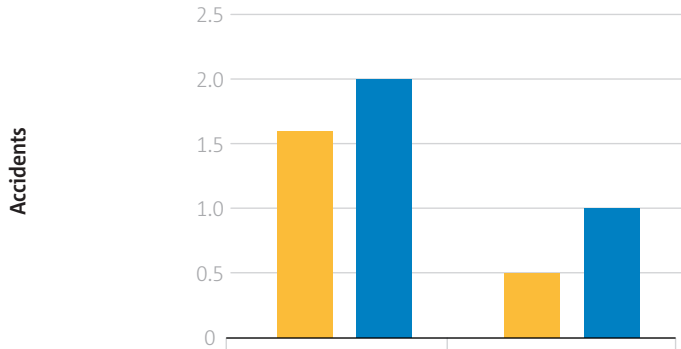



| | Air Taxi | Sightseeing | Air Ambulance | Airline | Blank |
|---|---|---|---|---|---|
| Average 2014-2023 | 0.6 | 0.6 | 0.3 | 0.1 | 0.1 |
| 2024 | 0 | 1 | 0 | 0 | 2 |

**Figure 2.13** Accidents by operation type involving CAT other than complex aeroplanes

## Propulsion type

The low numbers in this domain do not allow any comparison between the two main propulsion types. However, the data are still presented for information in Figure 2.14.




| | Reciprocating | Turboprop |
|---|---|---|
| Average 2014-2023 | 1.6 | 0.5 |
| 2024 | 2 | 1 |

**Figure 2.14** Accidents by propulsion type involving CAT other than complex aeroplanes

## Safety risks

The safety risks identified for CAT other than complex aeroplanes are derived from occurrences data recorded in the ECR, covering the two-year period of 2023-2024. From more than 540 occurrences, only 254 occurrences were completed with the KRA and ERCS safety risk score, representing an ERCS completion rate of 46.4% for the domain. The hereafter information is solely based on this restricted dataset.

The relative comparison between KRAs for this domain is highlighted in Figure 2.15. KRAs and occurrence categories (refer to Figures 2.4 and 2.11 of this document) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

As illustrated in Figure 2.15, the higher-risk KRAs are:

- **Collision on runway** includes occurrences involving collisions or near-collisions between an aircraft and another object (other aircraft, vehicles, etc.) or person that occurs on a runway of an aerodrome or other predesignated landing area. It does not include collisions with birds or wildlife. This KRA is mainly managed through safety issues identified in the ATM/ANS and the Aerodromes and Ground handling safety risk portfolios.
- **Airborne collision** includes all occurrences involving actual or potential airborne collisions between aircraft, while both aircraft are airborne, and between aircraft and other airborne objects (excluding

birds and wildlife). This KRA is mainly managed through safety issues identified in the ATM/ANS safety risk portfolio.

- **Terrain collision** includes an occurrence where an airborne aircraft collides with terrain, without indication that the flight crew was unable to control the aircraft. It includes instances when the flight crew is affected by visual illusions or degraded visual environment.

Since the last year's review, collision on runway has become the highest KRA by replacing the KRA aircraft upset key risk area, while airborne collision retained the second position, and terrain collision has moved to the third position replacing the KRA excursion. This can be explained by both, data completion for the ERCS scores and KRA, as well as by types of occurrences that were reported in the ECR.

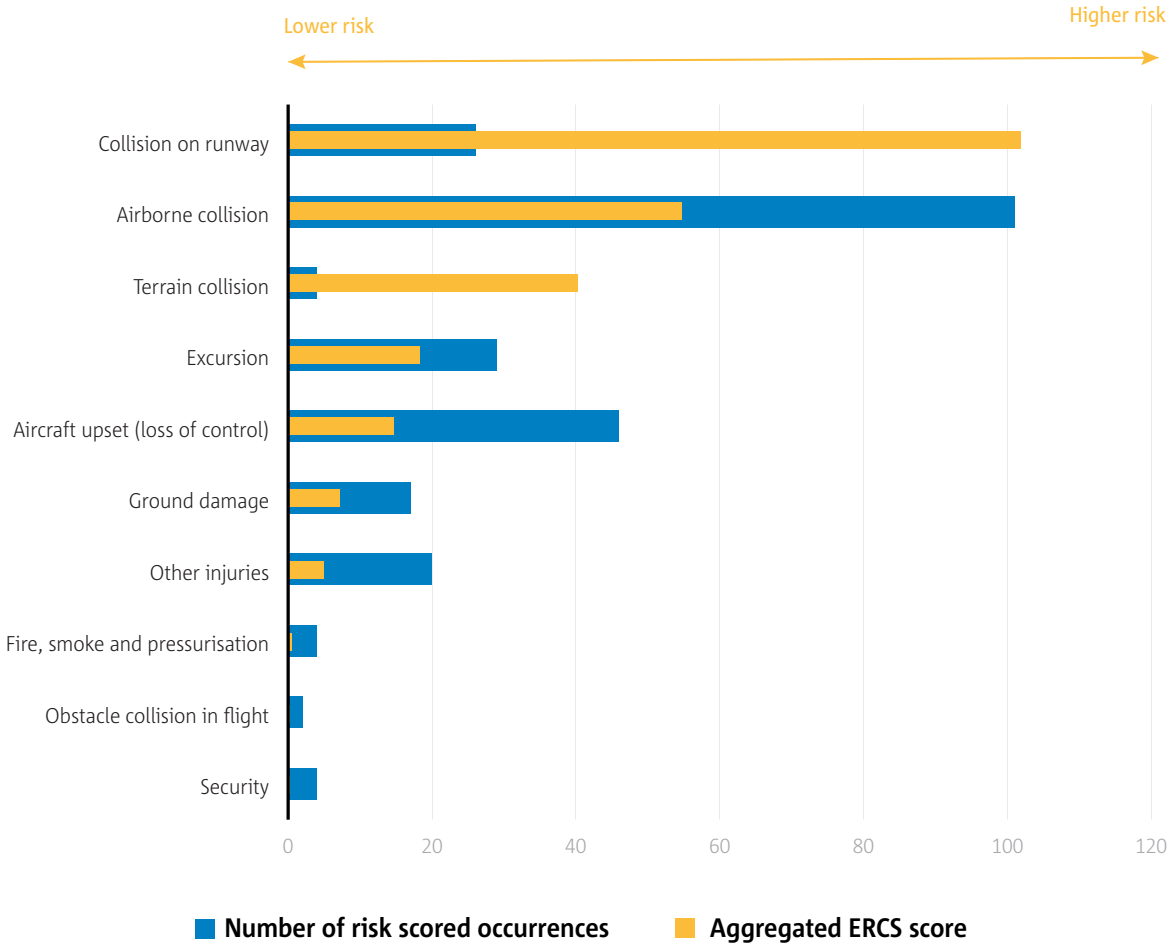



**Figure 2.15** KRAs by aggregated ERCS score and number of risk-scored occurrences involving CAT other than complex aeroplanes

# 2.3 Non-Commercial Complex (NCC) aeroplanes

This section covers the safety performance of complex aeroplanes performing NCC (e.g., business, demonstration, flight training/instructional, relocation, etc.):

- with a maximum certificated take-off mass exceeding 5 700 kg, or equipped with (a) turbofan engine(s) or more than one turboprop engine, and
- with an EASA Member State as state of operator or state of registry.

## Key statistics

The key statistics for this domain are in the tables below and include a comparison of the number of accidents (fatal and non-fatal) for the last year and the previous 10-year period. Also included is a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

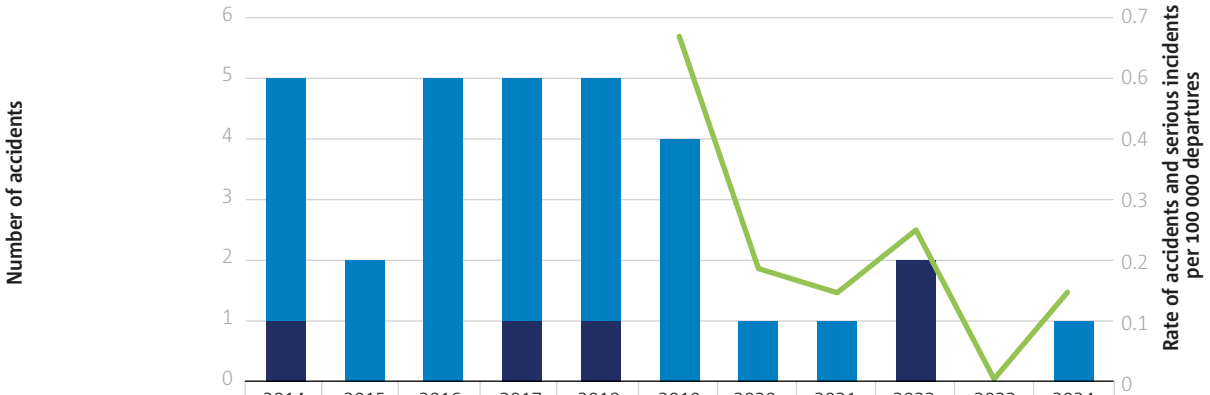
| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **5** | **0** | ↓ |
| **Non-fatal accidents** | **25** | **1** | ↓ |

**Table 2.5** Key statistics for NCC aeroplanes

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **19** | **3** |
| **Yearly max number over 2014-2023** | **10** | **2** |
| **Yearly min number over 2014-2023** | **0** | **0** |
| **Total number in 2024** | **0** | **0** |

**Table 2.6** Fatalities and serious injuries involving NCC aeroplanes

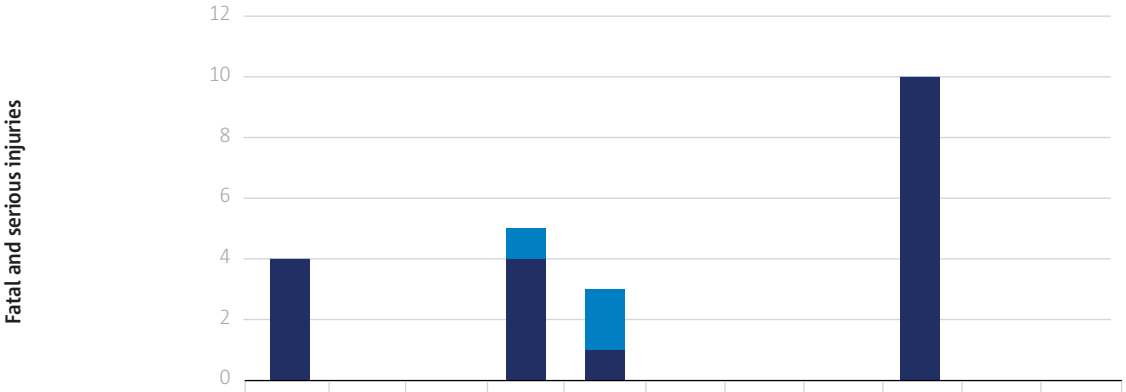
Figure 2.16 shows that during 2024, there was one non-fatal accident involving an EASA Member State registered or operated NCC aeroplane. It was a collision between an aircraft taxiing on a taxiway and an aircraft stopped at a holding point.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 4 | 2 | 5 | 4 | 4 | 4 | 1 | 1 | | | 1 |
| Fatal accidents | 1 | | | 1 | 1 | | | | 2 | | |
| Accident rate | | | | | | 0.7 | 0.2 | 0.2 | 0.3 | - | 0.2 |

**Figure 2.16** Numbers and rates of fatal accidents and non-fatal accidents per year involving NCC aeroplanes

The number of fatalities and serious injuries per year is shown in Figure 2.17. In 2024 there were no fatalities and no serious injuries.



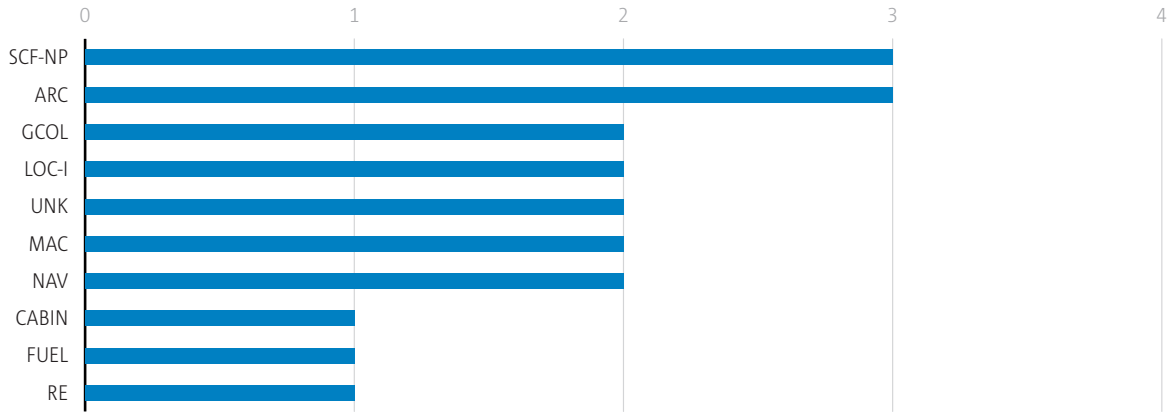

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fatalities | 4 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 10 | 0 | 0 |

**Figure 2.17** Fatal and serious injuries per year involving NCC aeroplanes

## Occurrence categories

Figure 2.18 outlines the occurrence categories assigned to the accidents in the past five years. Occurrences are categorised using the ICAO ADREP taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed.

In the period of 2020-2024 the highest number of accidents were system component failure, non-powerplant and abnormal runway contact related. The rest of accidents were scattered among different occurrence categories.

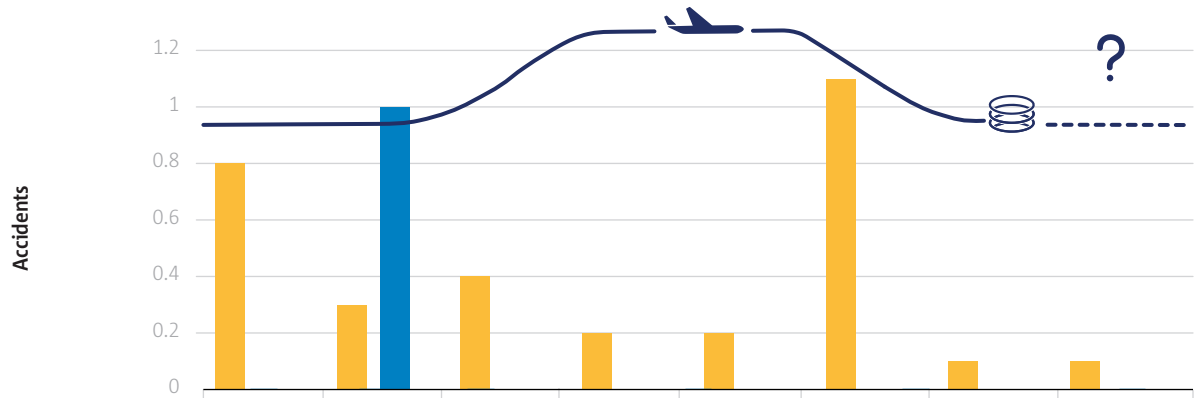



*SCF-NP: System/component failure or malfunction [non-powerplant]; ARC: Abnormal runway contact; GCOL: Ground Collision; LOC-I: Loss of control – inflight; UNK: Unknown or undetermined; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; NAV: Navigation error; CABIN: Cabin safety events; FUEL: Fuel related; RE: Runway excursion*

**Figure 2.18** Numbers of accidents by occurrence category involving NCC aeroplanes

## Phase of flight

The low numbers in this domain do not allow any comparison in terms of flight phase. However, the data are still presented for information in Figure 2.19.

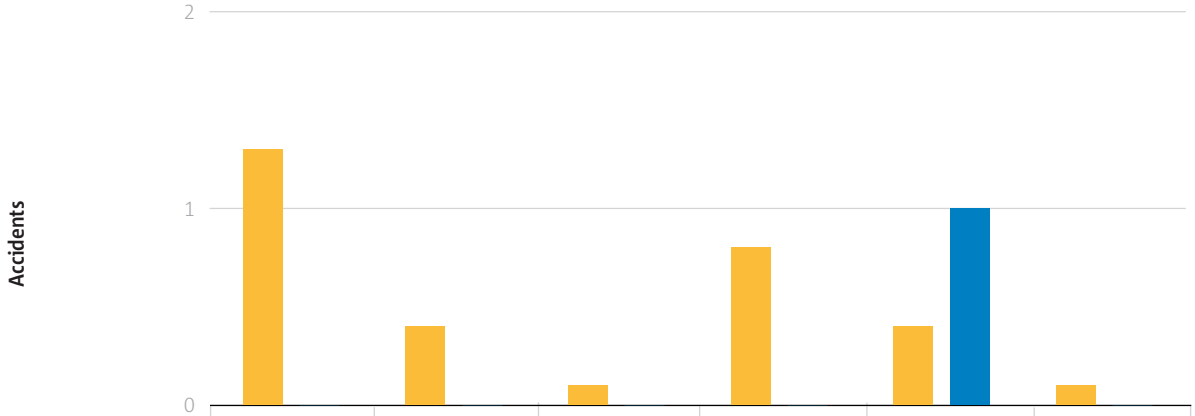



| | Standing | Taxi | Take-off | En route | Approach | Landing | Manoeuvring | Unknown |
|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 0.8 | 0.3 | 0.4 | 0.2 | 0.2 | 1.1 | 0.1 | 0.1 |
| 2024 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

**Figure 2.19** Accidents by phase of flight involving NCC aeroplanes

## Operation type

The low numbers in this domain do not allow any comparison in terms of operation type. However, the data are still presented for information in Figure 2.20.

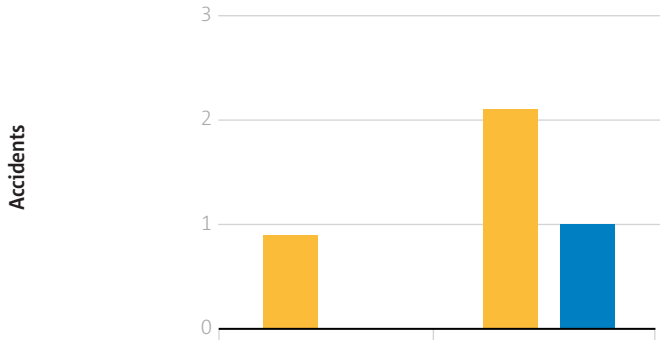



| | Business | Flight Training/ Instructional | Other | Pleasure | Relocation | Test Flight |
|---|---|---|---|---|---|---|
| Average 2014-2023 | 1.3 | 0.4 | 0.1 | 0.8 | 0.4 | 0.1 |
| 2024 | 0 | 0 | 0 | 0 | 1 | 0 |

**Figure 2.20** Accidents by operation type involving NCC aeroplanes

## Propulsion type

The low numbers in this domain do not allow any comparison between the two main propulsion types. However, the data are still presented for information in Figure 2.21.




| | Turboprop | Turbofan |
|---|---|---|
| Average 2014-2023 | 0.9 | 2.1 |
| 2024 | 0 | 1 |

**Figure 2.21** Accidents by propulsion type involving NCC aeroplanes

## Safety risks

CAT operations with complex aeroplanes, and NCC aeroplanes operations, are combined into one risk picture due to the similarity of the safety risks for these operation types, as well as the small amount of available data for the NCC segment. Refer to Safety risks in section Commercial Air Transport (CAT) - complex aeroplanes.

# 2.4 Specialised Operations (SPO) aeroplanes

The scope of this section covers SPO involving aeroplanes of all mass categories having an EASA Member State as state of registry or state of operator.

## Key statistics

The key statistics for this domain are in Table 2.7 and Table 2.8 and include a comparison of the number of accidents (fatal and non-fatal) for the year 2024 and the previous 10-year period. It also includes a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

The cumulated number of fatal accidents and non-fatal accidents in 2024 remained below the average of the preceding decade for both fatal and non-fatal accidents. Of the two fatal accidents in 2024, one occurred when a parachutist collided with the tailplane, causing it to separate from the aircraft and leading to a fatal crash. The second accident involved an aeroplane crashing into a forest. Both fatal accidents occurred during parachute drop operations. In 2024, the non-fatal accidents included communication problems with tower and landing gear malfunction, runway excursion, a forced landing due to engine issues, and an ejection of a passenger from the cabin, collision with the fuselage and tail of the plane, during an airdrop flight. The numbers of fatalities and serious injuries in 2024 were close to the minimum values of the preceding 10-year period.

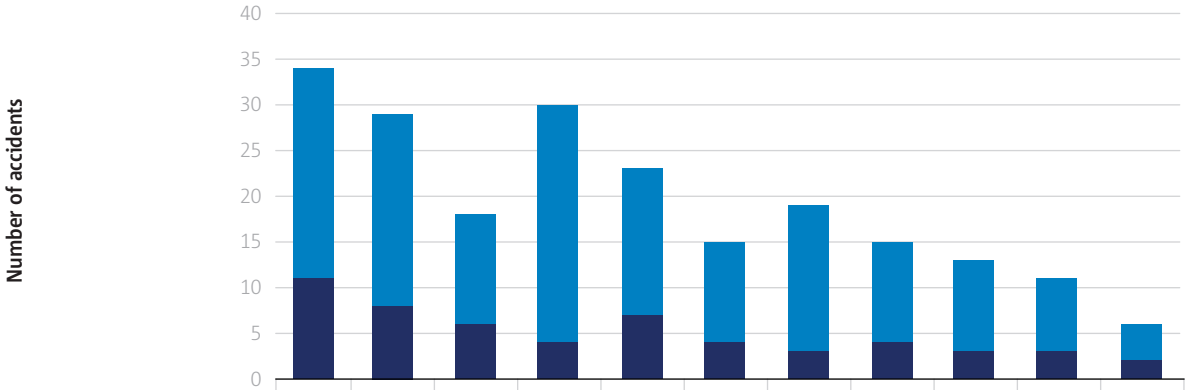
| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **53** | **2** | ↓ |
| **Non-fatal accidents** | **154** | **4** | ↓ |

**Table 2.7** Key statistics for SPO aeroplanes

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **106** | **53** |
| **Yearly max number over 2014-2023** | **31** | **16** |
| **Yearly min number over 2014-2023** | **3** | **1** |
| **Total number in 2024** | **2** | **2** |

**Table 2.8** Fatalities and serious injuries involving SPO aeroplanes

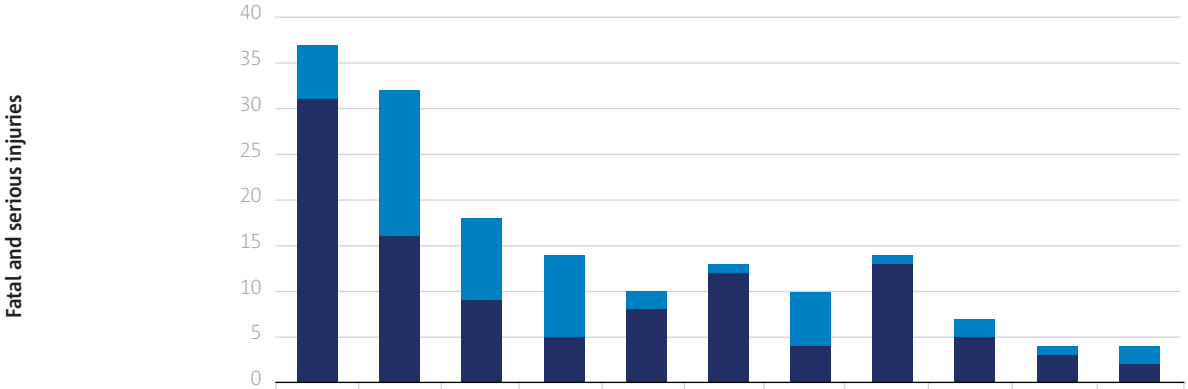
The number of accidents per year is shown in Figure 2.22. The numbers of fatal and non-fatal accidents in 2024 were both the lowest compared to the preceding decade. In other words, in all the years of the previous 10-year period, the number of fatal and non-fatal accidents were higher than the number of fatal accidents and non-fatal accidents in 2024.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 23 | 21 | 12 | 26 | 16 | 11 | 16 | 11 | 10 | 8 | 4 |
| Fatal accidents | 11 | 8 | 6 | 4 | 7 | 4 | 3 | 4 | 3 | 3 | 2 |

**Figure 2.22** Fatal accidents and non-fatal accidents per year involving SPO aeroplanes

The number of fatalities and serious injuries per year is shown in Figure 2.23. In 2024 the number of fatalities was the lowest, when compared to the preceding decade. The number of serious injuries only slightly increased in comparison to the previous year. Three out of the four non-fatal accidents resulted in aircraft being substantially damaged, and one resulted in a serious injury.



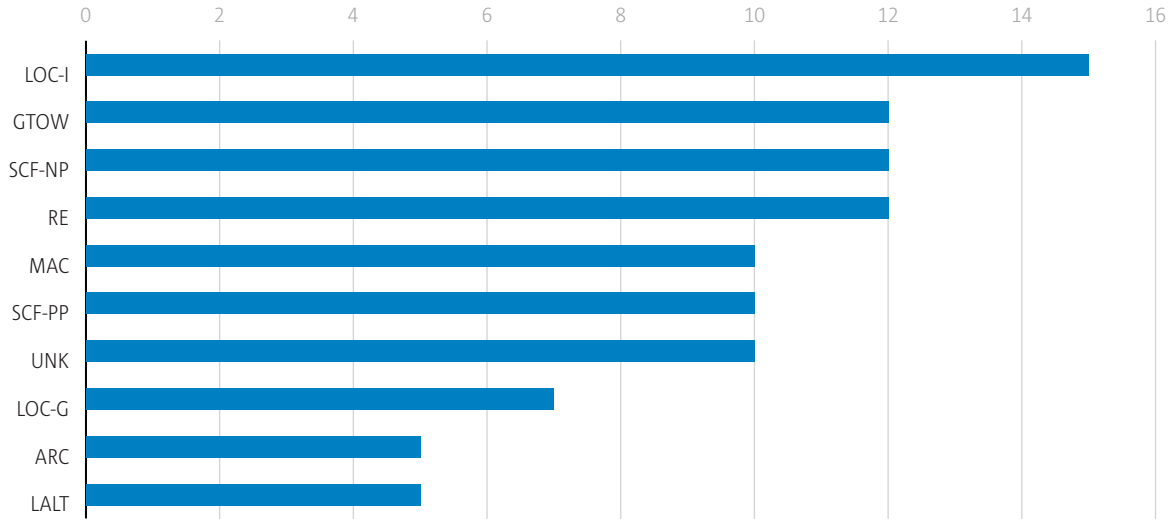

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious injuries | 6 | 16 | 9 | 9 | 2 | 1 | 6 | 1 | 2 | 1 | 2 |
| Fatalities | 31 | 16 | 9 | 5 | 8 | 12 | 4 | 13 | 5 | 3 | 2 |

**Figure 2.23** Fatal and serious injuries per year involving SPO aeroplanes

# Occurrence categories

Figure 2.24 outlines the top ten categories assigned to all the accidents in the past five years. Occurrences are categorised using the ICAO ADREP taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed.

In the period of 2020-2024, the highest number of accidents were in the occurrence category loss of control in flight, followed by glider towing related events, system component failure, non-powerplant and runway excursion occurrence categories.

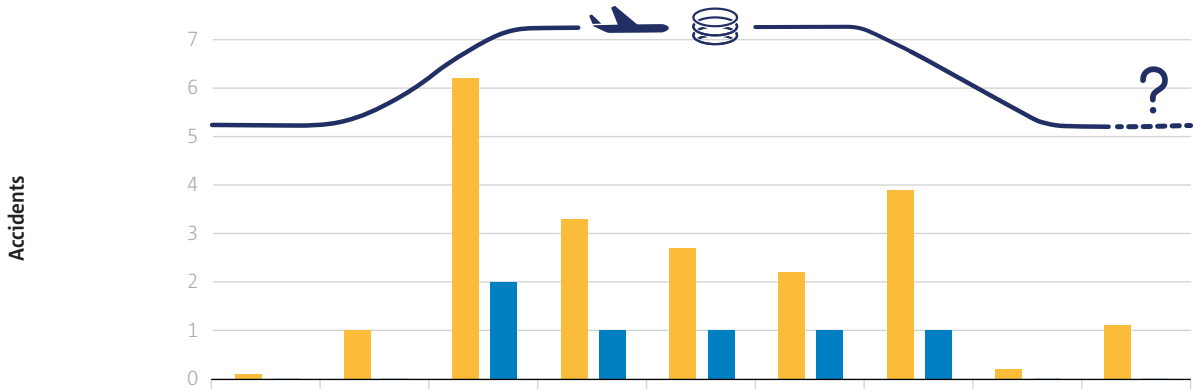



*LOC-I: Loss of control – inflight; GTOW: Glider towing related events; SCF-NP: System/component failure or malfunction [non-powerplant]; RE: Runway excursion; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; SCF-PP: powerplant failure or malfunction; UNK: Unknown or undetermined; LOC-G: Loss of control – ground; ARC: Abnormal runway contact; LALT: Low altitude operations*

**Figure 2.24** Numbers of occurrences by occurrence category involving SPO aeroplanes

# Phase of flight

Figure 2.25 shows the distribution of accidents by flight phase. The number of accidents in 2024 by flight phase were lower than the average of the preceding decade for all flight phases. In 2024, two of the six accidents occurred during take-off.

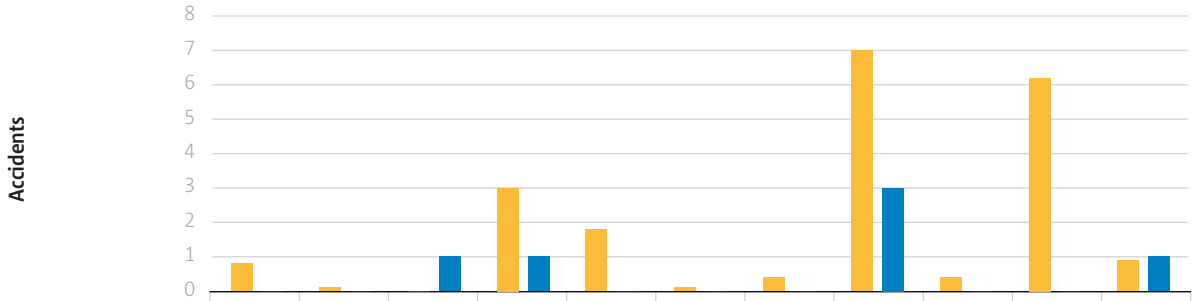



| | Standing | Taxi | Take-off | En route | Manoevring | Approach | Landing | Tow | Blank/ Unknown |
|---|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 0.1 | 1 | 6.2 | 3.3 | 2.7 | 2.2 | 3.9 | 0.2 | 1.1 |
| 2024 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0 | 0 |

**Figure 2.25** Accidents by phase of flight involving SPO aeroplanes

# Operation type

Figure 2.26 shows the number of accidents by type of SPO. In 2024 the number of accidents were lower than the average of the preceding decade for all operation types except for aerial survey. In 2024, three out of the six accidents occurred during parachute drop operations.

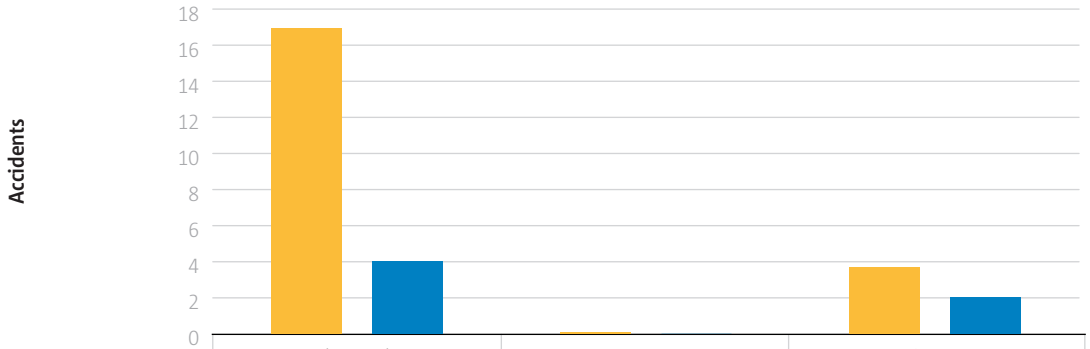



| | Aerial Advertising | Aerial Observation | Aerial Survey | Agri-cultural | Airshow/ Race | Calibration | Other | Parachute drop | Photo-graphy | Towing | Blank/ Unknown |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 0.8 | 0.1 | 0 | 3 | 1.8 | 0.1 | 0.4 | 7 | 0.4 | 6.2 | 0.9 |
| 2024 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 1 |

**Figure 2.26** Accidents by SPO type involving aeroplanes

## Propulsion type

Figure 2.27 shows the number of accidents by propulsion type. In 2024 out of the six accidents, four accidents involved aircraft with reciprocating engines. The remaining two accidents in 2024 involved aircraft with turboprop engines.




| | Reciprocating | Turbofan | Turboprop |
|---|---|---|---|
| Average 2014-2023 | 16.9 | 0.1 | 3.7 |
| 2024 | 4 | 0 | 2 |

**Figure 2.27** Accidents by propulsion type involving SPO aeroplanes

## Safety risks

The safety risks for SPO aeroplanes are derived from occurrences data recorded in the ECR, covering the two-year period 2023-2024. From the 677 occurrences, only 293 occurrences were completed with the KRA and ERCS safety risk score, representing an ERCS completion rate of 43.3% for the domain. The information hereafter is solely based on this restricted dataset.

The relative comparison between the KRAs for this domain is highlighted in Figure 2.28. KRAs and occurrence categories (refer to Figure 2.22 of this document) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

As illustrated in Figure 2.28, the higher-risk KRAs are:

- **Aircraft upset** includes an undesired aircraft state characterised by unintentional divergences from parameters normally experienced during operations, which might ultimately lead to an uncontrolled impact with terrain.
- **Airborne collision** includes all occurrences involving actual or potential airborne collisions between aircraft, while both aircraft are airborne, and between aircraft and other airborne objects (excluding birds and wildlife). This KRA is mainly managed through safety issues identified in the ATM/ANS safety risk portfolio.

- **Collision on runway** includes occurrences involving collisions or near-collisions between an aircraft and another object (other aircraft, vehicles, etc.) or person that occurs on a runway of an aerodrome or other predesignated landing area. It does not include collisions with birds or wildlife. This KRA is mainly managed through safety issues identified in the ATM/ANS and the Aerodromes and Ground handling safety risk portfolios.

Since the last year's review, aircraft upset has become the highest KRA, replacing the terrain collision. The KRA Airborne collision has moved from the third position in the last year's review to the second position. The KRA collision on runway has replaced the airborne collision in the third position. This can be explained by both, data completion for the ERCS scores and key risk area, as well as by types of occurrences that were reported in the ECR.

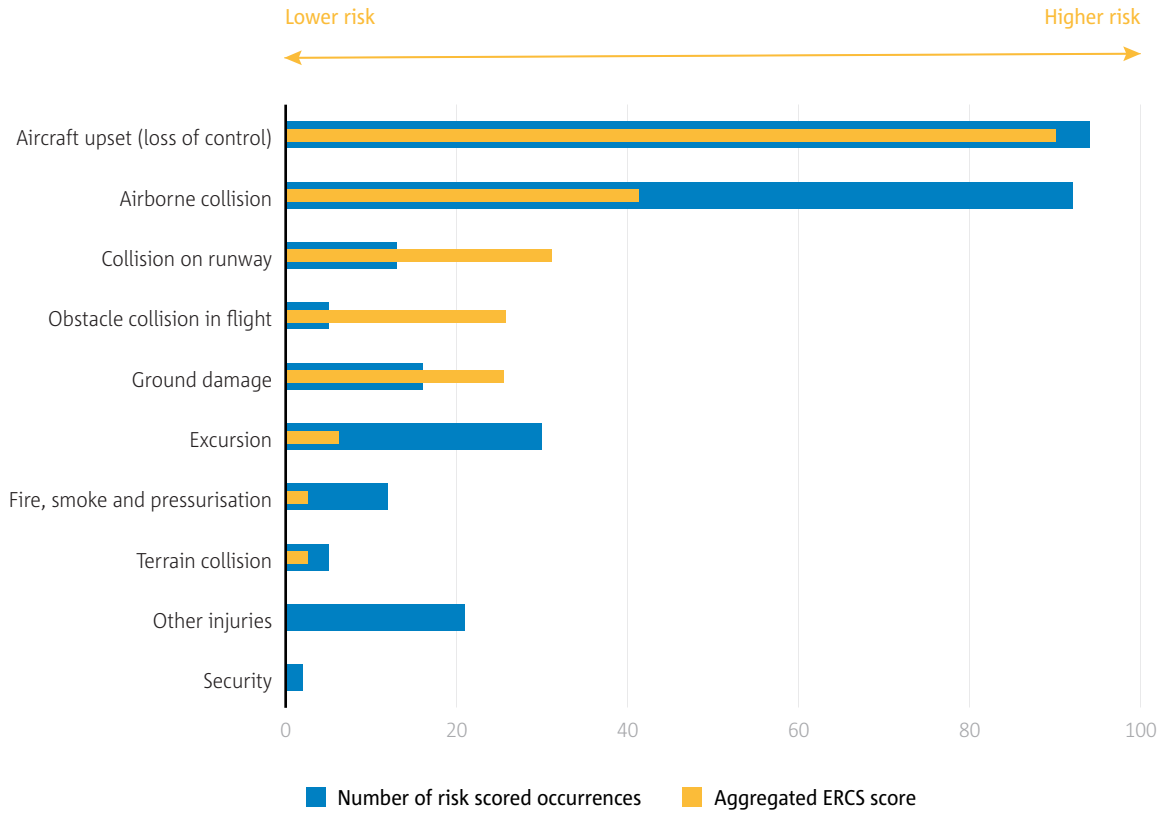



**Figure 2.28** KRAs by aggregated ERCS score and number of risk-scored occurrences involving SPO aeroplanes

# 2.5 Non-Commercial Operations (NCO) other than complex aeroplanes

The scope of this section covers NCO conducted by EASA Member State registered non-complex aeroplanes, having a maximum take-off mass below 5 700 kg, or not equipped with (a) turbofan engine(s) or more than one turboprop engine, and not covered in the sections above. This dataset includes certified small aeroplanes as well as Light Sport Aeroplanes (LSA) and Very Light Aeroplanes (VLA). Ultralights, microlights, and other aircraft not certified are excluded from this dataset but are examined further in the microlights chapter.

This chapter uses a consolidated dataset from the ECR database and the EASA database as its main source for the key statistics. However, the safety risks use the ECR database only.

Note: In this year's edition, we conducted a thorough review of the NCO accident dataset to ensure accurate classification of VLA, LSA, CS-23 certified aircraft, and microlights. Despite our efforts to identify and categorise relevant accidents, residual data quality issues in the ECR—including missing or incorrect aircraft registration, make, or model information, as well as duplicated reports—may slightly affect the accuracy of this analysis. As a result, the accident figures presented here may differ from those in previous editions of the ASR due to these challenges and refinements in our classification methodology.

# Key statistics

The key statistics for this domain are in the tables below and include a comparison of the number of accidents (fatal and non-fatal) for the last year and the previous 10-year period. It also includes comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

Table 2.9 shows a decrease of fatal and non-fatal accidents in 2024. Fatal accidents decreased by 5%, non-fatal accidents by 13% compared to the 10-year average.

| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **283** | **27** | ↓ |
| **Non-fatal accidents** | **1 638** | **142** | ↓ |

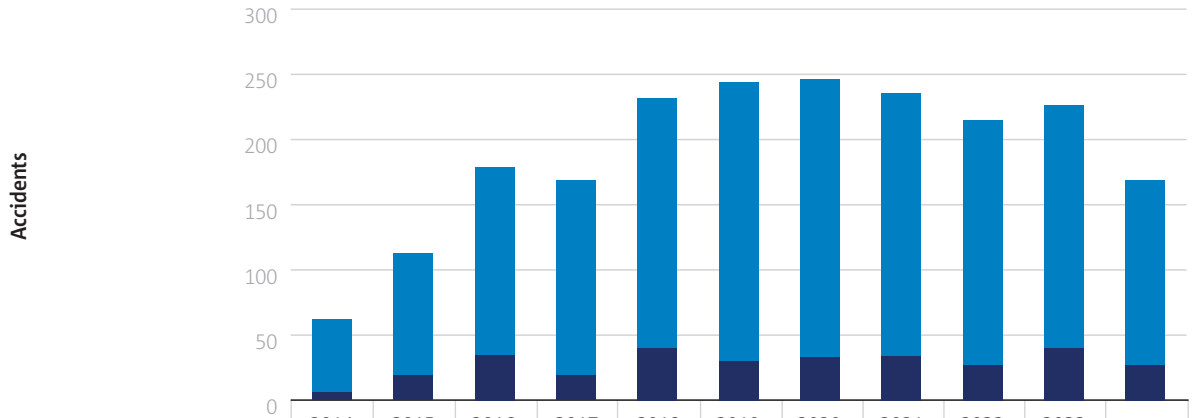
**Table 2.9** Key statistics for non-commercial other than complex aeroplanes

Table 2.10 presents the numbers of fatalities and serious injuries last year compared to the previous 10-year period. The table shows a 17% decrease in the number of fatalities in 2024 and there was a 28% decrease in serious injuries compared to the 10-year average.

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **532** | **277** |
| **Yearly max number over 2014-2023** | **77** | **41** |
| **Yearly min number over 2014-2023** | **12** | **14** |
| **Total number in 2024** | **44** | **20** |

**Table 2.10** Numbers of fatalities and serious injuries involving non-commercial other than complex aeroplanes

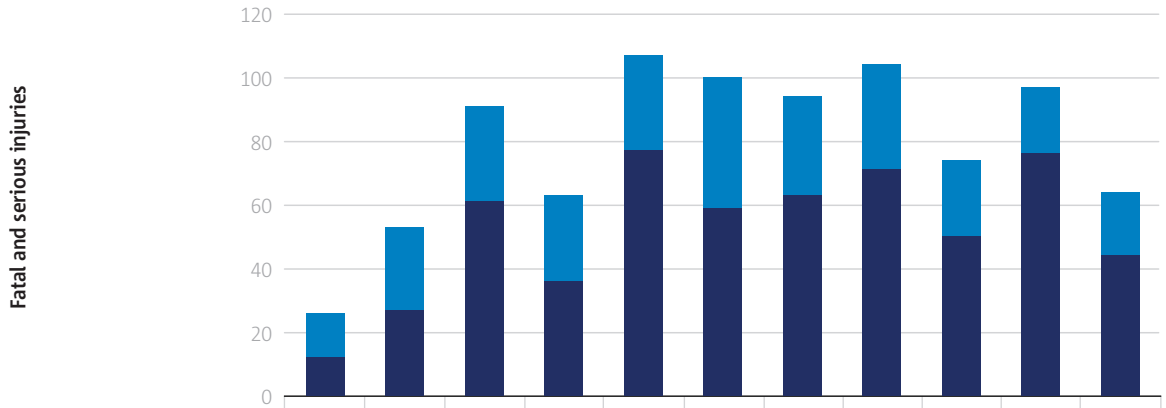
Figure 2.29 shows the numbers of fatal and non-fatal accidents per year. The figure shows moderate variations in fatal accidents, reaching a high of 40 fatal accidents in 2018 and 2023 then decreasing to 27 in 2024—a considerable reduction compared to the previous year (40 in 2023). The number of non-fatal accidents increased gradually from 56 in 2014, and peaked at 214 in 2019, to then decrease to 142 by 2024.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 56 | 94 | 144 | 150 | 192 | 214 | 213 | 201 | 188 | 186 | 142 |
| Fatal accidents | 6 | 19 | 35 | 19 | 40 | 30 | 33 | 34 | 27 | 40 | 27 |

**Figure 2.29** Fatal accidents and non-fatal accidents per year involving non-commercial other than complex aeroplanes

Figure 2.30 shows the total number of fatalities and serious injuries over time. The number of fatalities in 2024 (44) remained below the 10-year average of 53, decreasing significantly from a recent peak of 76 in 2023. The number of serious injuries in 2024 (20) was below the average of the preceding decade, representing the lowest annual total since 2014.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious injuries | 14 | 26 | 30 | 27 | 30 | 41 | 31 | 33 | 24 | 21 | 20 |
| Fatalities | 12 | 27 | 61 | 36 | 77 | 59 | 63 | 71 | 50 | 76 | 44 |

**Figure 2.30** Fatal and serious injuries per year involving non-commercial other than complex aeroplanes

Figure 2.31 compares the number of accidents per month for the past three years. It can be observed that the 2023 line stands out as the highest, forming a prominent peak in June, while the 2024 line shows a notable peak in August. The monthly distribution reflects the periods of heightened flying activity for small aeroplanes; for further details, refer to the safety risks section. Additionally, the 2022 line shows a more gradual increase, peaking in June and August, aligning closely with the overall seasonal trends observed in 2023 and 2024.

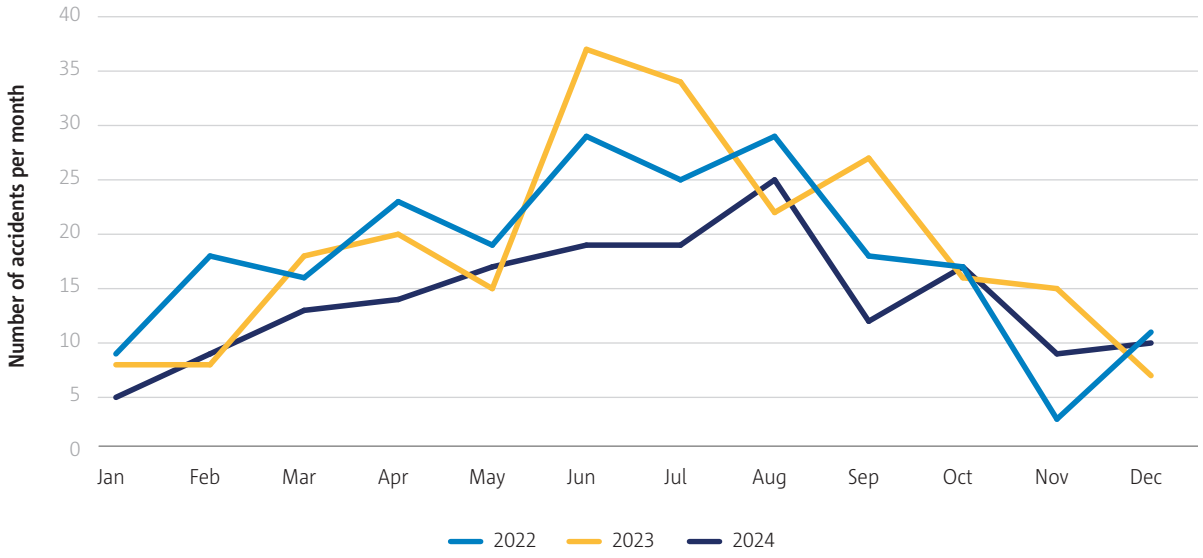
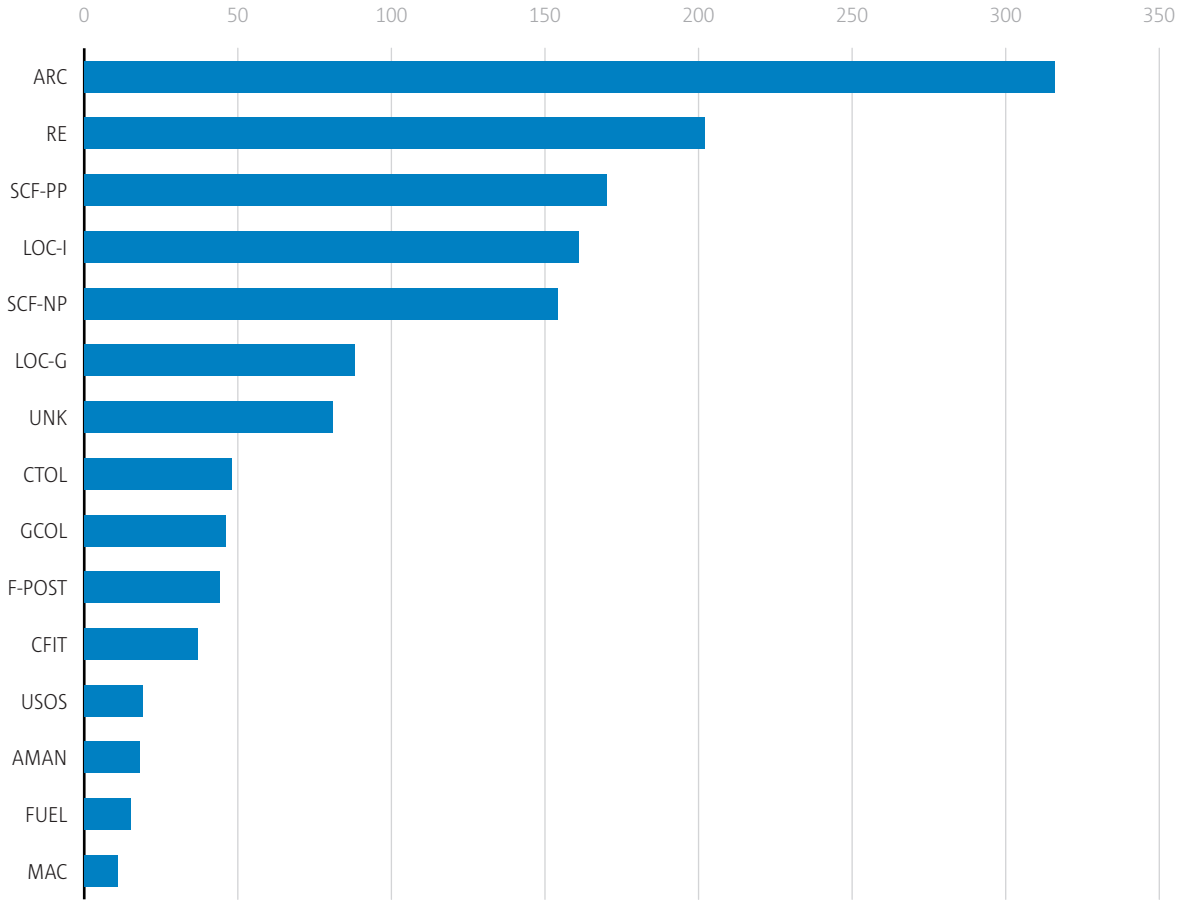



**Figure 2.31** Comparison of number of accidents involving non-commercial other than complex aeroplanes per month

EASA recommends that pilots engage in pre-flight planning and mentally rehearse potential scenarios to better address in-flight decision-making. Such preparation can significantly enhance a pilot's situational awareness, clarity of thought, and ability to execute safe landings, thereby reducing the likelihood of adverse outcomes.

## Occurrence categories

Figure 2.32 outlines the top 15 categories assigned to accidents in the past five years. Occurrences are categorised using the Commercial Aviation Safety Team (CAST)/ICAO Common Taxonomy Team (CICTT) taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed. Categories are of different natures, e.g., operational such as low altitude operations (LALT), environmental such as turbulence encounter (TURB), technical such as system/component failure or malfunction [non-powerplant] (SCF-NP), consequential such as fire/smoke resulting from impact (F-POST), etc. Multiple categories may therefore be assigned to a single occurrence. For example, if an engine failure occurred, and loss of control followed, the occurrence would be coded in both categories, i.e., SCF-PP: powerplant failure or malfunction and LOC-I: loss of control in flight. The sum of the number of occurrences per category may therefore be greater than the total number of occurrences that were realised in the period.



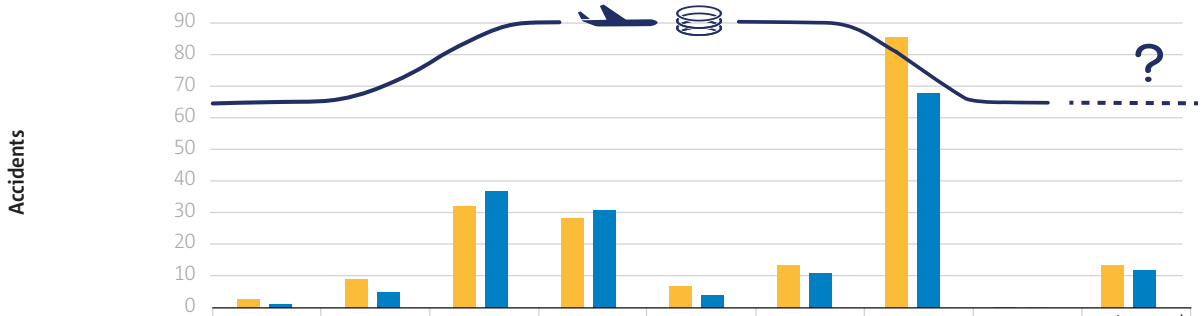

*ARC: Abnormal runway contact; RE: Runway excursion; SCF-PP: powerplant failure or malfunction; LOC-I: Loss of control - inflight; SCF-NP: System/component failure or malfunction [non-powerplant]; LOC-G: Loss of control - ground; UNK: Unknown or undetermined; CTOL: Collision with obstacle(s) during take-off and landing; GCOL: Ground Collision; F-POST: Fire/smoke (post-impact); CFIT: Controlled flight into or toward terrain; USOS: Undershoot/overshoot; AMAN: Abrupt manoeuvre; FUEL: Fuel related; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions.*

**Figure 2.32** Numbers of occurrences by occurrence category involving non-commercial other than complex aeroplanes

The occurrence category ARC leads with 316 accidents, followed by RE with 202 accidents. SCF-PP and LOC-I are next, with 170 and 161 accidents, respectively. This data highlights that approach and landing-related factors (ARC and RE) dominate, while engine failures (SCF-PP) and loss of control (LOC-I) also remain significant concerns.

# Phase of flight

From 2014–2023, landing-phase accidents in NCO averaged 85.7 per year, decreasing to 68 accidents in 2024—below the 10-year average and consistent with the trend observed in 2023. In contrast, take-off accidents increased from an average of 32.2 to 37 in 2024, and en-route accidents increased from 28.3 to 31. Overall, the 2024 figures align with long-term trends, with landing-phase accidents being still the most prevalent phase of flight during which an accident occurs. The unknown/blank category showed a minor decrease, which is typical because accident investigations can take up to three years, often delaying the availability of complete data.

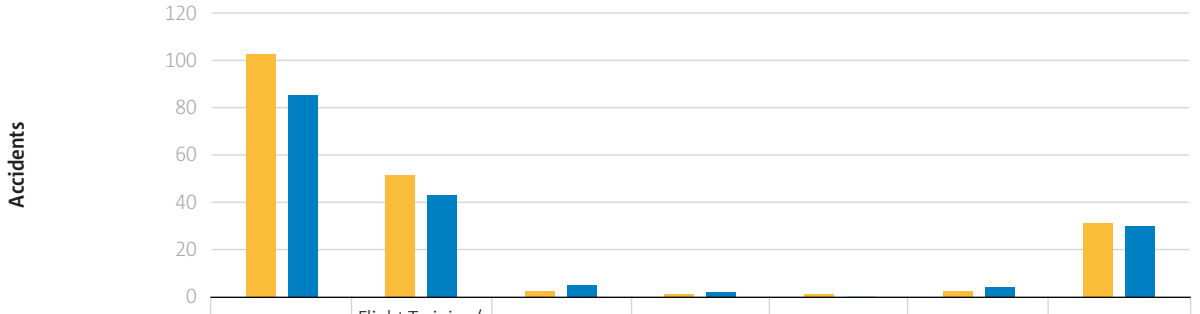



| | Standing | Taxi | Take-off | En route | Manoevring | Approach | Landing | Tow | Unknown/ Blank |
|---|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 2.6 | 9.1 | 32.2 | 28.3 | 6.9 | 13.6 | 85.7 | 0.2 | 13.5 |
| 2024 | 1 | 5 | 37 | 31 | 4 | 11 | 68 | 0 | 12 |

**Figure 2.33** Accidents by phase of flight involving non-commercial other than complex aeroplanes

# Operation type

The highest number of NCO accidents occur in pleasure/recreational flights, averaging 102.5 accidents in 2014-2023, decreasing to 85 accidents in 2024. Flight training/instructional and relocation flights follow, with averages of 51.4 (43 accidents in 2024) and 2.3 (5 accidents in 2024) respectively. Other categories, including test flights, demonstrations, and other activities, show minimal accidents, with the unknown/blank category averaging 31.2 but decreasing slightly to 20 in 2024, reflecting a slight improvement in data quality as investigations progress.



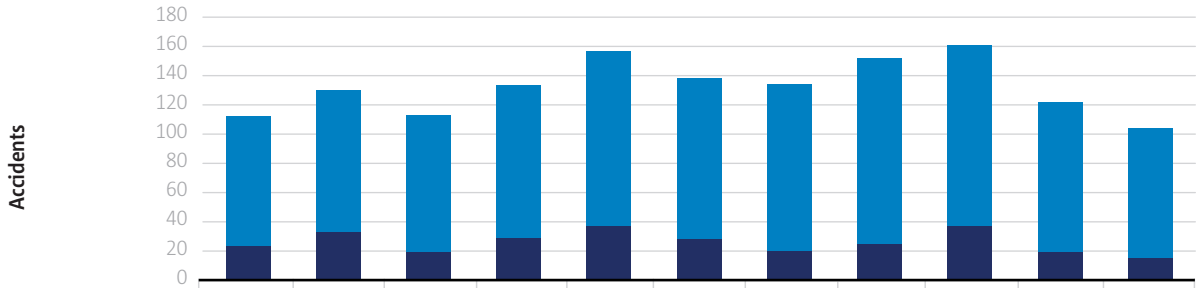

| | Pleasure | Flight Training/ instructional | Relocation | Test flight | Demonstration | Other | Unknown/Blank |
|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 102.5 | 51.4 | 2.3 | 1.2 | 1.1 | 2.3 | 31.2 |
| 2024 | 85 | 43 | 5 | 2 | 0 | 4 | 30 |

**Figure 2.34** Accidents by operation type involving non-commercial other than complex aeroplanes

# Microlights

The diversity of general aviation exceeds EASA´s regulatory remit. However, most accidents involving EASA Member State registered microlight and ultralight aircraft also occur in Europe, with some accidents also occurring outside Europe. Figure 2.35 shows fatal accidents and non-fatal accidents by EASA Member State registered microlights and ultralights from 2014 to 2024 that were reported into the ECR and to EASA. The dataset used is the same consolidated dataset that was used for non-commercial other than complex aeroplanes.

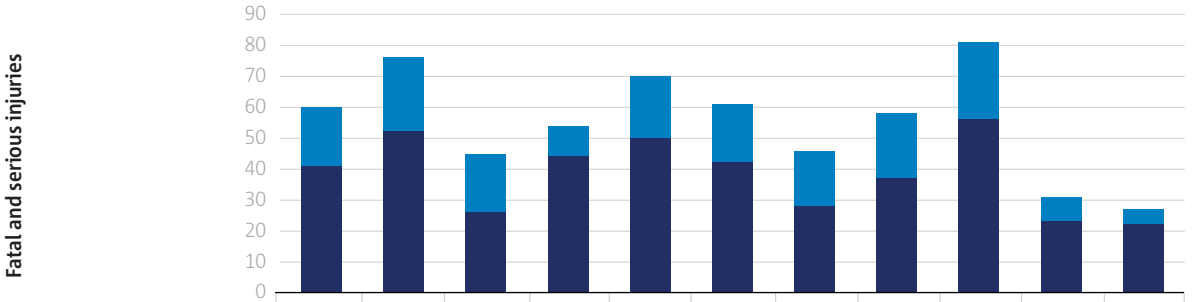
The number of fatal accidents involving non-commercially operated microlights decreased to 15 in 2024, the lowest since 2014 when it was 23. This marks a significant reduction from the peaks of 37 recorded in both 2018 and 2022. Non-fatal accidents decreased from 127 in 2021 to 89 in 2024 – same number of non-fatal accidents as in 2014.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 89 | 97 | 94 | 104 | 120 | 110 | 114 | 127 | 124 | 103 | 89 |
| Fatal accidents | 23 | 33 | 19 | 29 | 37 | 28 | 20 | 25 | 37 | 19 | 15 |

**Figure 2.35** Numbers of fatal accidents and non-fatal accidents per year involving non- commercially operated microlights

Figure 2.36 provides an overview of the reported fatalities and serious injuries involving non-commercially operated microlights during the same period. The dataset used is the same consolidated dataset that was used for non-commercial other than complex aeroplanes. Overall, the number of fatalities and serious injuries is showing a downward trend over time. Fatalities decreased notably to 22 in 2024 compared to 56 in 2022 and 41 in 2014, indicating an overall downward trend in fatalities over the decade. The number of serious injuries decreased to 5 in 2024, the lowest recorded in the period since 2014 when 19 serious injuries were reported.



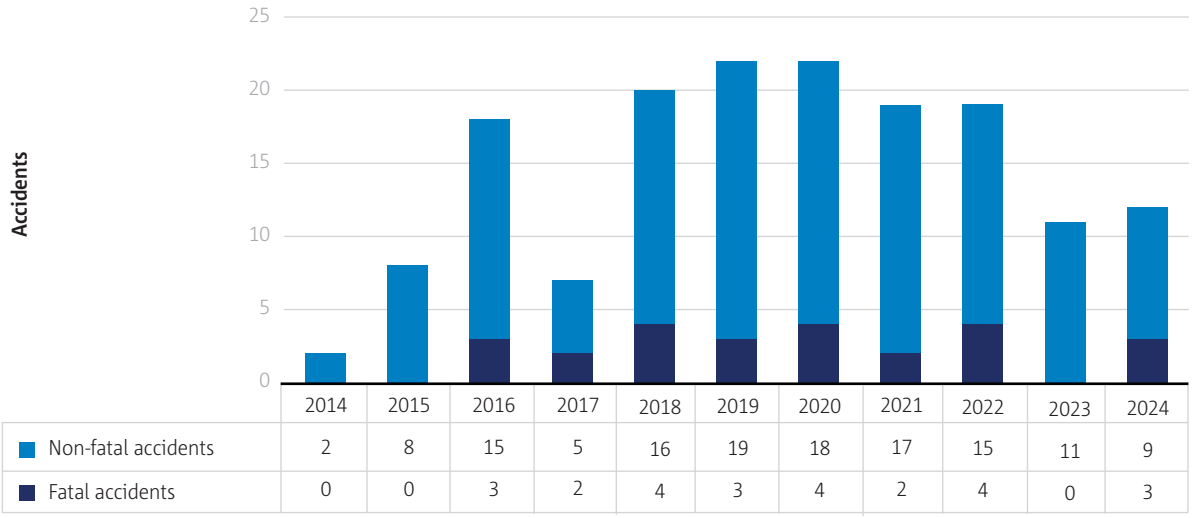

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious injuries | 19 | 24 | 19 | 10 | 20 | 19 | 18 | 21 | 25 | 8 | 5 |
| Fatalities | 41 | 52 | 26 | 44 | 50 | 42 | 28 | 37 | 56 | 23 | 22 |

**Figure 2.36** Numbers of fatal and serious injuries per year involving non-commercially operated microlights

# Aeroplanes registered outside the EASA Member States

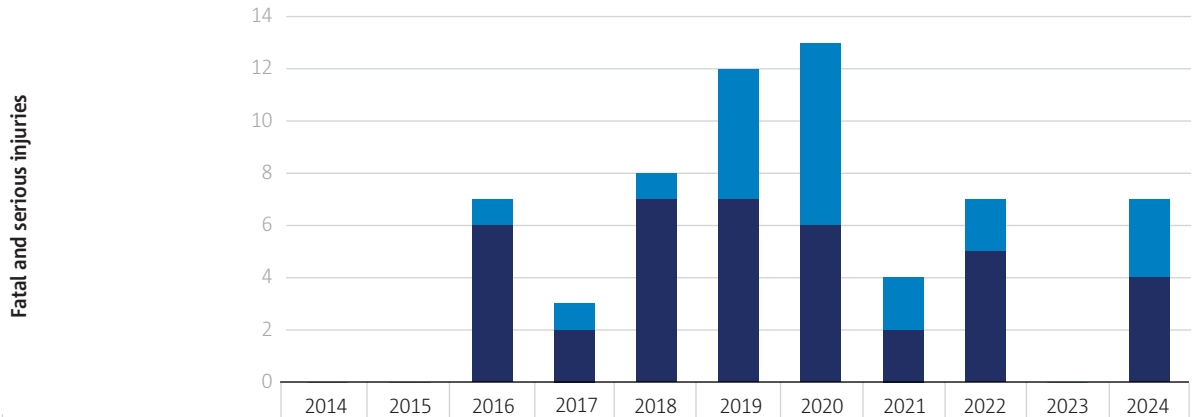
Aeroplanes registered outside the EASA Member States but operated inside the union, fall outside of EASA's regulatory remit. Most of these aeroplanes are registered in the United States of America (N-registered aeroplanes), and in the United Kingdom (G-registered aircraft). To provide an overview of this sector, EASA provides figures of accidents that have been reported to or collected by EASA. The dataset only includes certified VLA, LSA and small aeroplanes, the time period used is 2014-2024.

Figure 2.37 shows 135 non-fatal and 25 fatal accidents from 2014-2024. Figure 2.38 shows that these accidents resulted in 39 fatalities and 22 serious injuries.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 2 | 8 | 15 | 5 | 16 | 19 | 18 | 17 | 15 | 11 | 9 |
| Fatal accidents | 0 | 0 | 3 | 2 | 4 | 3 | 4 | 2 | 4 | 0 | 3 |

**Figure 2.37** Numbers of fatal accidents and non-fatal accidents in EASA Member States per year involving non-commercially operated aircraft not registered in an EASA Member State




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious injuries | 0 | 0 | 1 | 1 | 1 | 5 | 7 | 2 | 2 | 0 | 3 |
| Fatalities | 0 | 0 | 6 | 2 | 7 | 7 | 6 | 2 | 5 | 0 | 4 |

**Figure 2.38** Numbers of fatal and serious injuries per year involving non-commercially operated aircraft not registered in the EASA Member State

Figure 2.39 Numbers of fatal and non-fatal accidents in non-commercially operated aeroplanes not registered in an EASA Member State and occurring within an EASA Member State. There were 25 fatal accidents in the period on these aeroplanes.

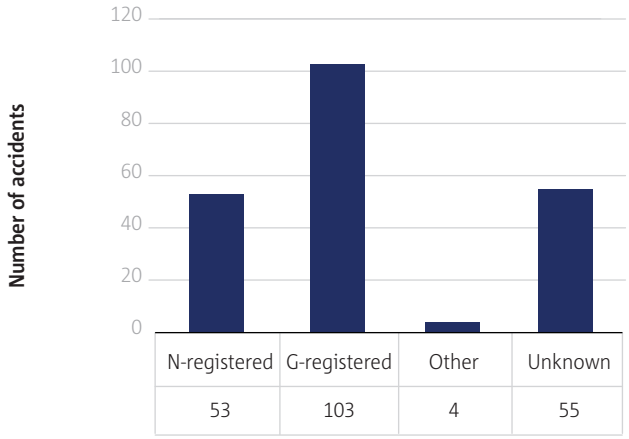



**Figure 2.39** Numbers of fatal and non-fatal accidents on non-commercially operated aeroplanes not registered in the EASA Member State and occurring within the EASA Member State.

## Safety risks

The safety risks for the non-commercially operated small aeroplanes are derived from occurrences data recorded in the ECR, covering the two-year period 2023-2024. From the 12 363 occurrences in 2023 and 2024, 7 248 occurrences were completed with the KRA and ERCS safety risk score, representing an ERCS completion rate of 58.6% for the domain. The hereafter information is solely based on this restricted dataset.

The relative comparison between KRAs for this domain is highlighted in Figure 2.40. KRAs and occurrence categories (refer Figure 2.32 in this document) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

The KRA with the highest safety risk is aircraft upset. This KRA has 1 919 occurrences over the two-year period, making it the second most likely KRA but it produces the highest risk score and is therefore the area where the greatest need for intervention lies. Terrain collision, the second highest risk KRA with 131 occurrences and almost half the safety risk score of aircraft upset KRA, shows the highest safety risk per occurrence. To contrast these figures, it can be observed that the KRA airborne collision has 2 555 occurrences, making it the most likely, but only the third highest safety risk. The risk of fatalities or injuries is therefore significantly lower. The same goes for the KRA excursion. Other KRAs worth mentioning are obstacle collision in flight and collision on runway.

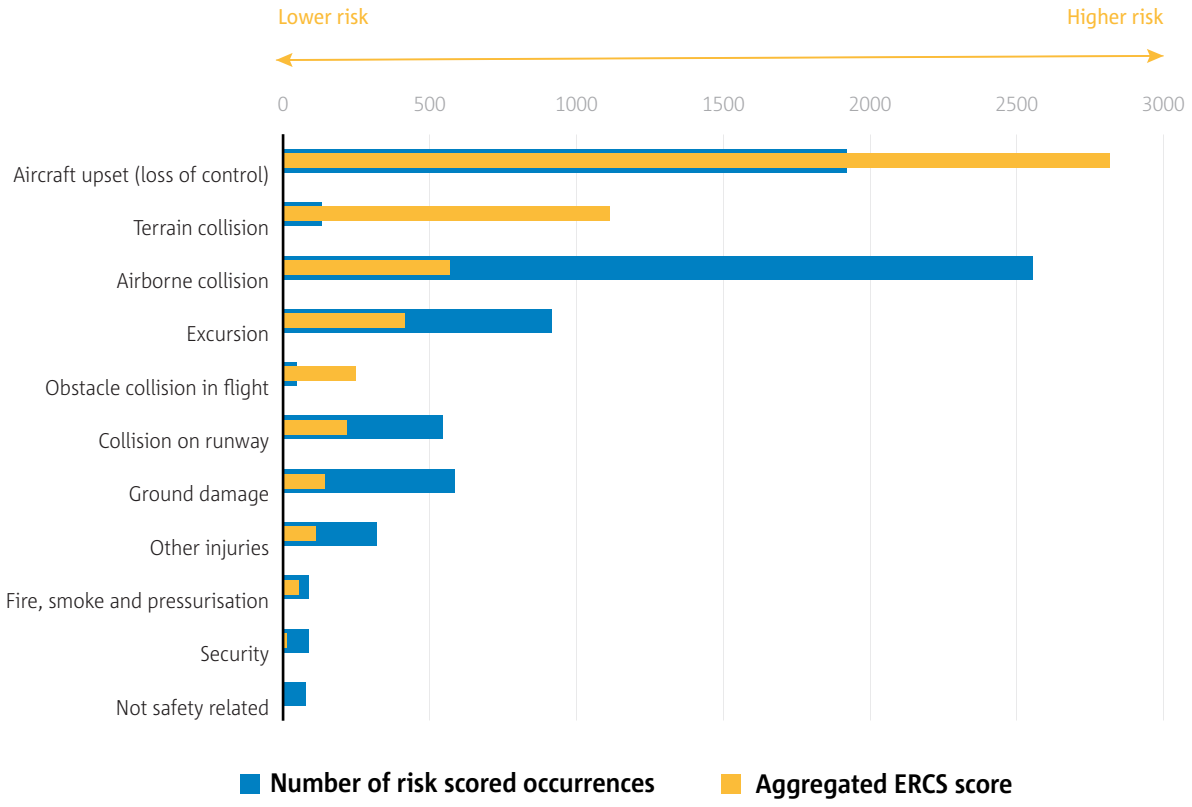



**Figure 2.40** KRAs by aggregated ERCS score and number of risk-scored occurrences involving NCO aeroplanes

EASA
European Union Aviation Safety Agency

# Chapter 3
# Helicopters

**ANNUAL SAFETY REVIEW**
**2025**

This chapter covers all operations involving EASA certified or validated helicopters. The chapter is divided in four main sections:

- **All helicopter operations** providing aggregated statistics on EASA certified or validated helicopters performing Commercial air transport (CAT), Specialised operations (SPO) or Non-commercial operations (NCO), and for which an EASA Member State is either state of operator, state of registry or state of occurrence;
- **CAT flights** conducted by EASA AOC holders and using certified or validated helicopters. This section brings together CAT helicopter operations for both onshore and offshore flights and includes HEMS, air ambulance, air taxi or sightseeing, and those flights to offshore oil, gas and renewable energy installations;
- **SPO** involving certified or validated helicopters, such as sling load, advertisement, and photography with an EASA Member State as the state of operator or state of registry;
- **NCO** involving certified or validated helicopters, with an EASA Member State as the state of operator or state of registry. This section includes, particularly training flights.

The data presented are based on the accidents collected by the Agency under Regulation (EU) 996/2010 on accident and serious incident investigation and Regulation (EU) 376/2014 on occurrence reporting. This report is enhanced with compiled data gathered from operators, OEMs to build an overall safety picture for the helicopter operations.

For each section, the key statistics, occurrence categories and safety risks are presented in the core document. The overview of the safety risks is solely derived from occurrence data from the ECR. It is important to note that the fleet size data has been extracted from the Cirium[12] database regarding the total EASA Member State fleet for the period between 2020-2024.

The list of fatal accidents associated with the scope of this chapter is provided in Appendix 1 of this document.

12 Source: Cirium Fleets Analyzer. Extraction date: May 2025. Includes all civil (i.e., non-military and non-state) CS-27 and CS-29 rotorcraft that are operated by EASA Member State operators. EASA Type I rotorcraft are excluded. Cirium makes no warranties, express or implied, as to the accuracy, adequacy, timeliness, or completeness of its data or its fitness for any particular purpose. Cirium disclaims all liability relating to or fully arising out of use of its data and other content or permissible by law.

# 3.1 All helicopter operations

The scope of this section covers the key safety statistics for certified or validated helicopters performing CAT, SPO or NCO, for which an EASA Member State is either the state of operator, the state of registry or the state of occurrence.

Since these figures are not normalised with traffic data, the number of occurrences should be interpreted cautiously, as there is variation in the figures for the helicopter flying activity at the European level and is difficult to estimate the corresponding mission types and hours flown. The Rotorcraft community is currently taking action to address the recurrent challenge of assessing the level of helicopter flying activity in Europe by evaluating the option of a proxy of accident rate data, to consolidate fleet flying hours. We know that the information contained within this report can be improved: accuracy and fidelity can be enhanced; industry/NCAs intelligence can be expanded; further Information gathering, exchange and analysis can be performed to continuously develop this report.

## Key statistics

The key statistics for this domain are in Table 3.1 and Table 3.2. It includes a comparison of the number of accidents (fatal and non-fatal) and serious incidents for the last year and the previous 10-year period. Similarly, a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe is also included.

In absolute numbers, 2024 shows an increase in non-fatal accidents and serious incidents compared to the average of the previous decade, while fatal accidents staying near the lowest level recorded in the past ten years.

| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **82** | **7** | ↓ |
| **Non-fatal accidents** | **353** | **37** | ↑ |
| **Serious incidents** | **144** | **38** | ↑ |

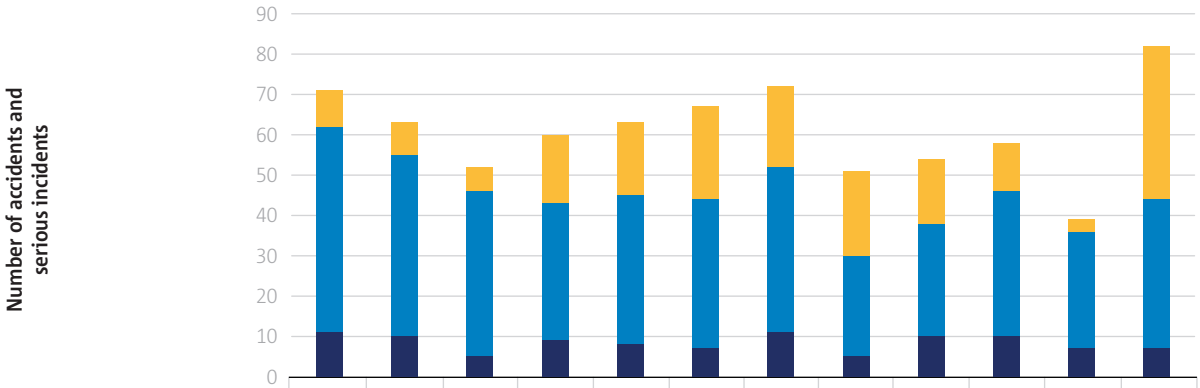
**Table 3.1** Key statistics for all helicopter operations

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **191** | **109** |
| **Yearly max number over 2014-2023** | **37** | **19** |
| **Yearly min number over 2014-2023** | **9** | **5** |
| **Total number in 2024** | **14** | **14** |

**Table 3.2** Fatalities and serious injuries involving all helicopter operations

The graph below shows the distribution of fatal and non-fatal accidents over the period (Figure 3.1). In 2024, the total number of fatal accidents remained near the minimum, non-fatal accidents stayed close to the 10-year average, whereas serious incidents saw a notable increase.

In the last 5-year period (2020-2024) covered by this report, there were 75 fatalities in the identified accidents. Considering all accidents (fatal and non-fatal) gives a mean fatality rate of 0.38 fatalities per accident. Considering only fatal accidents, the mean fatality rate becomes 2 fatalities per accident.

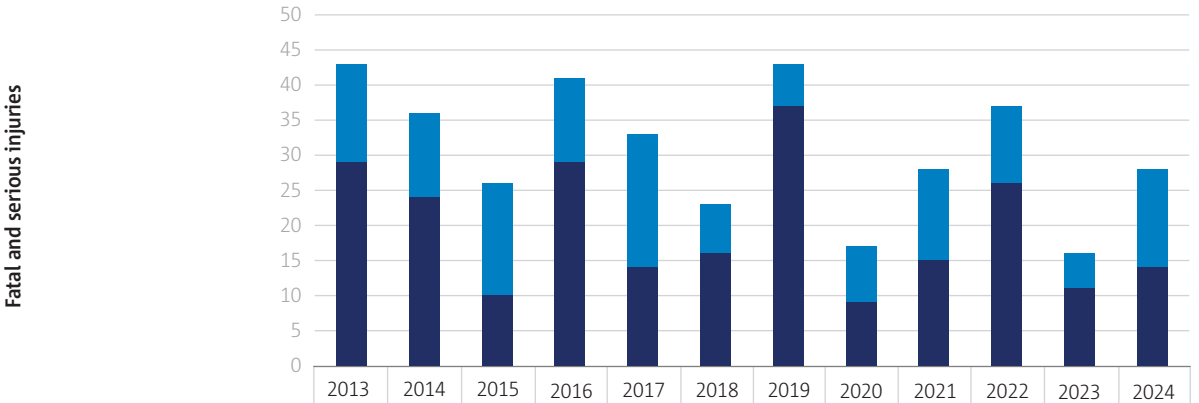



| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious incidents | 9 | 8 | 6 | 17 | 18 | 23 | 20 | 21 | 16 | 12 | 3 | 38 |
| Non-fatal accidents | 51 | 45 | 41 | 34 | 37 | 37 | 41 | 25 | 28 | 36 | 29 | 37 |
| Fatal accidents | 11 | 10 | 5 | 9 | 8 | 7 | 11 | 5 | 10 | 10 | 7 | 7 |

**Figure 3.1** Fatal accidents, non-fatal accidents and serious incidents per year involving all helicopter operations

The Figure 3.1 shows the occurrence number totals, split between fatal and non-fatal and serious incidents.

In 2024, there was a slight increase in the number of fatalities, while serious injuries experienced a noticeable increase.

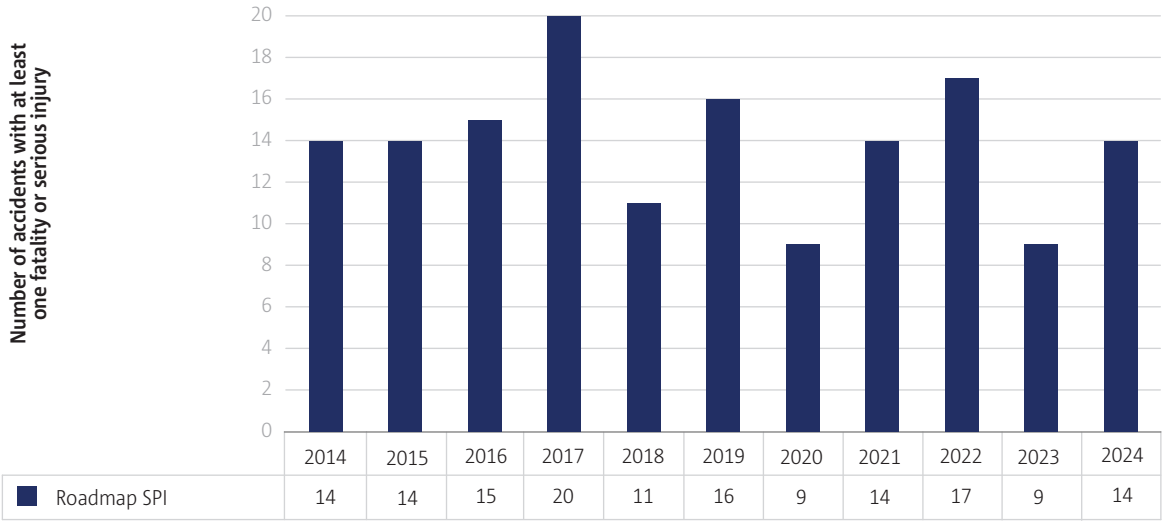



| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 14 | 12 | 16 | 12 | 19 | 7 | 6 | 8 | 13 | 11 | 5 | 14 |
| Fatalities | 29 | 24 | 10 | 29 | 14 | 16 | 37 | 9 | 15 | 26 | 11 | 14 |

**Figure 3.2** Fatal and serious injuries per year involving all helicopter operations

# Rotorcraft safety roadmap Safety Performance Indicator (SPI)

The safety performance of the Rotorcraft safety roadmap is measured by a series of metrics , one of those is to continually reduce fatalities and injuries, and to achieve a continuous reduction of operational safety risks. The Safety Performance Indicator (SPI) is used to monitor the and understand the safety performance as we progress to sustain a positive trend. As part of the Rotorcraft Roadmap, safety is a continuous work that addresses transversal issues and and encompasses training, operations, as well initial and continuing airworthiness. Initiatives with operators and manufacturers aim to prioritise risk detection and identify which activities require strong support through both training and operational updates.



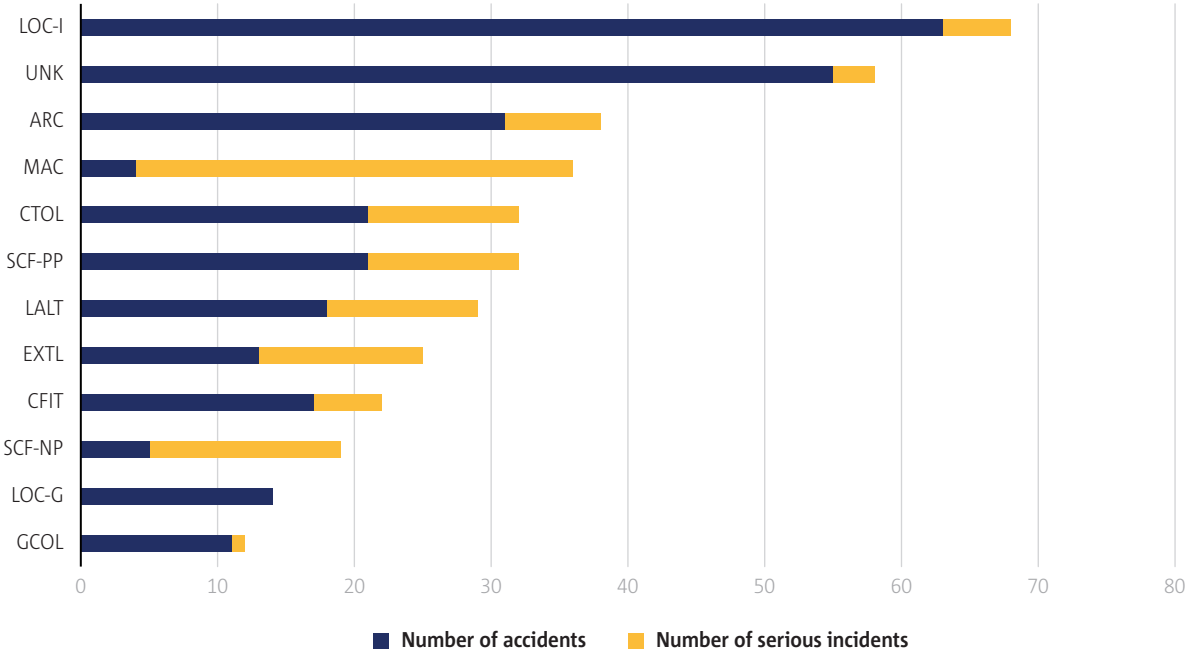

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Roadmap SPI | 14 | 14 | 15 | 20 | 11 | 16 | 9 | 14 | 17 | 9 | 14 |

**Figure 3.3** Number of accidents and serious incidents with a least one fatality or serious injury for all helicopter operations

## Occurrence categories

Figure 3.4 shows the breakdown of all accidents by ICAO ADREP taxonomy over the 5-year period by type of occurrence class.

The CAST/ICAO Common Taxonomy Team (CICTT) provides definitions for aviation occurrence categories. For each of the accidents, where possible, one or more occurrence categories were allocated. In some cases, more than one occurrence category is applied to a single accident. Categories are of different natures, e.g., operational such as low altitude operations (LALT), environmental such as turbulence encounter (TURB), technical such as system/ component failure or malfunction [non-powerplant] (SCF-NP), consequential such as fire/smoke resulting from impact (F-POST), etc. The sum of the number of occurrences per category may therefore be greater than the total number of occurrences that were realised in the period.




*LOC-I: Loss of control – inflight; UNK: Unknown or undetermined; ARC: Abnormal runway contact; MAC: Airprox/ACAS alert/loss of separation/ (near) midair collisions; CTOL: Collision with obstacle(s) during take-off and landing; SCF-PP: powerplant failure or malfunction; LALT: Low altitude operations; EXTL: External load related occurrences; CFIT: Controlled flight into or toward terrain; SCF-NP: System/component failure or malfunction [non-powerplant]; LOC-G: Loss of control – ground; GCOL: Ground Collision*

**Figure 3.4** Numbers of accidents and serious incidents by occurrence category and occurrence class for all helicopter operations

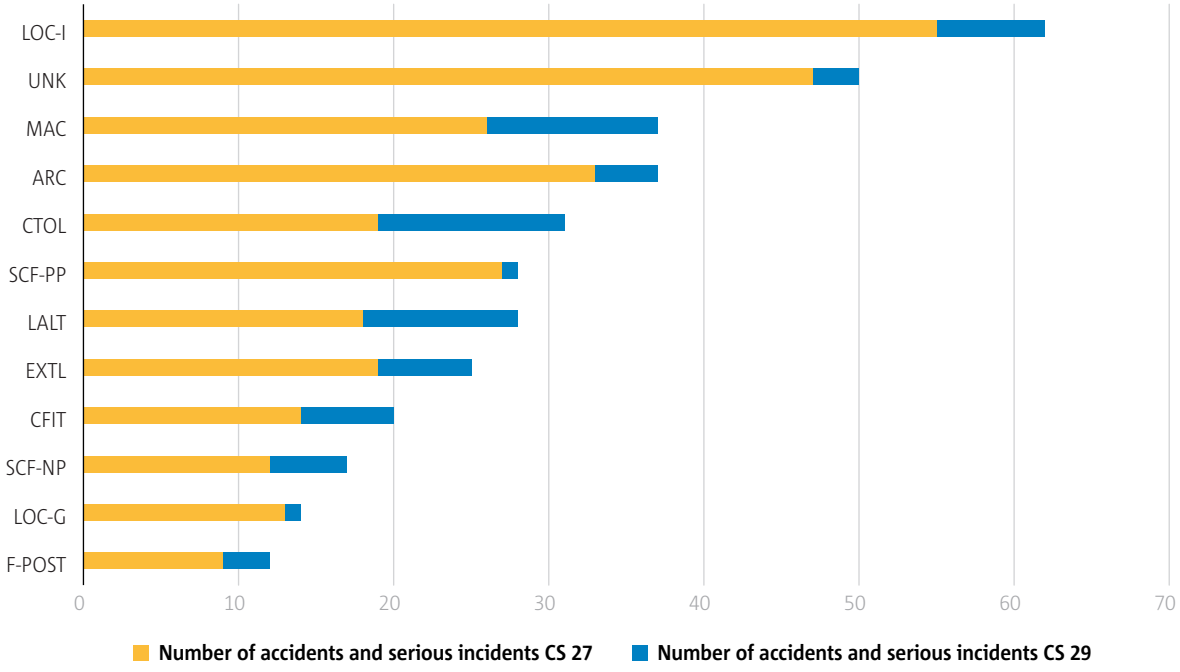
In the last five years covered by this dataset (2020-2024), the three most common occurrence categories accidents (fatal and non-fatal) were: loss of control in flight (LOC-I);  abnormal runway contact (ARC), collision with obstacle(s) (CTOL).

Including serious incidents we have these five grouping: MAC, ARC, CTOL, SCF-PP, LALT,  account for nearly same total number of accidents and serious incidents.

The occurrence category UNK: unknown is the second high-risk accident occurrence category which appears in the figures. This may be the result of the investigation process and reporting where mapping occurrence categories can take a certain amount of time. The UNK category here contains 17%. The quality of reporting the safety occurrences is in important factor to understand the true safety performance of the industry and measure improvements as we progress towards our goal of zero fatal accidents and that reporting organisations and competent authorities continue their effort to improve the coding quality of occurrence records submitted under Regulation (EU) 376/2014.

The data presented highlight the importance of the Data4Safety Programme and the benefits of sharing data; with focus on the development of automation algorithms applied to occurrence information, to support the coding of fields such as the Occurrence Category values and reduce the proportion of "Unknown" values. By collaborating we can better understand the safety performance of the helicopter operations and measure the improvements as we progress towards.

The Figure 3.5 shows the breakdown of all accidents by ICAO ADREP taxonomy over the 5-year by type of certification specification, Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29).



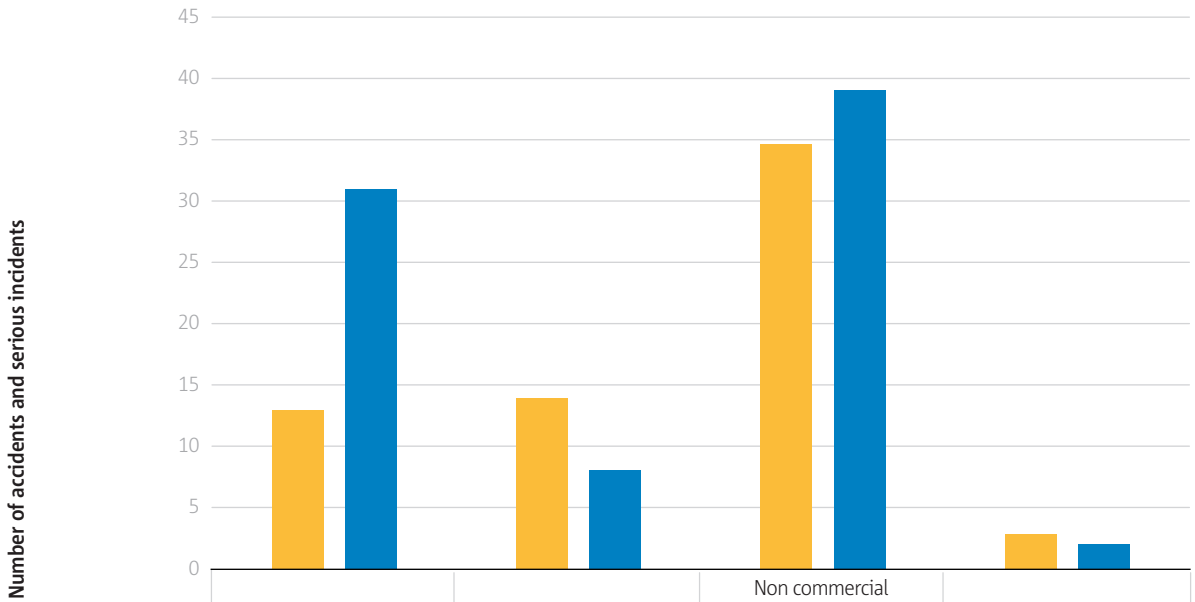

*LOC-I: Loss of control – inflight; UNK: Unknown or undetermined; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; ARC: Abnormal runway contact; CTOL: Collision with obstacle(s) during take-off and landing; SCF-PP: powerplant failure or malfunction; LALT: Low altitude operations; EXTL: External load-related occurrences; CFIT: Controlled flight into or toward terrain; SCF-NP: System/component failure or malfunction [non-powerplant;  LOC-G: Loss of control – ground;; ] F-POST: Fire/smoke (post-impact);*

**Figure 3.5** Numbers of accidents and serious incidents by occurrence category and aircraft certification type for all helicopter operations

# Helicopter operations sub-domains

Figure 3.6 shows the numbers of accidents for the four main sub-domains of operations involving certified and validated helicopters. Over the decade 2014-2023, the proportions of each domain are the following:

- 53.1% of all accidents and serious incidents involved certified and validated helicopters performing non-commercial operations and for which an EASA Member State was either the state of operator or state of registry;
- 21.3% of all accidents and serious incidents involved certified and validated helicopters performing SPO and for which an EASA Member State was either the state of operator or state of registry;
- 19.8% of all accidents and serious incidents involved certified and validated helicopters performing CAT conducted by EASA Member State AOC holders;
- 2% of all accidents and serious incidents involved certified helicopters whose state of operator and state of registry were a third country but for which the state of occurrence was an EASA Member State.

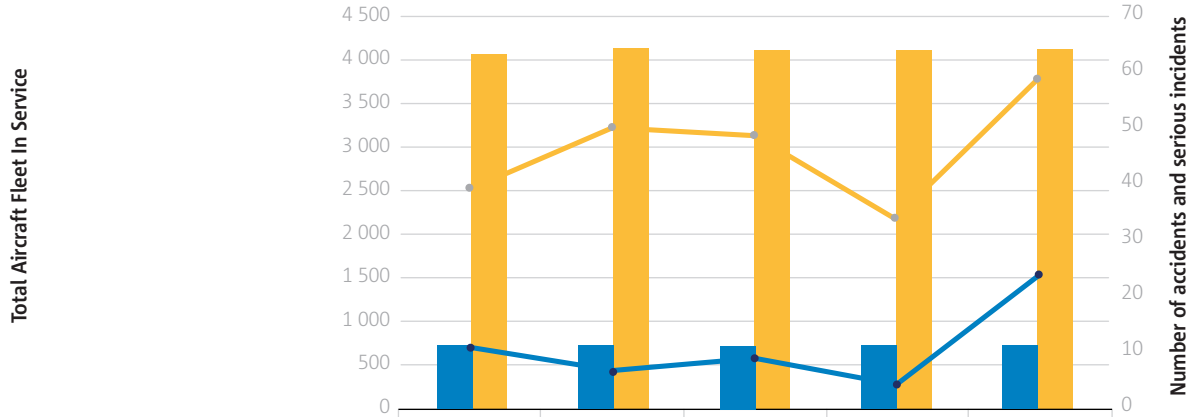



| | CAT - EASA MS AoC holder | SPO - EASA MS operated or registered | Non commercial - EASA MS operated or registered | Third country registered |
|---|---|---|---|---|
| Average 2014-2023 | 12.9 | 13.9 | 34.6 | 2.8 |
| 2024 | 31 | 8 | 39 | 2 |

**Figure 3.6** Accidents and serious incidents by helicopter operation sub-domains

# Type of certified helicopter (CS27/CS29)

Figure 3.7 shows the distribution over the 5-year period of the EASA Member State rotorcraft fleets in total by type of certification specification, Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29), with a trendline of accidents in the given period. The total fleet in service is shown in the primary vertical axis of the graph, whereas the total number of accidents in each period is shown in the secondary vertical axis.




| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| CS 29 Total In Service | 731 | 731 | 724 | 734 | 734 |
| CS 27 Total In Service | 4 076 | 4 136 | 4 121 | 4 117 | 4 126 |
| CS 29 Accidents and Serious incidents | 11 | 6 | 9 | 4 | 24 |
| CS 27 Accidents and Serious incidents | 39 | 50 | 49 | 34 | 58 |

**Figure 3.7** Accidents and serious incidents by certification specification for all helicopter operations with the breakdown of aircraft certification type for the reported fleet

# Safety risks

The safety risks identified hereafter are derived from occurrences data recorded in the ECR, covering the two-year period of 2023-2024. With an average of approximately 1950 occurrences per year, 2100 were completed with an ERCS safety risk score, resulting a 52% ERCS completion rate for the domain.

When considering only accidents and serious incidents, the ERCS completion rate for the domain rises to 85%.

The relative comparison between KRAs for this domain is highlighted in Figure 3.8. KRAs and occurrence categories (refer to core document Figure 3.4) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

In the visual below you can see the top KRAs with the higher-risk KRAs being:

- **Aircraft upset (loss of control)** includes an undesired aircraft state characterised by unintentional divergences from parameters normally experienced during operations, which might ultimately lead to an uncontrolled impact with terrain. It remains a critical KRA of helicopter occurrence, particularly concerning due to their potentially severe consequences, emphasising the critical need for comprehensive safety measures and preventive strategies within the aviation industry. Various factors contribute to aircraft upset. These factors can range from engine failures, adverse weather conditions, maintenance events, or HP deficiencies such as, but not limited to; inappropriate energy management, inappropriate automation management, spatial disorientation, weakness in monitoring, etc. Managing an event like this requires pilots to use their technical and non-technical competencies to best effect to maximize resilience and minimize the possibility and effect of surprise.
- **Airborne collision** includes all occurrences involving actual or potential airborne collisions between aircraft, while both aircraft are airborne and between aircraft and other airborne objects (excluding birds and wildlife). Despite accounting for a relatively small percentage of ERCS equivalent weight, over the past year, airborne collision is a significant contributor to occurrences. The statistics highlight the importance for both manned and unmanned aircraft operated by aviation professionals to recognise this threat and develop skills on how to scan for traffic conflicts.
- **Terrain collision (CFIT)** includes occurrences where an aircraft collides with terrain, without indication that the flight crew was unable to control the aircraft. Analysing data for the last year, terrain collision is not the most frequent outcome of accidents but when looking at the ERCS score it has the highest ERCS equivalent weight. Today, accident data shows that terrain collision occurrences are much lower.

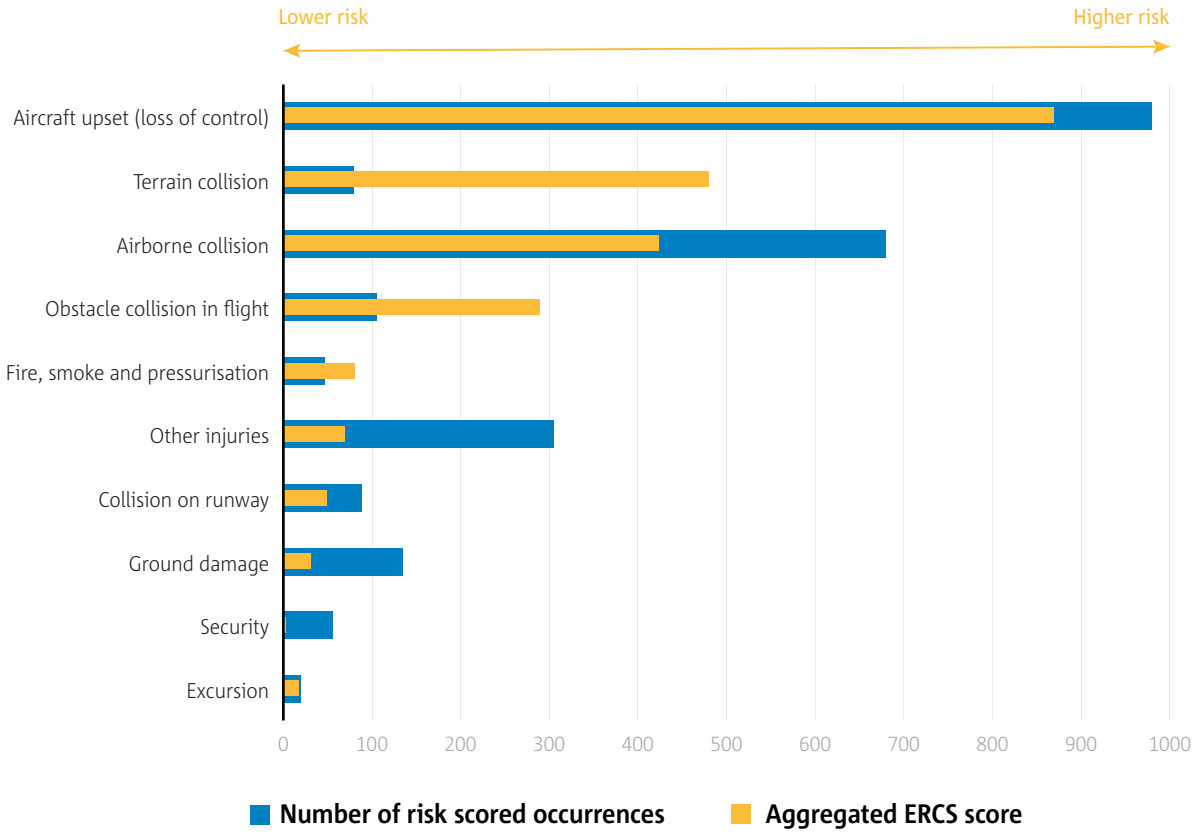



**Figure 3.8** KRAs by aggregated ERCS score and number of risk-scored occurrences involving all helicopter operations

# 3.2 Commercial air transport (CAT) helicopters

This section presents the key safety statistics for EASA certified or validated helicopters performing CAT and operated by an EASA Member State AOC holder. This includes offshore flights, as well as onshore HEMS, air ambulance, sightseeing tours, air taxis or any other operation to transport passengers, cargo or mail for remuneration or other valuable consideration.

## European CAT helicopter fleet

Figure 3.9 and Figure 3.10 show the size of the helicopter CAT sector in the EASA Member State and its evolution over the period 2020-2024.

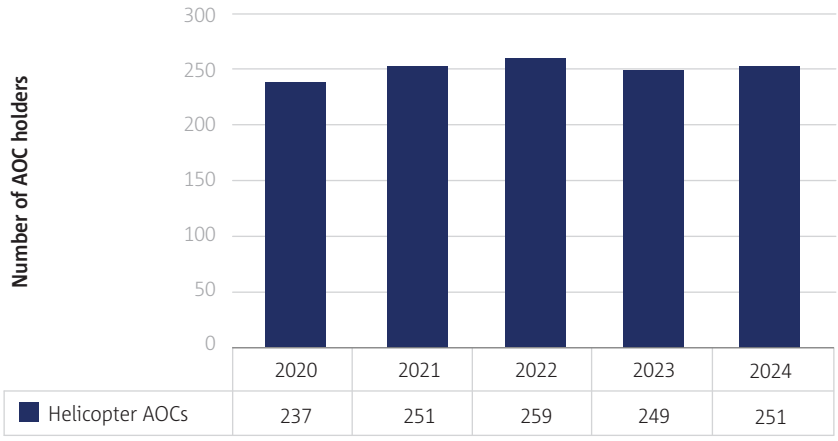



**Figure 3.9** Number of helicopter AOC holders in the EASA Member States

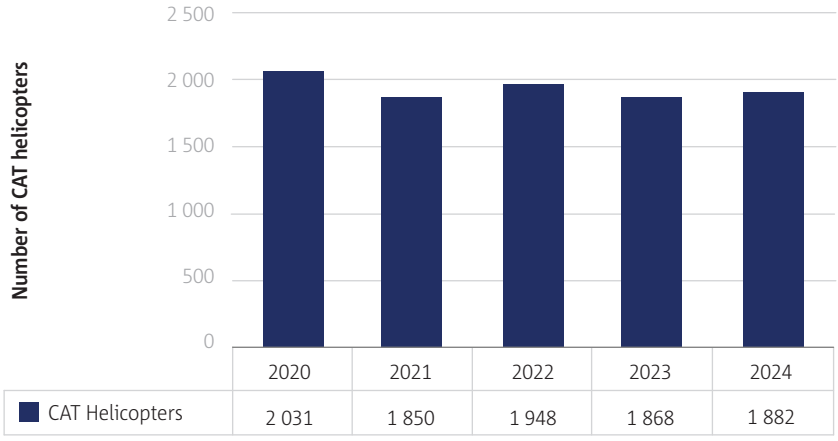



**Figure 3.10** Number of helicopters performing CAT in the EASA Member States

# Key statistics

The key statistics for this domain are in Table 3.3 and Table 3.4, which includes a comparison of the number of accidents (fatal and non-fatal) and serious incidents for the last year and the previous 10-year period. It also includes a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

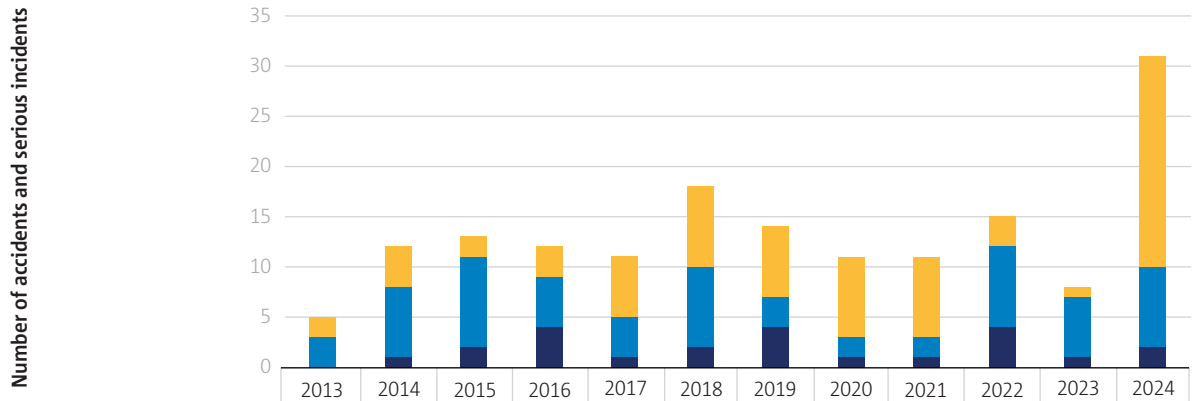
| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **21** | **2** | = |
| **Non-fatal accidents** | **54** | **8** | ↑ |
| **Serious incidents** | **50** | **21** | ↑ |

**Table 3.3** Key Statistics for CAT helicopters

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **93** | **20** |
| **Yearly max number over 2014-2023** | **27** | **7** |
| **Yearly min number over 2014-2023** | **1** | **0** |
| **Total number in 2024** | **4** | **6** |

**Table 3.4** Fatalities and serious injuries involving CAT helicopters

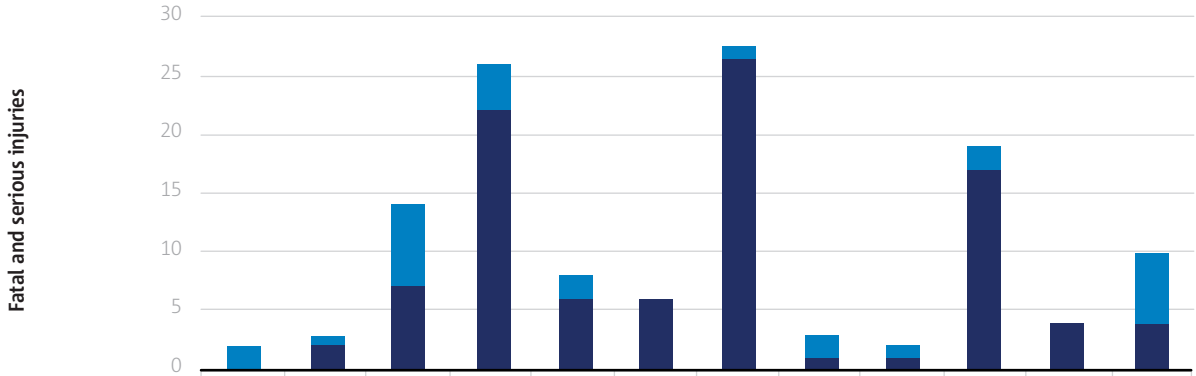
The total number of occurrences in 2024 shows an upward trend compared to the average of the past decade, with a notable rise in serious incidents, reaching the highest level in the last 10-years.




| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious incidents | 2 | 4 | 2 | 3 | 6 | 8 | 7 | 8 | 8 | 3 | 1 | 21 |
| Non-fatal accidents | 3 | 7 | 9 | 5 | 4 | 8 | 3 | 2 | 2 | 8 | 6 | 8 |
| Fatal accidents | 0 | 1 | 2 | 4 | 1 | 2 | 4 | 1 | 1 | 4 | 1 | 2 |

**Figure 3.11** Fatal accidents, non-fatal accidents and serious incidents per year involving CAT helicopters

The figure below shows the 10-year occurrence number totals, split between fatal fatalities and serious injuries. To further analyse, the number of serious injuries in 2024 is at its highest point; however, the total remains limited to just 3 occurrences. This is specific to commercial operations, which on average carry a higher number of passengers compared to other types of operations.

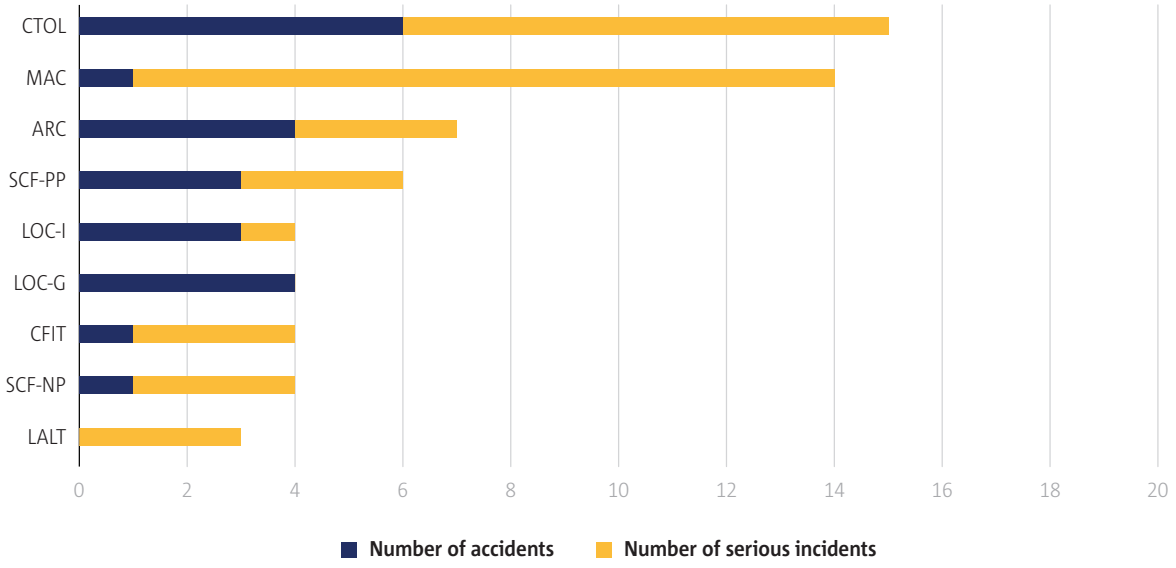



| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 2 | 1 | 7 | 4 | 2 | 0 | 1 | 2 | 1 | 2 | 0 | 6 |
| Fatalities | 0 | 2 | 7 | 22 | 6 | 6 | 27 | 1 | 1 | 17 | 4 | 4 |

**Figure 3.12** Fatal and serious injuries per year involving CAT helicopters

## Occurrence categories

Figure 3.13 outlines the top occurrence categories assigned to the accidents in the past five years.



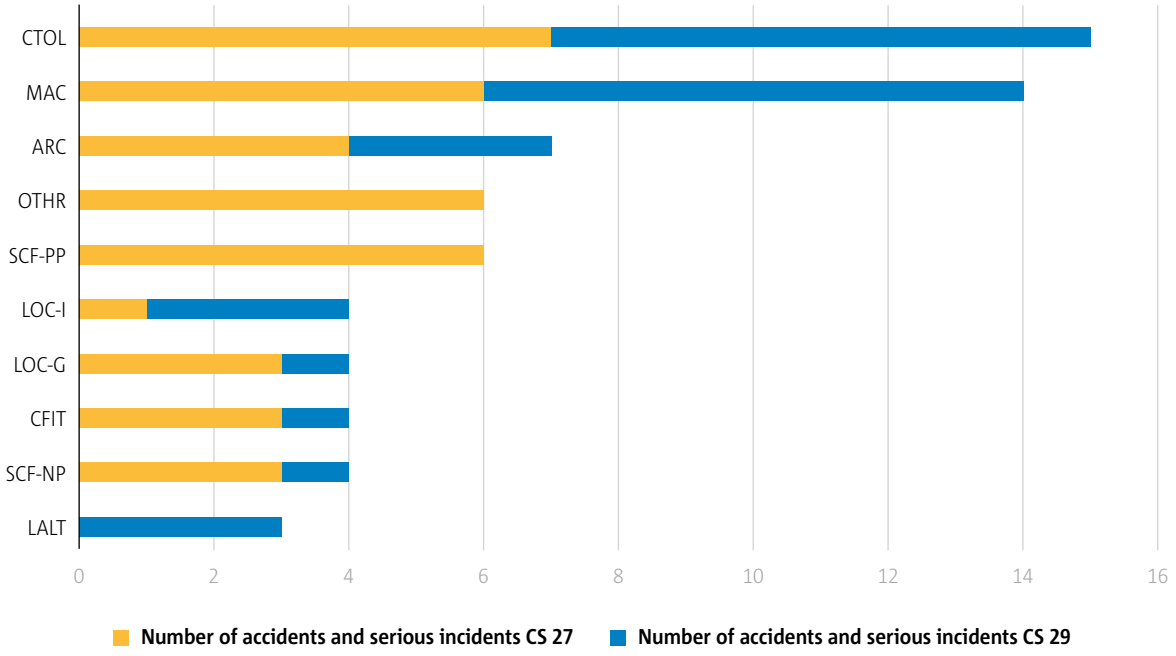

*CTOL: Collision with obstacle(s) during take-off and landing; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; ARC: Abnormal runway contact; SCF-PP: powerplant failure or malfunction; LOC-I: Loss of control – inflight; LOC-G: Loss of control – ground; CFIT: Controlled flight into or toward terrain; SCF-NP: System/component failure or malfunction [non-powerplant]; LALT: Low altitude operations*

**Figure 3.13** Numbers of accidents and serious incidents by occurrence category and occurrence class involving CAT helicopters

Occurrences are categorised using the ICAO ADREP taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed.

Based on the analysis , the three most common occurrence categories associated with all accidents involving CAT helicopters over 2020-2024 are: CTOL: Collision with obstacle(s) during take-off and landing with a high number of serious incidents in 2024; Airprox/ACAS alert/loss of separation/(near) midair collisions remains high exposed in commercial operations with a increased number in reported serious incidents, followed by ARC: Abnormal runway contact.

The Figure 3.14 shows the breakdown of all accidents by ICAO ADREP taxonomy over the 5-year by type of certification specification, Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29).

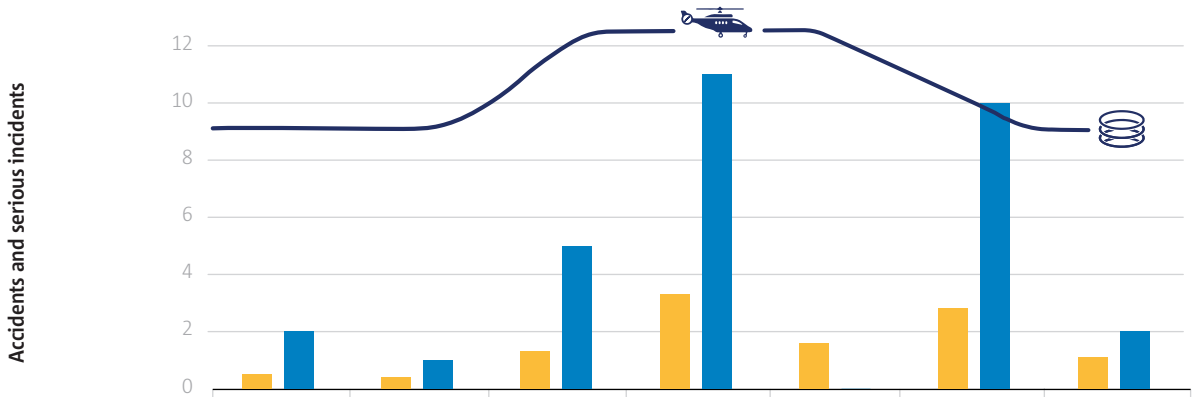



*CTOL: Collision with obstacle(s) during take-off and landing; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; ARC: Abnormal runway contact; OTHR: Other; SCF-PP: powerplant failure or malfunction; LOC-I: Loss of control – inflight; LOC-G: Loss of control – ground; CFIT: Controlled flight into or toward terrain; SCF-NP: System/component failure or malfunction [non-powerplant]; LALT: Low altitude operations*

**Figure 3.14** Numbers of accidents and serious incidents by occurrence category and aircraft certification type involving CAT helicopters

# Phase of flight

Figure 3.15 shows the distribution of accidents by flight phase. Over the decade 2014-2023, the en-route phase and landing phase are the most involved in accidents. In 2024, the same trend continues, with 21 out of 31 occurrences taking place during the en-route or landing phases of flight.

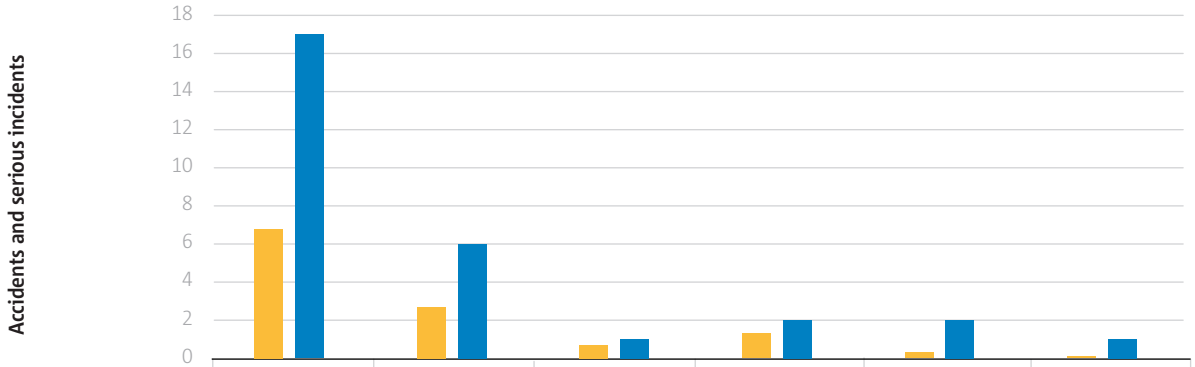



| | Standing | Taxi | Take-off | En route | Approach | Landing | Manoeuvring |
|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 0.5 | 0.4 | 1.3 | 3.3 | 1.6 | 2.8 | 1.1 |
| 2024 | 2 | 1 | 5 | 11 | 0 | 10 | 2 |

**Figure 3.15** Accidents and serious incidents by phase of flight involving CAT helicopters

# Operation type

Figure 3.16 shows the number of accidents and serious incidents per sub-type of operations. With a total of 21 occurrences for this operational type, six accidents and 15 serious incidents in 2024, the figures involving HEMS and Air Ambulance operations showed a significant increase of more than half compared to the average figures of the preceding decade for this type of operation. It showed a similar upward trend in Air Taxi operations.

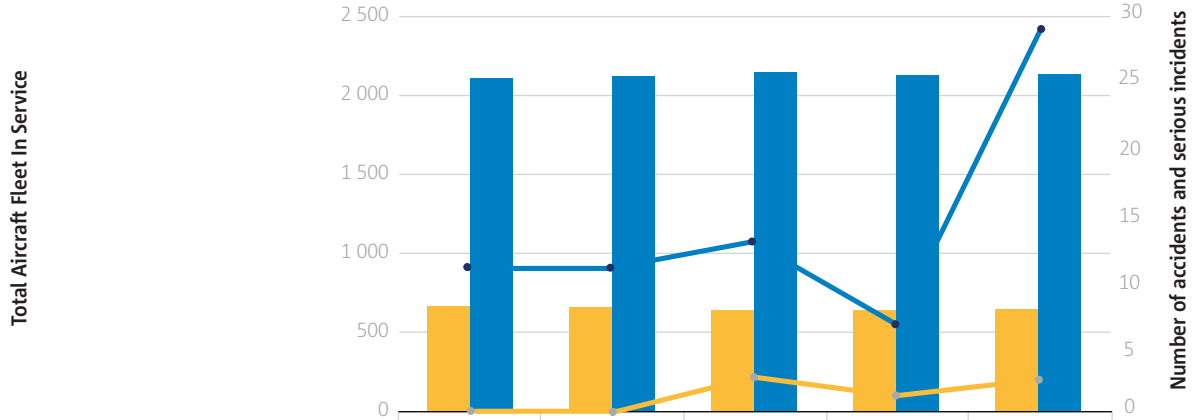



| | HEMS | Air Taxi | Offshore | Sightseeing | Air Ambulance | Airline |
|---|---|---|---|---|---|---|
| Average 2014-2023 | 6.8 | 2.7 | 0.7 | 1.3 | 0.3 | 0.1 |
| 2024 | 17 | 6 | 1 | 2 | 2 | 1 |

**Figure 3.16** Accidents and serious incidents by operation type involving CAT helicopters

# Propulsion type

Figure 3.17 shows the distribution over the 5-year period of the EASA Member State rotorcraft fleets in total by type of propulsion and with a trendline of accidents and serious incidents in the given period. The total fleet in service is shown in the primary vertical axis of the graph, whereas the total number of accidents and serious incidents in each period is shown in the secondary vertical axis.

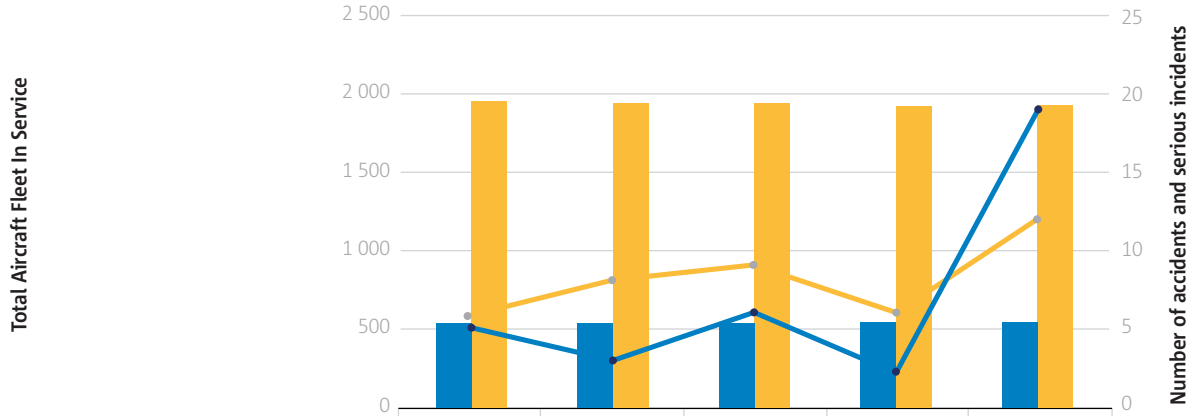



| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| Reciprocating Total In Service | 666 | 658 | 645 | 645 | 650 |
| Turboshaft Total In Service | 2 109 | 2 127 | 2 152 | 2 133 | 2 137 |
| Reciprocating Accidents and Serious incidents | 0 | 0 | 2 | 1 | 2 |
| Turboshaft Accidents and Serious incidents | 11 | 11 | 13 | 7 | 29 |

**Figure 3.17** Accidents and serious incidents by propulsion type involving CAT helicopters with the breakdown of propulsion type for the reported fleet

# Helicopter certification specification (CS27/ CS29)

Figure 3.18 shows the distribution over the 5-year period of the EASA Member State rotorcraft fleets in total by type of certification specification and with a trendline of accidents and serious incidents in the given period. The total fleet in service is shown in the primary vertical axis of the graph, whereas the total number of accidents and serious incidents in each period is shown in the secondary vertical axis. The relationship between certification and CAT operation requirements for transport category rotorcraft is acknowledged to be convoluted due to the diversity of mission types and their applicability to commercial operations. Through this analysis, it becomes evident that the large rotorcraft fleet based on CS 29 certification standards is more exposed compared to the fleet of small rotorcraft based on CS 27 standards.




| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| CS 29 Total In Service | 538 | 542 | 536 | 545 | 548 |
| CS 27 Total In Service | 1 957 | 1 942 | 1 945 | 1 922 | 1 932 |
| CS 29 Accidents and Serious incidents | 5 | 3 | 6 | 2 | 19 |
| CS 27 Accidents and Serious incidents | 6 | 8 | 9 | 6 | 12 |

**Figure 3.18** Accidents and serious incidents by certification specification (CS27/CS29) for CAT operations with the breakdown of aircraft certification type for the reported fleet

# Safety risks

The safety risks for CAT helicopters are derived from occurrences data recorded in the ECR, covering the two-year period 2023-2024.

With an average of approximately 1070 occurrences per year, 1510 were completed with an ERCS safety risk score, resulting a 70% ERCS completion rate for the domain.

When considering only accidents and serious incidents, the ERCS completion rate for the domain rises to 88%.

The relative comparison between KRAs for this domain is highlighted in Figure 3.19. KRAs and occurrence categories (refer to core document Figure 3.13) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per

occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction 3.19.

Aircraft upset remains the main KRAs of the CAT helicopters domain.

The KRAs of Terrain Collision and Fire, Smoke, and Pressurisation recorded fatal accidents during the 2023–2024 analysis period, elevating their risk levels into the top three.

Due to the nature of their activity, the special equipment required and the conditions they get flown in, such as flying at low altitudes and in challenging weather conditions, to reach patients in remote or inaccessible areas, CAT helicopters are exposed to operational and environmental threats.

The aggregated ERCS score shows that airborne collision ranks as the second highest key risk area. This statistic is a strong reminder of the dangers of airborne collision, highlighting the importance of taking the necessary precautions to avoid such a catastrophic event. It serves as a warning to pilots and other aircraft operators to be extra vigilant when flying in the vicinity of other aircraft. Furthermore, it emphasises the need for improved safety protocols and regulations to reduce the risk of aircraft collisions. With common sense and strict adherence to rules and regulations will prevent further accidents.

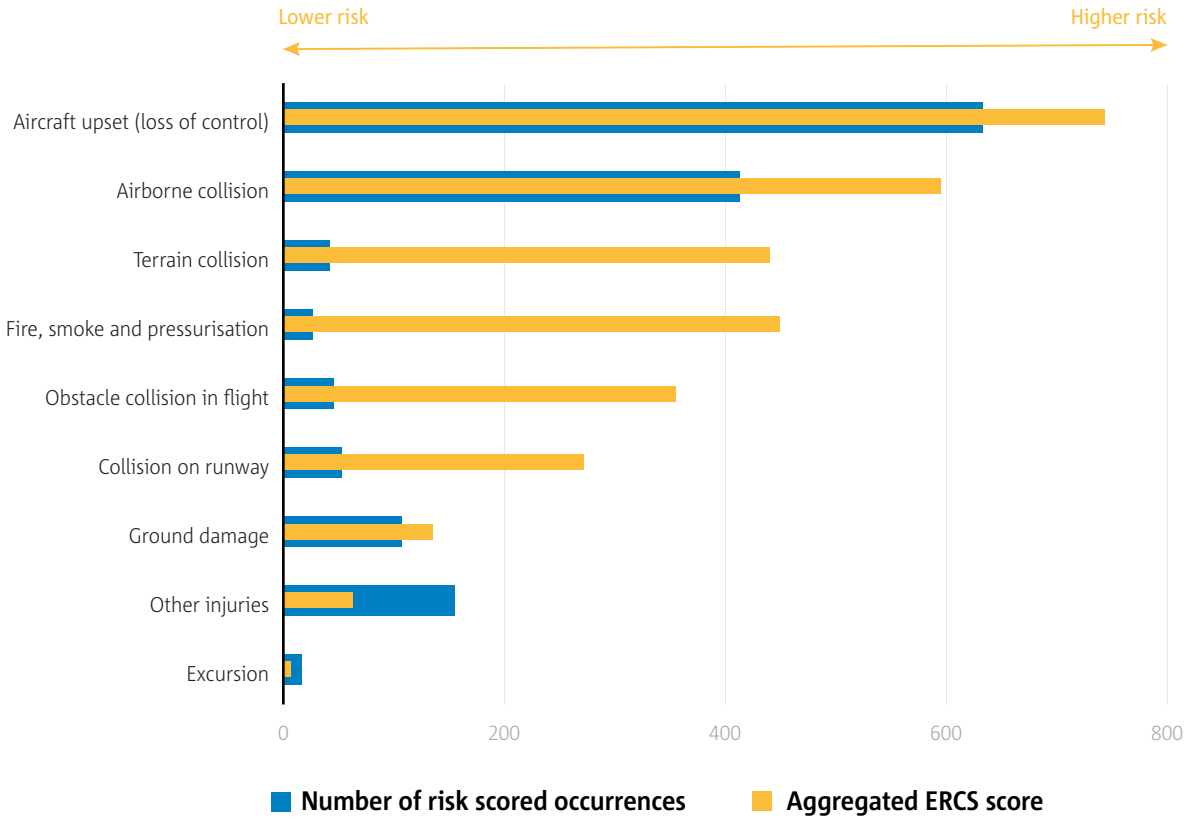



**Figure 3.19** KRAs by aggregated ERCS score and number of risk-scored occurrences involving CAT helicopters

# 3.3 Specialised Operations (SPO) helicopters

This section presents the main safety statistics for EASA certified or validated helicopters performing SPO with an EASA Member State as state of operator or state of registry. SPO are defined as any operation other than CAT where the aircraft is used for specialised activities such as: agriculture, construction, photography, surveying, observation and patrol, aerial advertisement.

## Key statistics

The key statistics for this domain are in Table 3.5 and Table 3.6, which include a comparison of the number of fatal and non-fatal accidents and serious incidents for the last year and the previous 10-year period. It also includes a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

In 2024, there was a slight increase in the number of serious incidents compared to the previous year, while the occurrences of non-fatal accidents and fatal accidents remained at their lowest levels.

| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **14** | **1** | = |
| **Non-fatal accidents** | **95** | **6** | ↓ |
| **Serious incidents** | **34** | **5** | ↑ |

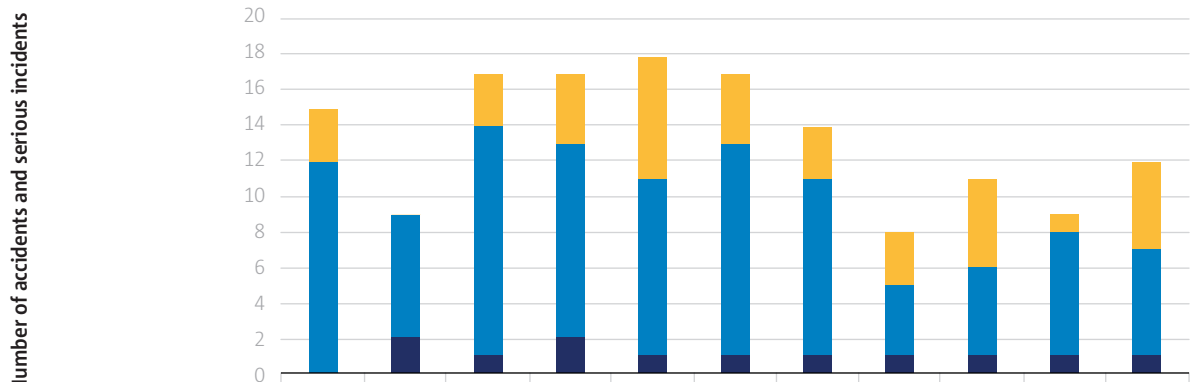
**Table 3.5** Key statistics for SPO helicopters

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **22** | **39** |
| **Yearly max number over 2014-2023** | **11** | **8** |
| **Yearly min number over 2014-2023** | **0** | **1** |
| **Total number in 2024** | **1** | **3** |

**Table 3.6** Fatalities and serious injuries involving SPO helicopters

The number of accidents per year is shown in Figure 3.20.

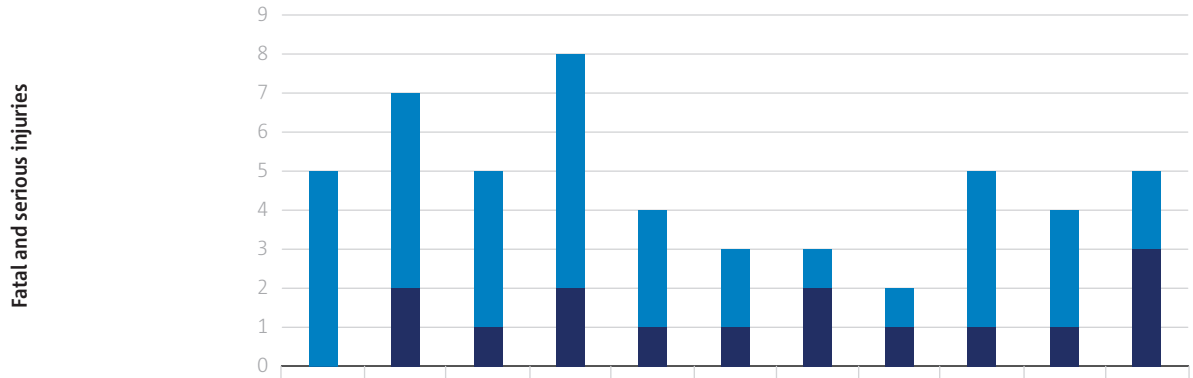
The total number of occurrences in 2024 remains stable and close to the average for the same period. However, a fatal accident occurred during powerline calibration operations, resulting in three deaths.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious incidents | 3 | 0 | 3 | 4 | 7 | 4 | 3 | 3 | 5 | 1 | 5 |
| Non-fatal accidents | 12 | 7 | 13 | 11 | 10 | 12 | 10 | 4 | 5 | 7 | 6 |
| Fatal accidents | 0 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

**Figure 3.20** Fatal accidents, non-fatal accidents and serious incidents per year involving SPO helicopters

The numbers of fatalities and serious injuries per year are shown in Figure 3.21. With three fatalities, the figures for 2024 reach the max of the preceding 10-year period.

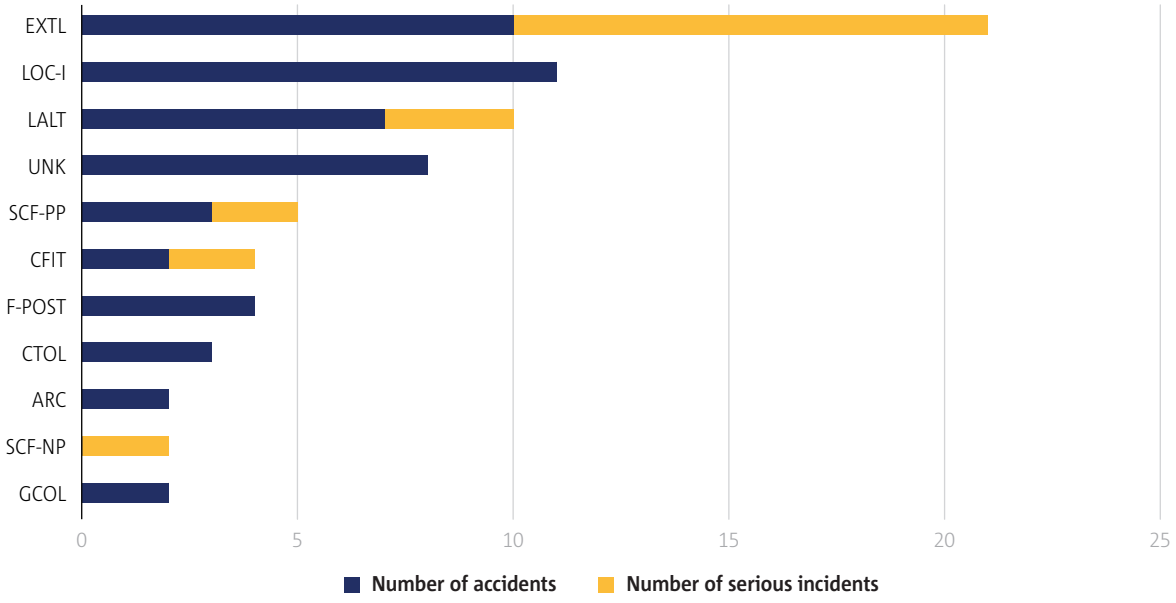



| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 5 | 5 | 4 | 6 | 3 | 2 | 1 | 1 | 4 | 3 | 2 |
| Fatalities | 0 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 |

**Figure 3.21** Fatal and serious injuries per year involving SPO helicopters

## Occurrence categories

Figure 3.22 outlines the top occurrence categories assigned to the accidents in the past five years.

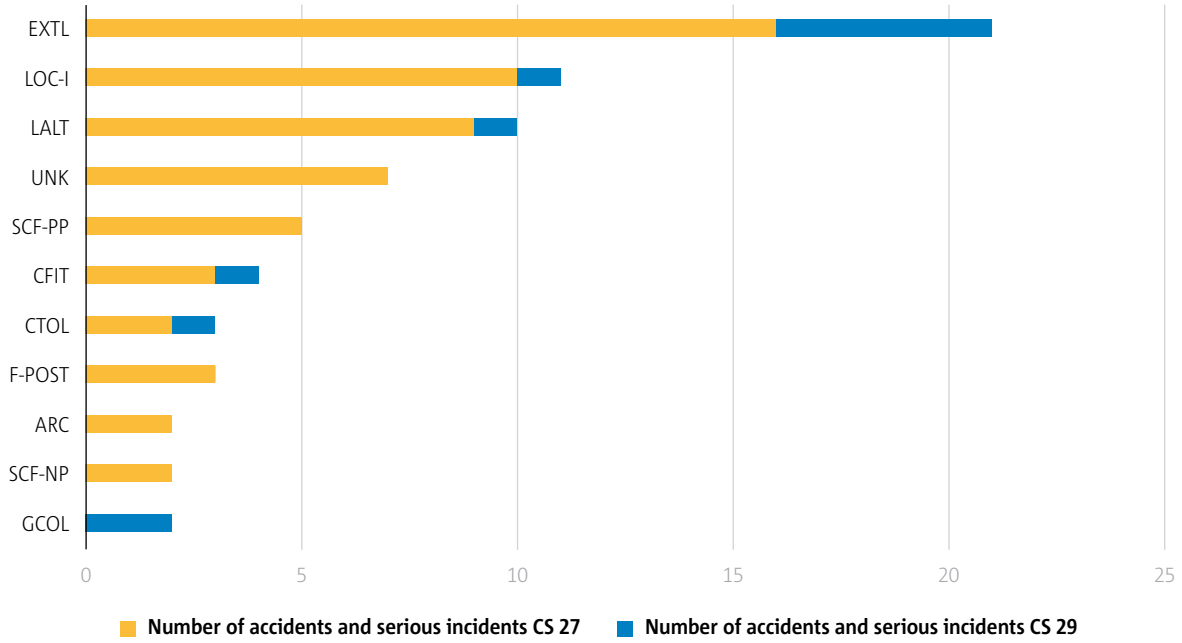



*EXTL: External load related occurrences; LOC-I: Loss of control – inflight; LALT: Low altitude operations; UNK: Unknown or undetermined; SCF-PP: powerplant failure or malfunction; CFIT: Controlled flight into or toward terrain; F-POST: Fire/smoke (post-impact); CTOL: Collision with obstacle(s) during take-off and landing; ARC: Abnormal runway contact; SCF-NP: System/component failure or malfunction [non-powerplant]; GCOL: Ground Collision*

**Figure 3.22** Numbers of and accidents and serious incidents by occurrence category and occurrence class involving SPO helicopters

Specific to this type of operation, helicopters carry external loads for a variety of missions, hence the most frequent occurrence category associated with all accidents and serious incidents is EXTL: External load-related occurrences. It is followed by LOC-I: Loss of control – inflight and LALT being as well specific hazards for SPO and low-altitude operations.

The Figure 3.23 shows the breakdown of all accidents by ICAO ADREP taxonomy over the 5-year by type of certification specification, Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29).

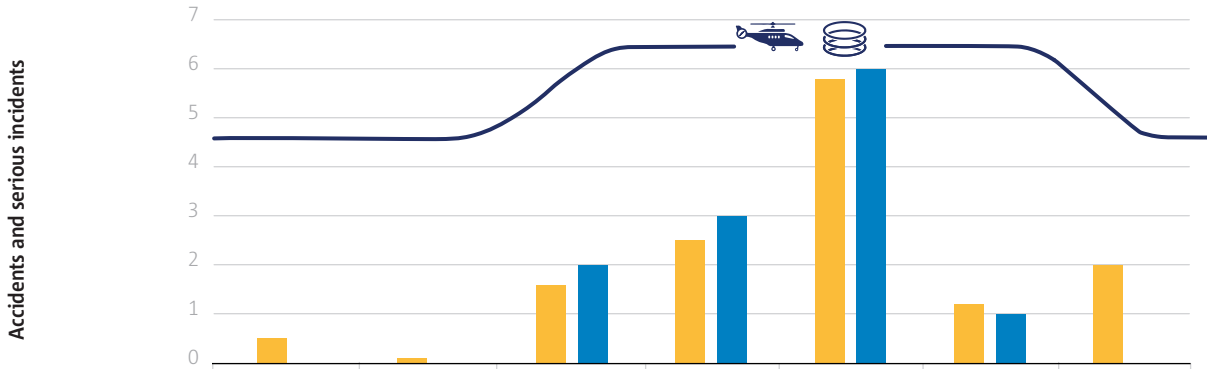



*EXTL: External load related occurrences; LOC-I: Loss of control – inflight; LALT: Low altitude operations; UNK: Unknown or undetermined; SCF- PP: powerplant failure or malfunction; CFIT: Controlled flight into or toward terrain; CTOL: Collision with obstacle(s) during take-off and landing; F-POST: Fire/smoke (post-impact); ARC: Abnormal runway contact; SCF-NP: System/component failure or malfunction [non-powerplant]; GCOL: Ground Collision*

**Figure 3.23** Numbers of accidents and serious incidents by occurrence category and aircraft certification type involving SPO helicopters

# Phase of flight

Figure 3.24 shows the breakdown of accidents by flight phase for SPO. As was the case with the average of the preceding 10-year period, the highest number of accidents in 2024 happened during the manoeuvring phase, which is expected for helicopters performing SPO, as the risk undertaken is the highest when performing the activities, such as high-dimension lifting devices, power line operations or constructing a large mast.

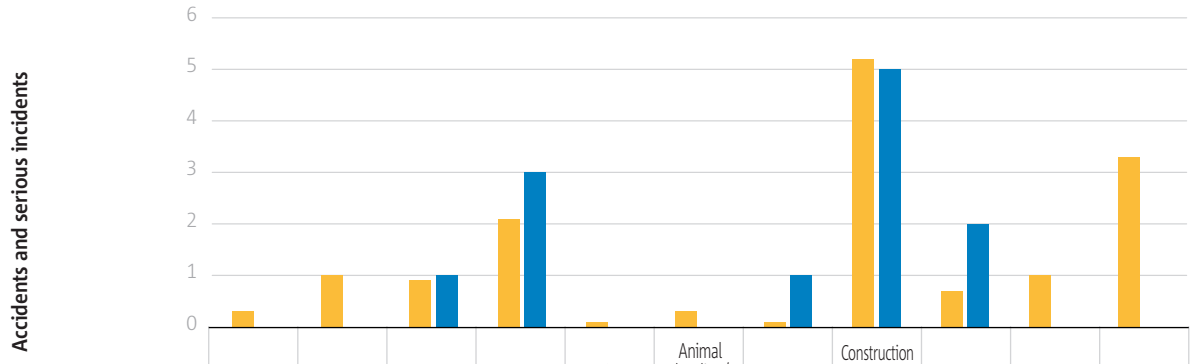



| | Standing | Taxi | Take-off | En route | Manoeuvring | Approach | Landing |
|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 0.5 | 0.1 | 1.6 | 2.5 | 5.8 | 1.2 | 2 |
| 2024 | 0 | 0 | 2 | 3 | 6 | 1 | 0 |

**Figure 3.24** Accidents and serious incidents by phase of flight involving SPO helicopters

# Operation type

Figure 3.25 shows the number of accidents er sub-type of SPO operations.

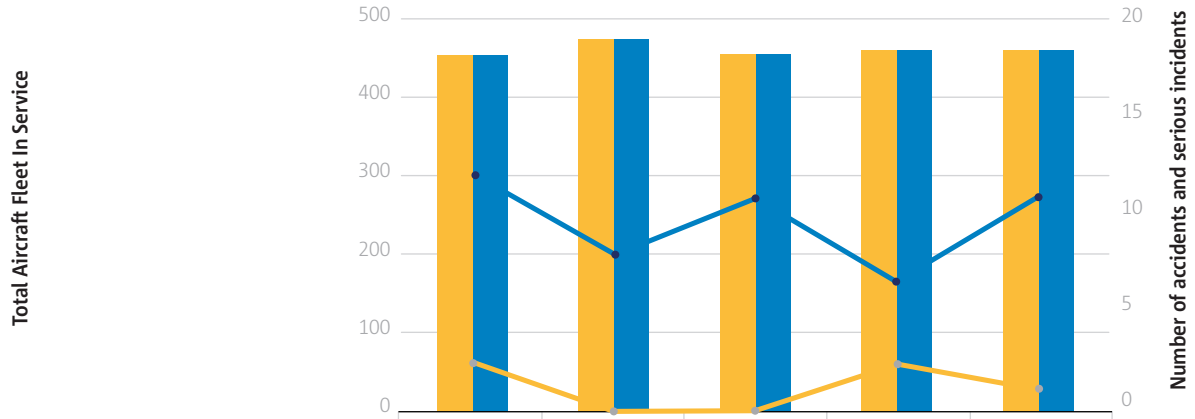



| | Aerial observation | Aerial patrol | Aerial survey | Agricultural | Airshow /race | Animal herding/ mustering | Calibration | Construction sling/ load | Logging | Photography | Other/ unknown |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 0.3 | 1 | 0.9 | 2.1 | 0.1 | 0.3 | 0.1 | 5.2 | 0.7 | 1 | 3.3 |
| 2024 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 5 | 2 | 0 | 0 |

**Figure 3.25** Accidents and serious incidents by operation type involving SPO helicopters

# Propulsion type

Figure 3.26 shows the distribution over the 5-year period of the EASA Member State rotorcraft fleets in total by type of propulsion and with a trendline of accidents and serious incidents in the given period. The total fleet in service is shown in the primary vertical axis of the graph, whereas total number of accidents and serious incidents in each period is shown in the secondary vertical axis.

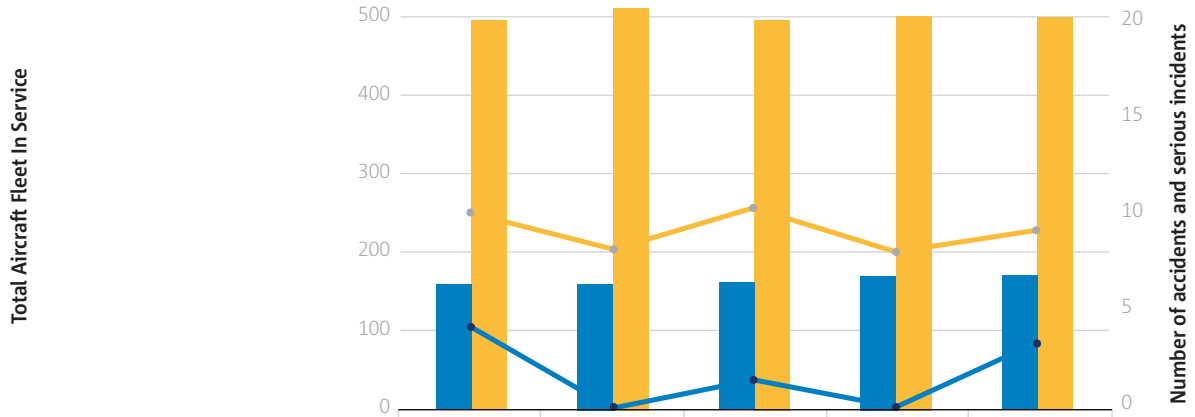



| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| Reciprocating Total In Service | 455 | 475 | 456 | 461 | 461 |
| Turboshaft Total In Service | 455 | 475 | 456 | 461 | 461 |
| Reciprocating Accidents and Serious incidents | 2 | 0 | 0 | 2 | 1 |
| Turboshaft Accidents and Serious incidents | 12 | 8 | 11 | 7 | 11 |

**Figure 3.26** Accidents and serious incidents by propulsion type involving SPO helicopters with the breakdown of propulsion type for the reported fleet

## Helicopter certification specification (CS27/CS29)

Figure 3.27 shows the distribution over the 5-year period of the EASA Member State rotorcraft fleets in total by type of certification specification, Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29), with a trendline of accidents and serious incidents in the given period. The total fleet in service is shown in the primary vertical axis of the graph, whereas the total number of accidents and serious incidents in each period is shown in the secondary vertical axis.




| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| CS 29 Total In Service | 160 | 161 | 163 | 171 | 172 |
| CS 27 Total In Service | 497 | 513 | 498 | 503 | 501 |
| CS 29 Accidents and Serious incidents | 4 | 0 | 1 | 0 | 3 |
| CS 27 Accidents and Serious incidents | 10 | 8 | 10 | 8 | 9 |

**Figure 3.27** Accidents and serious incidents by certification specification (CS27/CS29) for SPO with the breakdown of aircraft certification type for the reported fleet

## Safety risks

The safety risks for SPO helicopters are derived from occurrences data recorded the ECR, covering the two-year period 2023-2024.

With an average of approximately 260 occurrences per year, 330 were completed with an ERCS safety risk score, resulting a 63% ERCS completion rate for the domain.

When considering only accidents and serious incidents, the ERCS completion rate for the domain rises to 93%.

The relative comparison between KRAs for this domain is highlighted in Figure 3.28. KRAs and occurrence categories (refer to core document Figure 3.22) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

When it comes to KRA, obstacle collision in flight is most risky in terms of aggregated risk, which is not surprising given the conditions and the common environmental factors that come with this type of operation. Helicopter pilots navigate the most harrowing environments known to flight, where recovery has no margin for delayed and human reaction.

Aircraft upset or loss of control remains in top three , terms of both, number of occurrences and aggregated risk and represents a strong reminder of the potential for disastrous consequences.

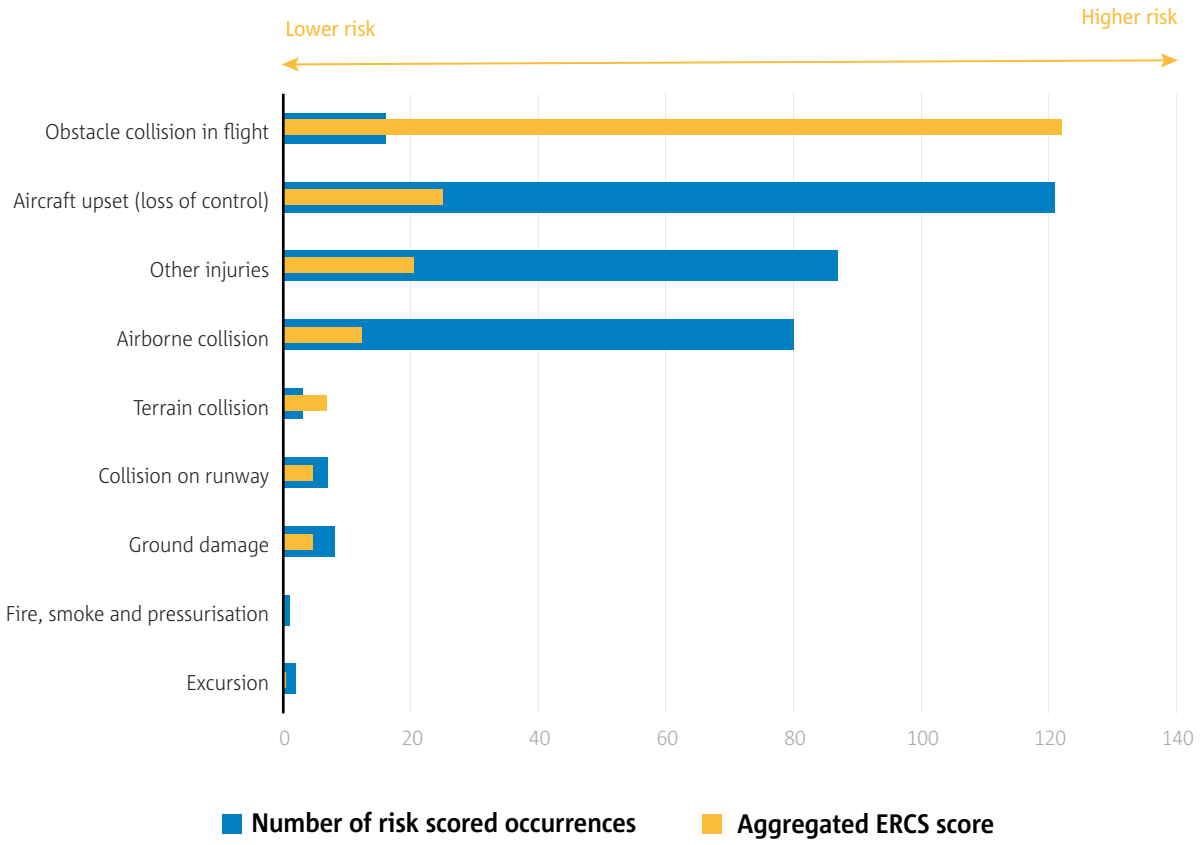



**Figure 3.28** KRAs by aggregated ERCS score and number of risk-scored occurrences involving SPO helicopters

# 3.4 Non-commercial operations (NCO) helicopters

This section presents the main safety statistics for EASA certified or validated helicopters performing NCO with an EASA Member State as state of operator or state of registry. The type of flying included in this section are mainly flight training, test flights, leisure flights and ferry flights.

## Key statistics

The key statistics for this domain are in Table 3.7 and Table 3.8, which includes a comparison of the number of fatal and non-fatal accidents for the last year and the previous 10-year period. It also includes a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

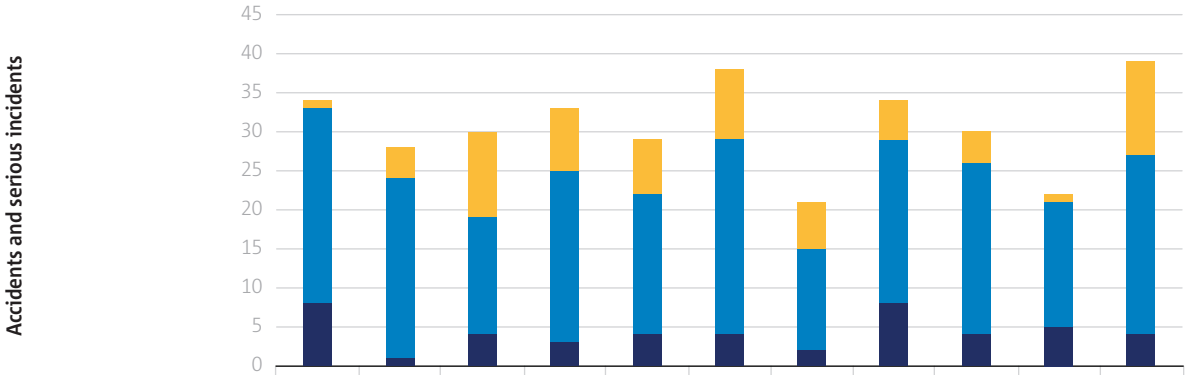
| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **45** | **4** | = |
| **Non-fatal accidents** | **219** | **23** | ↓ |
| **Serious incidents** | **58** | **12** | ↑ |

**Table 3.7** Key statistics for NCO helicopters

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **71** | **49** |
| **Yearly max number over 2014-2023** | **20** | **11** |
| **Yearly min number over 2014-2023** | **1** | **2** |
| **Total number in 2024** | **7** | **5** |

**Table 3.8** Fatalities and serious injuries involving NCO helicopters

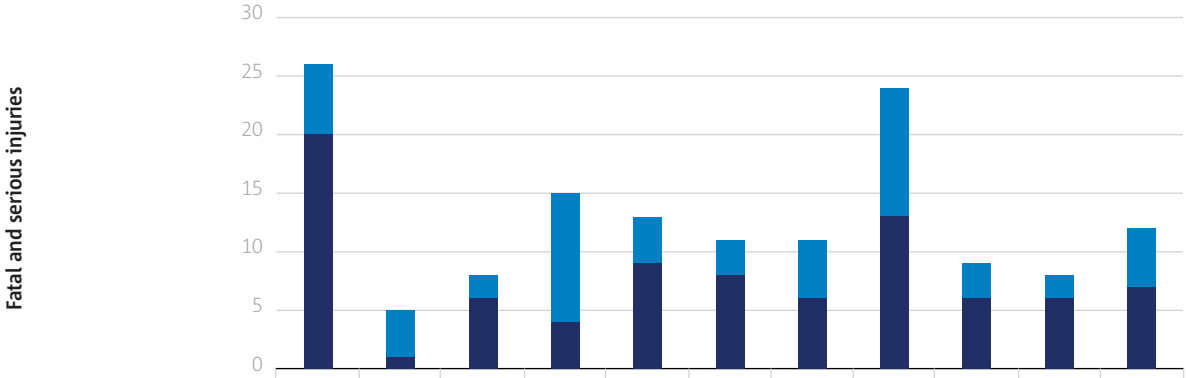
In 2024, the total number of accidents, including fatal, non-fatal, and serious incidents reached its highest level compared to the average of the previous decade, making it the peak year in the last 10 years. Despite this rise, the fatality risk in 2024 remained below average, ranking among the three lowest years for fatalities and serious injuries.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious incident | 1 | 4 | 11 | 8 | 7 | 9 | 6 | 5 | 4 | 1 | 12 |
| Non-fatal accident | 25 | 23 | 15 | 22 | 18 | 25 | 13 | 21 | 22 | 16 | 23 |
| Fatal accident | 8 | 1 | 4 | 3 | 4 | 4 | 2 | 8 | 4 | 5 | 4 |

**Figure 3.29** Fatal accidents, non-fatal accidents and serious incidents per year involving NCO helicopters

The numbers of fatalities and serious injuries per year are shown in Figure 3.30.

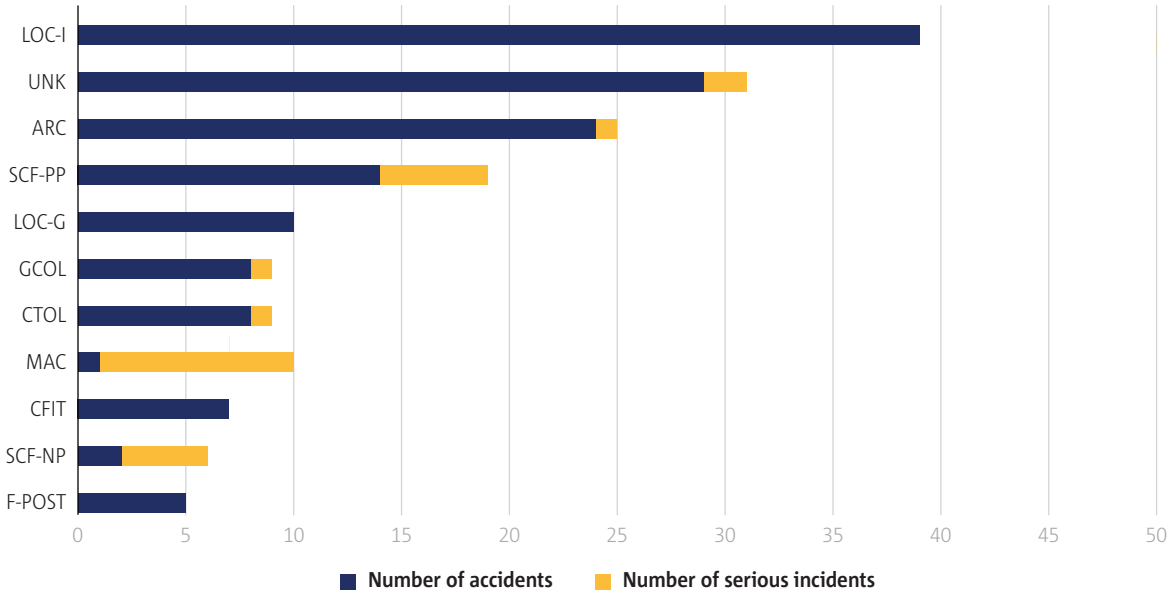



| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 6 | 4 | 2 | 11 | 4 | 3 | 5 | 11 | 3 | 2 | 5 |
| Fatalities | 20 | 1 | 6 | 4 | 9 | 8 | 6 | 13 | 6 | 6 | 7 |

**Figure 3.30** Fatal and serious injuries per year involving NCO helicopters

## Occurrence categories

Figure 3.31 outlines the top occurrence categories assigned to the accidents in the past five years.




*LOC-I: Loss of control – inflight; UNK: Unknown or undetermined; ARC: Abnormal runway contact; SCF-PP: powerplant failure or malfunction; LOC-G: Loss of control – ground; CTOL: Collision with obstacle(s) during take-off and landing; MAC: Airprox/ACAS alert/loss of separation/ (near) midair collisions; CFIT: Controlled flight into or toward terrain; GCOL: Ground Collision; SCF-NP: System/ component failure or malfunction [non-powerplant]; ; F-POST: Fire/smoke (post-impact);*

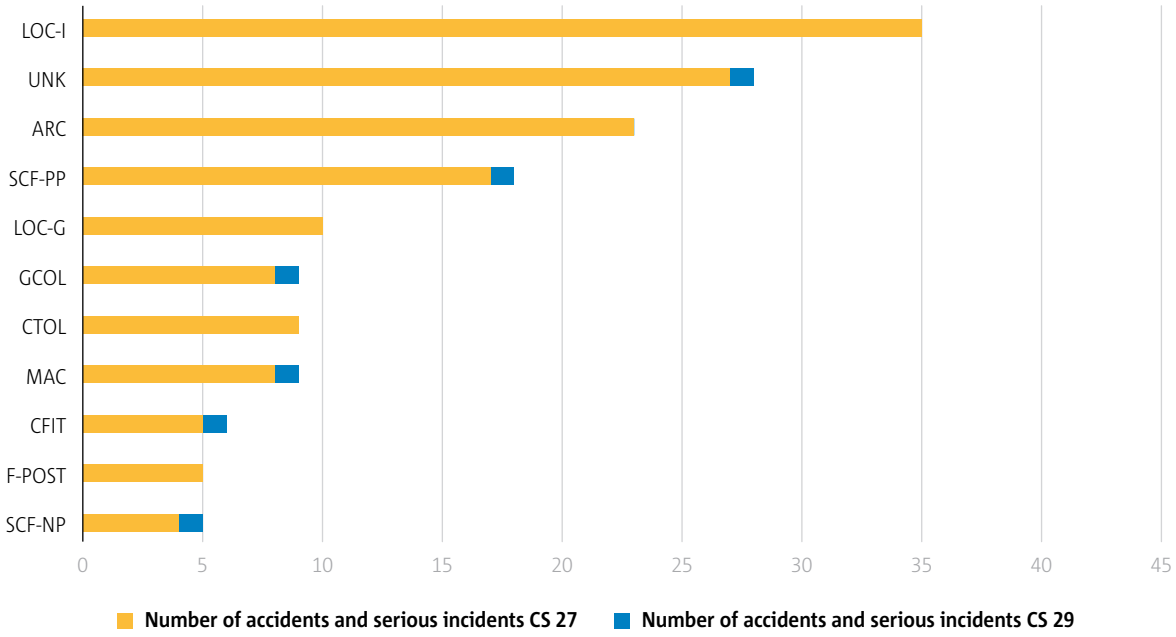
**Figure 3.31** Numbers of accidents and serious incidents by occurrence category and occurrence class involving NCO helicopters

Occurrences are categorised using the ICAO ADREP taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed.

Loss of control in flight (LOC-I) emerges as the primary occurrence category for non-commercial operations, with flight training missions being notably susceptible. Notably, all occurrences categorized under LOC-I have resulted in accidents, highlighting their high-risk nature.

Abnormal ground contact with the runway (ARC) is the third key risk area, after UNK: Unknown or undetermined. Similarly, this scenario is one of the main ones appearing in flight training and excursion from/overshooting of the helipad. Events such as hard/heavy landings, off centre landings are included in this category. Includes any rotor striking the intended landing surface during take-off and landing. However, if loss of control or collision occurred, the event is also coded under the appropriate categories: LOC-I: Loss of control – inflight; LOC-G: Loss of control – ground; GCOL: Ground Collision; CTOL: Collision with obstacle(s) during take-off and landing.

The Figure 3.32 shows the breakdown of all accidents by ICAO ADREP taxonomy over the 5-year by type of certification specification, Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29).

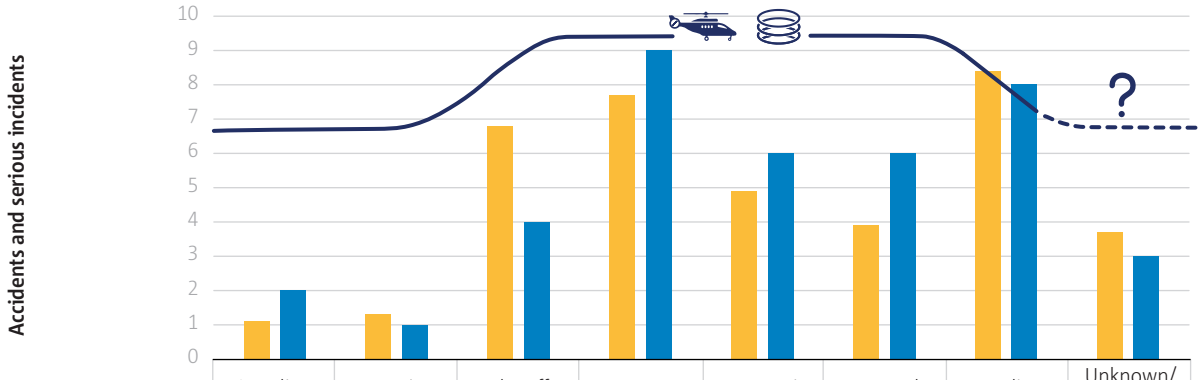



*LOC-I: Loss of control – inflight; UNK: Unknown or undetermined; ARC: Abnormal runway contact; SCF-PP: powerplant failure or malfunction; LOC-G: Loss of control – ground; CTOL: Collision with obstacle(s) during take-off and landing; MAC: Airprox/ACAS alert/loss of separation/ (near) midair collisions; CFIT: Controlled flight into or toward terrain; F-POST: Fire/smoke (post-impact); SCF-NP: System/ component failure or malfunction [non-powerplant]*

**Figure 3.32** Numbers of accidents and serious incidents by occurrence category and aircraft certification type involving NCO helicopters

## Phase of flight

Figure 3.33 shows the distribution of accidents by flight phase.



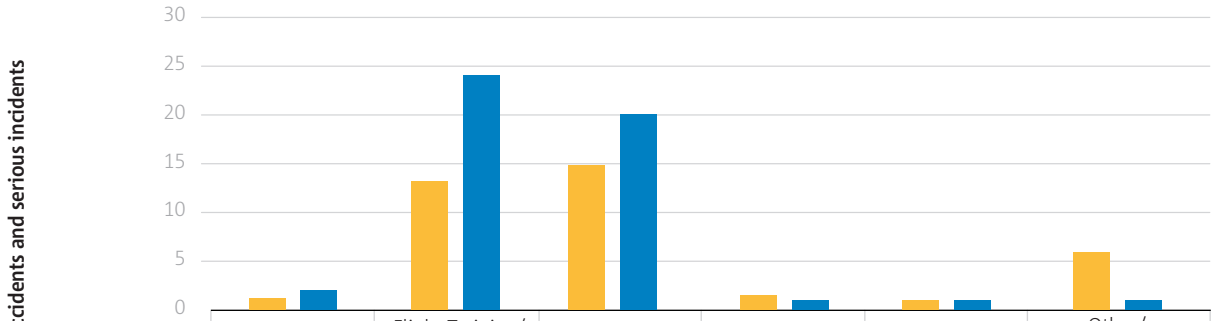

| | Standing | Taxi | Take-off | En route | Manoeuvring | Approach | Landing | Unknown/ blank |
|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 1.1 | 1.3 | 6.8 | 7.7 | 4.9 | 3.9 | 8.4 | 3.7 |
| 2024 | 2 | 1 | 4 | 9 | 6 | 6 | 8 | 3 |

**Figure 3.33** Accidents and serious incidents by phase of flight involving NCO helicopters

# Operation type

Figure 3.34 shows the number of accidents per type of operation.

In 2024, as in the previous decade, the highest number of occurrences with identified operation types were in pleasure flights and flight training/instructional operations. Notably, in 2024, there were three fatal accidents in flight training/instructional operations out of four of total in NCO operation, the highest number recorded during the analysed period.



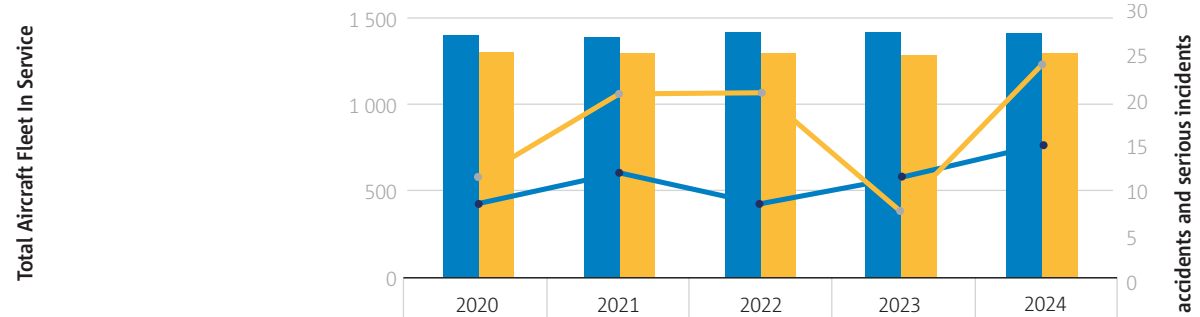

| | Business | Flight Training/ Instructional | Pleasure | Relocation | Test Flight | Other/ unknown |
|---|---|---|---|---|---|---|
| Average 2014-2023 | 1.2 | 13.2 | 14.8 | 1.5 | 1 | 5.9 |
| 2024 | 2 | 24 | 20 | 1 | 1 | 1 |

**Figure 3.34** Accidents and serious incidents by operation type involving NCO helicopters

# Propulsion type

Figure 3.35 shows the distribution over the 5-year period of the EASA Member State rotorcraft fleets in total by type of propulsion and with a trendline of accidents and serious incidents in the given period.

The total fleet in service is shown in the primary vertical axis of the graph, whereas the total number of accidents in each period is shown in the secondary vertical axis.



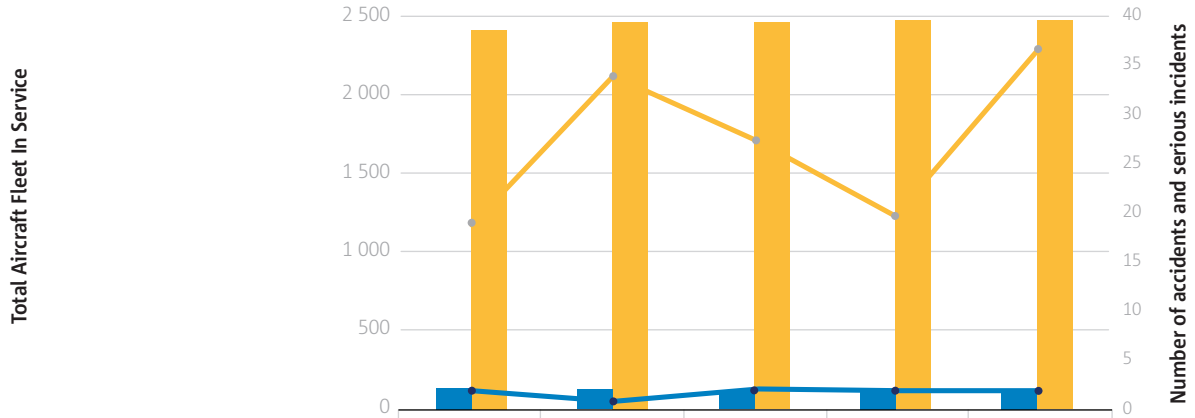

| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| Turboshaft Total In Service | 1 388 | 1 421 | 1 419 | 1 415 | 1 415 |
| Reciprocating Total In Service | 1 294 | 1 299 | 1 285 | 1 294 | 1 294 |
| Turboshaft Accidents and Serious incidents | 9 | 13 | 9 | 11 | 14 |
| Reciprocating Accidents and Serious incidents | 12 | 21 | 21 | 9 | 25 |

**Figure 3.35** Accidents and serious incidents by propulsion type involving NCO helicopters with the breakdown of propulsion type for the reported fleet

# Helicopter certification specification (CS27/CS29)

Figure 3.36 shows the distribution over the 5-year period of the EASA Member State rotorcraft fleets in total by type of certification specification, Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29), with a trendline of accidents and serious incidents in the given period. The total fleet in service is shown in the primary vertical axis of the graph, whereas total number of accidents and serious incidents in each period is shown in the secondary vertical axis.

A stable trend is observed for the number of occurrences in Large Rotorcraft (CS-29), whereas a notable increase for Small Rotorcraft (CS-27) reaching the maximum over the analysis period.




| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| CS 29 Total In Service | 136 | 125 | 120 | 117 | 117 |
| CS 27 Total In Service | 2 420 | 2 469 | 2 468 | 2 479 | 2 479 |
| CS 29 Accidents and Serious incidents | 2 | 1 | 2 | 2 | 2 |
| CS 27 Accidents and Serious incidents | 19 | 33 | 28 | 20 | 37 |

**Figure 3.36** Accidents and serious incidents by certification specification (CS27/CS29) for NCO with the breakdown of aircraft certification type for the reported fleet

# Safety risks

The safety risks for NCO helicopters are derived from occurrences data recorded the ECR, covering the two-year period 2023-2024.

With an average of approximately 487 occurrences per year, 587 were completed with an ERCS safety risk score, resulting a 60% ERCS completion rate for the domain.

When considering only accidents and serious incidents, the ERCS completion rate for the domain rises to 85%.

The relative comparison between KRAs for this domain is highlighted in Figure 3.37

KRAs and occurrence categories (refer to core document Figure 3.31) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only

be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

The data reviewed on the occurrences involving NCO helicopters shows that terrain collision is by far the top KRA in terms of aggregated risk, followed by aircraft upset which is high risk in both number of occurrences and ERCS score. This is to be expected considering that the speed of the impact in controlled flight into terrain can have substantial energy and therefore high-risk score. On top of this, the flight envelope that they are being exposed in in flight training mission presents more risk as well (e.g., engine off landings, practice forced landings, advanced autorotations). Airborne collision is a top KRA in terms of both, number of occurrences and aggregated risk and represents a strong reminder of the high energy; highlighting the importance of taking the necessary precautions to avoid such a catastrophic event. It serves as a warning to pilots and other aircraft operators to be extra vigilant when flying in the vicinity of other aircraft. Furthermore, it emphasises the need for improved safety protocols and regulations to reduce the risk of aircraft collisions.

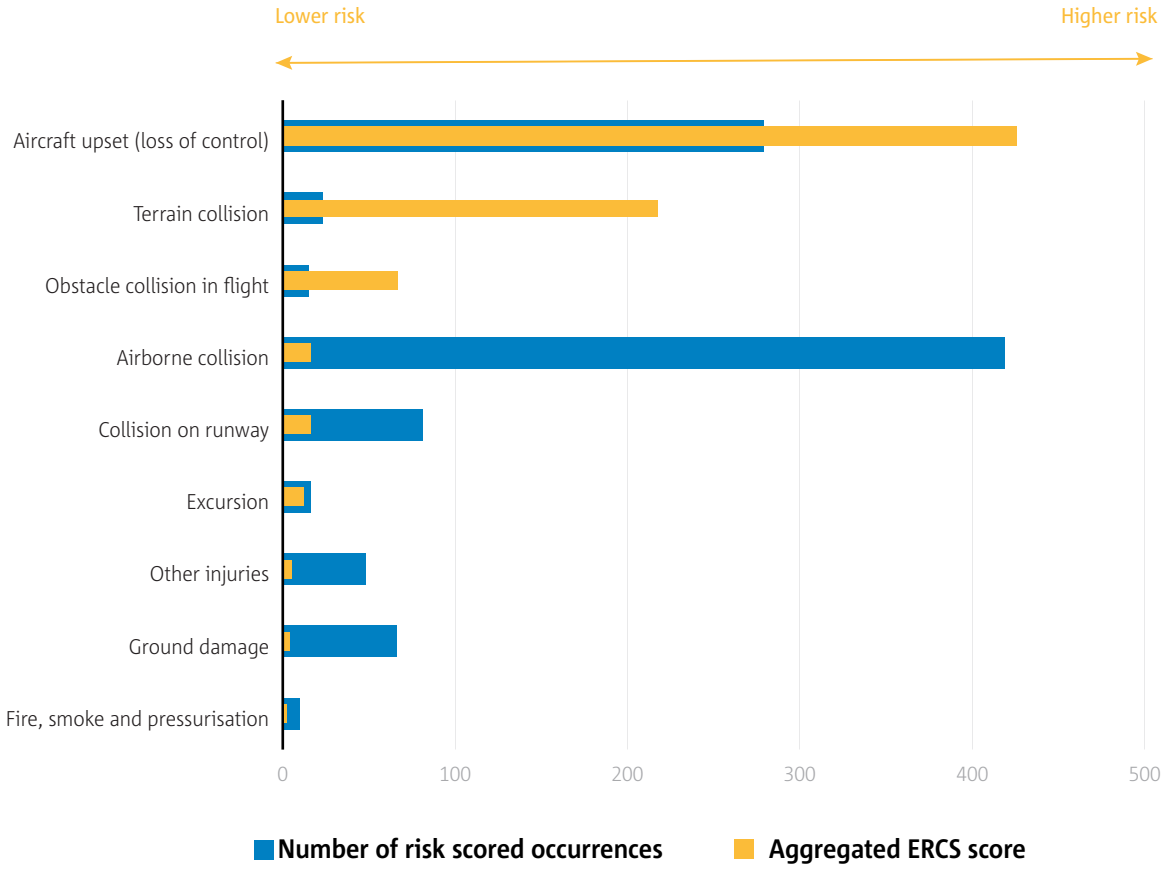



**Figure 3.37** KRAs by aggregated ERCS score and number of risk-scored occurrences involving NCO helicopters

EASA
European Union Aviation Safety Agency

# Chapter 4
# Balloons

**ANNUAL SAFETY REVIEW**
**2025**

The scope of this chapter covers hot air balloon operations where the state of registry or the state of operator is an EASA Member State. The data presented is based on the accidents collected by the Agency under Regulation (EU) 996/2010 on accident and serious incident investigation and Regulation (EU) 376/2014 on occurrence reporting, and through actively searching for accidents from other official sources.

The chapter provides in the core document the key statistics, occurrence categories and safety risks for balloon operations. The overview of the safety risks is solely derived from occurrence data from the European Common Repository (ECR).

The list of fatal accidents associated with the scope of this chapter is provided in Appendix 1 of this document.

## Key statistics

The key statistics for this domain are in Table 4.1 and Table 4.2 and include a comparison of the number of accidents (fatal and non-fatal) for the last year and the previous 10-year period. It also includes a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

Table 4.1 shows a comparison between the 10-year average and 2024. It indicates that the number of fatal accidents in 2024 decreased compared to the 10-year average. Non-fatal accidents, however, show slight increase compared to the 10-year average. The year 2015 saw the lowest number of non-fatal accidents, with 2016 and 2024 following it closely.

Table 4.2 presents the number of fatalities and serious injuries for 2024 vs. the 10-year average.

The number of fatalities remains low in 2024 with one fatality reported, below the 10-year average. In 2024 there were seven serious injuries which is 30% less than the minimum value for the preceding 10 years.

A better understanding of the level of balloon safety in EASA Member States could be achieved if exposure data showing the number of flights was collected at regulatory level. EASA encourages all national authorities to collect, aggregate and share such data for the benefit of all.

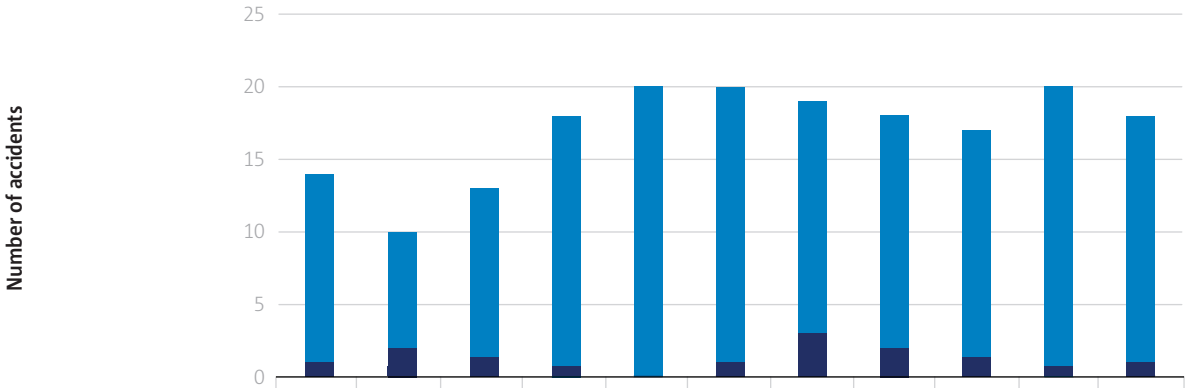
| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **12** | **1** | ↓ |
| **Non-fatal accidents** | **158** | **17** | ↓ |

**Table 4.1** Key statistics for balloons

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **12** | **177** |
| **Yearly max number over 2014-2023** | **3** | **24** |
| **Yearly min number over 2014-2023** | **0** | **10** |
| **Total number in 2024** | **1** | **7** |

**Table 4.2** Fatalities and serious injuries involving balloons

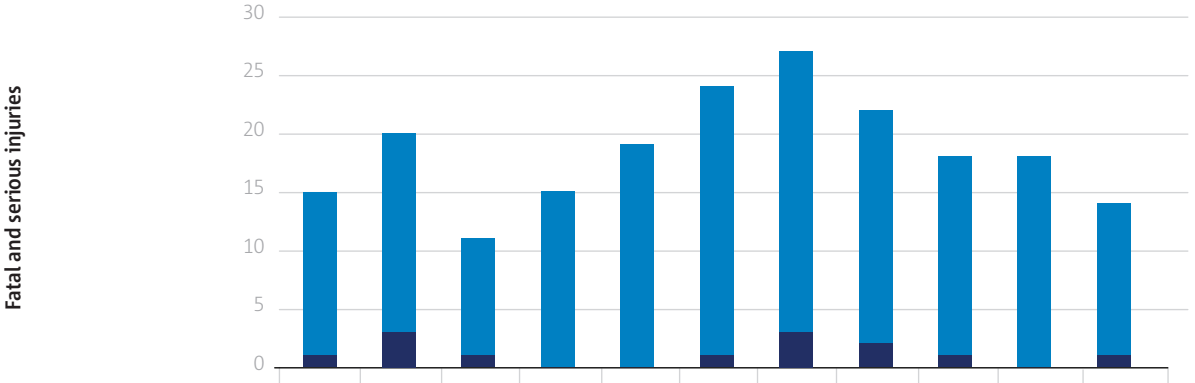
Figure 4.1 illustrates the trend in fatal and non-fatal accidents from 2014 to 2024. In 2024, the total number of accidents decreased compared to the previous year, with 17 non-fatal and one fatal accident recorded. Fatal accidents have remained low, with either zero or one case annually since 2022. The highest number of non-fatal accidents in the past decade was recorded in both 2018 and 2023, with 20 cases each. Overall, the trend since 2017 shows year-to-year variability but no sustained increase in the total number of accidents.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 13 | 8 | 12 | 18 | 20 | 19 | 16 | 16 | 16 | 20 | 17 |
| Fatal accidents | 1 | 2 | 1 | 0 | 0 | 1 | 3 | 2 | 1 | 0 | 1 |

**Figure 4.1** Fatal accidents and non-fatal accidents per year involving balloons

Figure 4.2 shows the number of fatalities and serious injuries in a similar downward trend as Figure 4.1. Notably, 2024 saw a 28 % reduction in serious injuries compared with 2023 while maintaining a low fatal-accident rate. Serious injuries peaked at 24 in 2020 and have generally declined since, reaching 13 in 2024—the lowest figure recorded since 2016. Fatalities remained sporadic in the balloon domain of operations and no fatalities were recorded in 2017, 2018 or 2023, single fatality years occurred in 2014, 2016, 2019 and 2024 and three fatalities were recorded in 2015 and again in 2020. Consequently, the combined total of fatal and serious injuries has trended downward after 2020 despite some year-to-year variability.



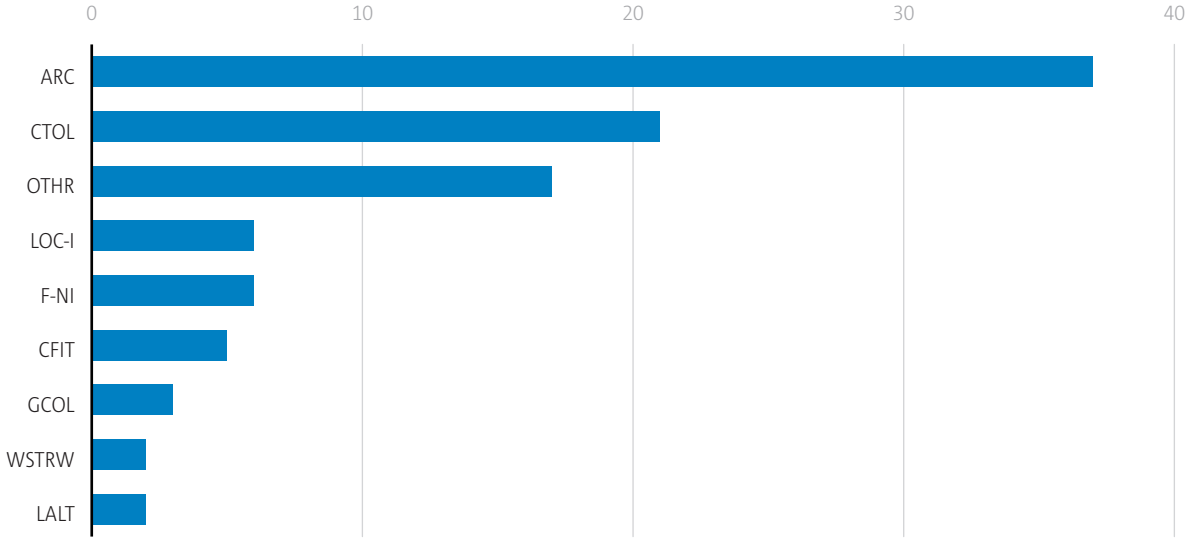

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 14 | 17 | 10 | 15 | 19 | 23 | 24 | 20 | 17 | 18 | 13 |
| Fatalities | 1 | 3 | 1 | 0 | 0 | 1 | 3 | 2 | 1 | 0 | 1 |

**Figure 4.2** Fatalities and serious injuries involving balloons

## Occurrence categories

Figure 4.3 outlines categories assigned to the accidents in the past five years. Occurrences are categorised using the ICAO Accident Incident Data Reporting (ADREP) taxonomy for occurrence categories, developed to support common coding of the main elements of an occurrence that should be investigated, recorded, and analysed. Categories are of different nature, e.g., operational such as loss of control in flight (LOC-I), environmental such as windshear or thunderstorm (WSTRW), technical such as abnormal runway contact (ARC), consequential such as controlled flight into or toward terrain (CFIT), etc. Multiple categories may therefore be assigned to a single occurrence. For example, if a collision with an obstacle occurred during landing followed by a fire unrelated to the impact, the occurrence would be coded in both categories, i.e., CTOL: collision with obstacle during take-off and landing and F-NI: fire/smoke (non-impact). The sum of the number of occurrences per category may therefore be greater than the total number of occurrences realised in the period.

For the period 2020-2024 figures show that abnormal runway contact is by far the most frequent occurrence category, approaching 40 recorded accidents - almost twice the number of collisions with obstacles during take-off and landing (CTOL). CTOL and the broad “Other” category follow at roughly 22 and 17 events, respectively; together with ARC they account for the large majority of reported cases. Low to moderate single digit totals are seen for loss of control in flight, fire/smoke non-impact (F-NI) and controlled flight into terrain. Ground collision (GCOL), windshear/thunderstorm and low-altitude operations (LALT) each contribute only a handful of occurrences. The distribution underscores that events during the landing and take-off phases remain the dominant safety concern for the balloons, while environmental and low altitude factors are comparatively rare. The collision with obstacles during take-off or landing occurrence category includes collisions with powerlines, buildings, or other structures.

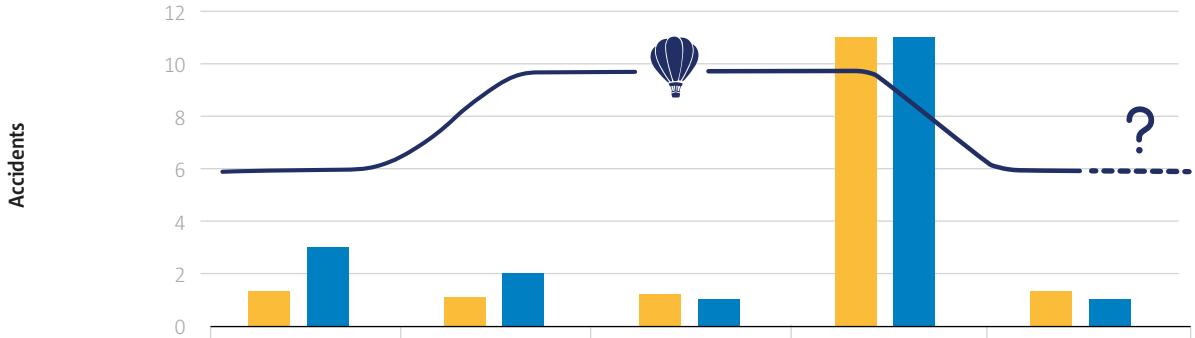



*ARC: Abnormal runway contact; OTHR: Other; CTOL: Collision with obstacle(s) during take-off and landing; UNK: Unknown or undetermined; F-POST: Fire/smoke (post-impact); LOC-I: Loss of control - inflight; GCOL: Ground Collision; WSTRW: Windshear or thunderstorm; AMAN: Abrupt manoeuvre; F-NI: Fire/smoke (non-impact); CFIT: Controlled flight into or toward terrain; GCOL: Ground Collision; LOC-G: Loss of control - ground; NAV: Navigation error; SCF-NP: System/component failure or malfunction [non-powerplant]; TURB: Turbulence encounter; CABIN: Cabin safety events; LALT: Low altitude operations; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; MED: Medical; RAMP: Ground Handling*

**Figure 4.3** Numbers of occurrences by occurrence category involving balloons

# Phase of flight

Accident counts for balloons during 2024 showed increases in the standing and take-off phases compared to the 2014 - 2023 average, rising from 1.3 to 3 and 1.1 to 2, respectively. En route accidents decreased slightly to 1 in 2024 from an average of 1.2. The landing phase remained constant with 11 accidents both in 2024 and on average. Unknown or blank phase accidents also declined slightly from 1.3 to 1. These figures highlight that most balloon accidents continue to occur during landing, with some fluctuations in other phases observed in 2024 as shown in Figure 4.4.

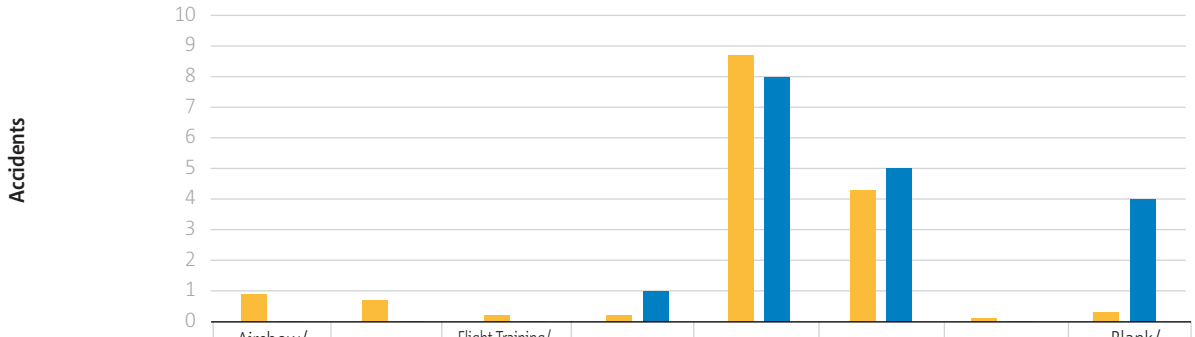



| | Standing | Take-off | En route | Landing | Unknown/ Blank |
|---|---|---|---|---|---|
| Average 2014-2023 | 1.3 | 1.1 | 1.2 | 11 | 1.3 |
| 2024 | 3 | 2 | 1 | 11 | 1 |

**Figure 4.4** Accidents involving balloons by phase of flight

# Operation type

Most balloon accidents are related to passenger and pleasure flights, as shown in Figure 4.5 with a decrease in 2024 compared with the 10-year average. Number of accidents involving balloons varied across operation types compared to the 2014–2023 average. No accidents were recorded in the airshow/race, business or flight training/instructional categories, all of which had low historical averages. The "Other" category saw a slight increase with one accident in 2024. Passenger-related accidents remained high but slightly below the average, with eight reported cases. Pleasure flights experienced a small increase, rising to five accidents from an average of 4.3. Notably, the blank/unknown category experienced a marked increase to four accidents in 2024, surpassing the previous average of 0.3. This rise may reflect a corresponding decrease to zero accidents in the airshow/race, business and flight training/instructional categories, although this interpretation remains speculative. Demonstration flight accidents remained rare, with no accidents reported in 2024.




| | Airshow/ race | Business | Flight Training/ Instructional | Other | Passenger | Pleasure | Demonstration | Blank/ Unknown |
|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 0.9 | 0.7 | 0.2 | 0.2 | 8.7 | 4.3 | 0.1 | 0.3 |
| 2024 | 0 | 0 | 0 | 1 | 8 | 5 | 0 | 4 |

**Figure 4.5** Accidents involving balloons by operation type

## Safety risks

The safety risks for balloons are derived from occurrences data recorded in the ECR, covering the two year period 2023-2024. From the 320 occurrences in two years, only 117 occurrences were completed with the KRA and ERCS safety risk score, representing a completion rate of 37% for the domain. The hereafter information is solely based on this restricted dataset.

The KRAs for balloons are shown in Figure 4.6. KRAs and occurrence categories (refer to core document Figure 4.3) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

Obstacle collision in flight generates the highest aggregated ERCS risk despite accounting for only 13 risk scored occurrences, underscoring its disproportionate severity. Airborne collision shows the largest case count (61) but a markedly lower aggregated score, reflecting higher frequency yet lower individual risk per event. Aircraft upset (loss of control) ranks third and all remaining KRAs register single digit occurrence counts and aggregated scores below 5 000, indicating a comparatively minor contribution to overall risk. This distribution highlights the need to prioritise mitigation of obstacle and airborne collision hazards, which together drive the majority of balloons risk exposure. For a more accurate assessment of safety risks for balloons, it is paramount to be mindful of the ERCS definition for airborne collision, i.e., a collision between aircraft while both aircraft are airborne, or between aircraft and other airborne objects (excluding birds and wildlife); as opposed to obstacle collision in flight addressing collision between an airborne aircraft and obstacles rising from the surface of the earth (obstacles include tall buildings, trees, power cables, telegraph wires and antennae as well as tethered objects). Proper recording of both KRAs airborne collision and obstacle collision in flight is crucial for further assessment.

The aircraft upset KRA and the terrain collision KRA include hard landings which have resulted in serious injuries to passengers, but without damage to the basket or other balloon components. Injuries are often due to the firmness of the landings, which could potentially be mitigated through better preparation of passengers for touchdown. There have been cases where pilots have fallen from the basket during hard landings because restraints were either not available or not used. Occurrences like these should be captured under the KRA excursion: “an occurrence when an aircraft leaves the runway or movement area of an aerodrome or landing surface of any other predesignated landing area, without getting airborne. It includes high-impact vertical landings for rotorcraft or vertical take-off and landing aircraft and balloons or airships.” ((EU) 2020/2034). This is particularly important to highlight as a number of occurrences recorded under the KRAs listed above have in fact been hard landings and should have been captured under the KRA excursion for accurate classification and risk assessment.

2024 hot air balloon accidents highlighted various challenges. In one accident a commercial flight encountered strong winds leading to multiple hard landings and a serious passenger injury. In a separate case, a sudden wind shift caused a balloon to crash into a house and trees during an attempted emergency landing, injuring the pilot who was dragged by a rope entangled around his arm. In another report pilot sustained facial burns after testing the burner with its protective cover still in place, causing a gas ignition. Additionally, a balloon collided with a tree during flight, and in another incident, a helper was seriously burned by the burner flame due to a sudden gust while preparing the balloon. Hard landings also resulted in significant injuries: two passengers were seriously injured when the basket bounced and tipped, while another flight ended with injuries including a fractured arm and back compression. Lastly, a balloon struck a tree while navigating a valley, tearing several panels of the envelope and necessitating a high-speed emergency landing.

The other injuries KRA shows up as another critical KRA in 2024. Occurrences where injuries have been inflicted from the inflation of the balloon until the passengers have exited the balloon basket, and which cannot be attributed to any other KRA, are included there.

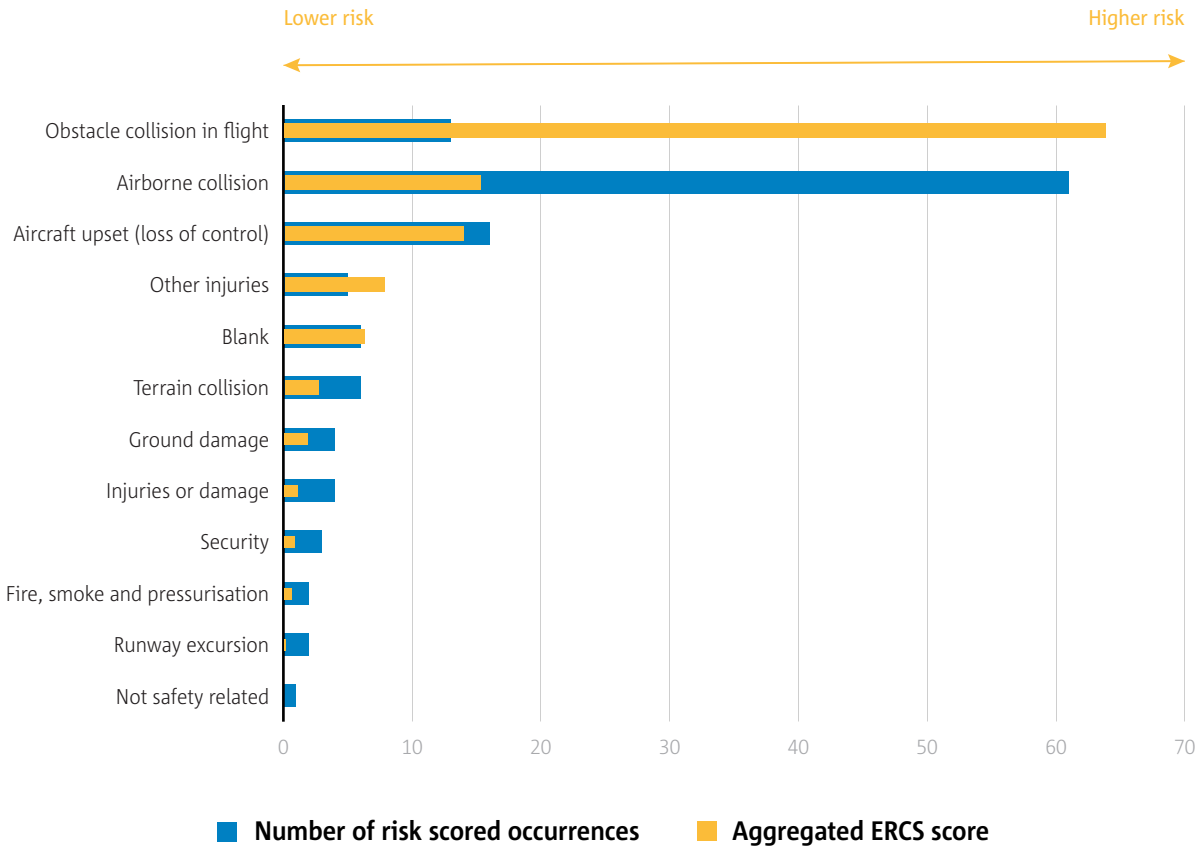



**Figure 4.6** KRAs by aggregated ERCS score and number of risk-scored occurrences involving balloons

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# Chapter 5
# Sailplanes

**ANNUAL SAFETY REVIEW**
**2025**

This chapter covers sailplane operations where the state of registry of the aircraft is an EASA Member State. The data presented are based on the accidents collected by the Agency under Regulation (EU) 996/2010 on accident and serious incident investigation and Regulation (EU) 376/2014 on occurrence reporting, and through actively searching for these accidents from other official sources.

The chapter provides in the core document the key statistics, the occurrence categories and the safety risks for non-powered and powered sailplanes, but excludes ultralight sailplanes. The European Common Repository (ECR) and the EASA database are used as the data sources for this part. The overview of the safety risks is solely derived from occurrence data from the ECR. Updated accident rates for sailplanes are not available this year due to missing utilisation data. It is therefore worth stressing the importance of collecting exposure data to provide proper oversight visibility on the domain from which trends related to usage, such as hours, launches, or kilometres flown, could be identified.

Sailplane operations are a unique aviation domain, largely due to how gliding is performed. Unlike other domains where aircraft are powered by engines, most sailplane operations (with the notable exception of increasing numbers of self-launching sailplanes) depend on teamwork and safe towing into the air, using an aircraft or a winch, for the flight to commence. This added operational complexity has fostered a collaborative team spirit and cohesive atmosphere for safety within the gliding community. The gliding community, with the leadership of the European Gliding Union (EGU), has been actively involved in shaping the EU rules on Sailplane Air Operations (OPS) and Flight Crew Licensing (FCL) rules, and in providing EASA with valuable input and insight into sailplane operations. EASA and the EGU continue to collaborate to improve sailplane safety and to enhance associated reporting by refining rate analysis and terminology.

The list of fatal accidents associated with the scope of this chapter is provided in Appendix 1 of this document.

# Key statistics

The key statistics for this domain are in Table 5.1 and Table 5.2 and include a comparison of the number of accidents (fatal and non-fatal) for the last year and the previous 10-year period. It also includes a comparison of the fatalities and serious injuries sustained in those accidents during the same timeframe.

Table 5.1 shows a downward trend in the number of fatal and non-fatal accidents, compared to the 10-year average. Table 5.2 lays out the figures on the number of fatalities and serious injuries. In 2024 there were 12 fatalities which is equal to the minimum value for the preceding 10 years. Compared to the 10-year average, the number of fatalities decreased by 45% and the number of serious injuries decrease by 12%. The observed decrease in accident figures is encouraging but it should be viewed in the context of utilisation rates. This decline may not solely reflect improved safety and could be influenced by reduced sailplane activity.

| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **187** | **10** | ↓ |
| **Non-fatal accidents** | **1 422** | **116** | ↓ |

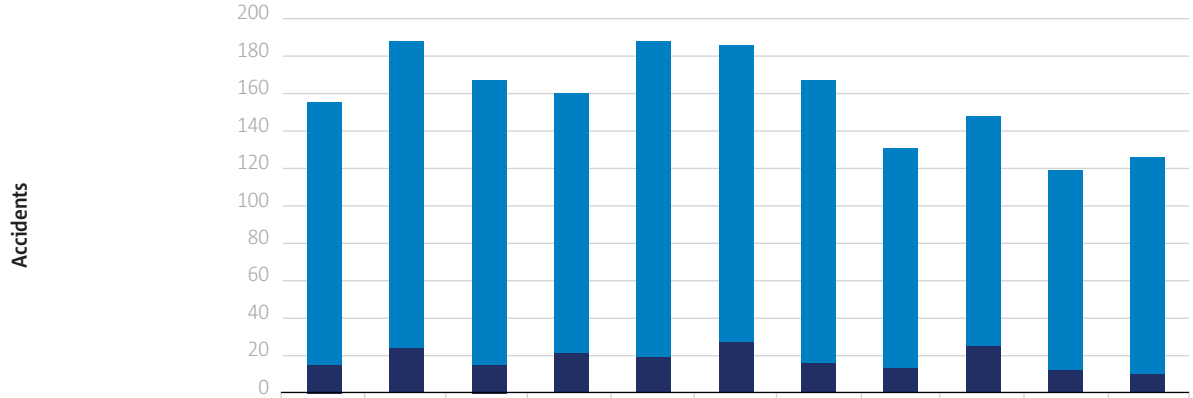
**Table 5.1** Key statistics for sailplanes

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **219** | **261** |
| **Yearly max number over 2014-2023** | **30** | **44** |
| **Yearly min number over 2014-2023** | **12** | **10** |
| **Total number in 2024** | **12** | **23** |

**Table 5.2** Fatalities and serious injuries involving sailplanes

Figure 5.1 provides an overview of fatal and non-fatal accidents from 2014 to 2024.

The number of fatal accidents varied, reaching the highest number of 27 in 2019, and decreasing to a record low of 10 in 2024. The number of non-fatal accidents, while below the 10-year average, increased slightly to 116 in 2024 from 107 in 2023.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 140 | 164 | 152 | 139 | 169 | 159 | 151 | 118 | 118 | 107 | 116 |
| Fatal accidents | 15 | 24 | 15 | 21 | 19 | 27 | 16 | 13 | 25 | 12 | 10 |

**Figure 5.1** Fatal and non-fatal accidents per year involving sailplanes

Figure 5.2 shows a monthly comparison between the years 2022 to 2024.

The figure shows a jump in the number of accidents in May 2022, while in 2023 and 2024 the highest number of sailplane accidents were reported in July. These in-year variations may be explainable by variations in continental weather and hence utilisation rates in different years

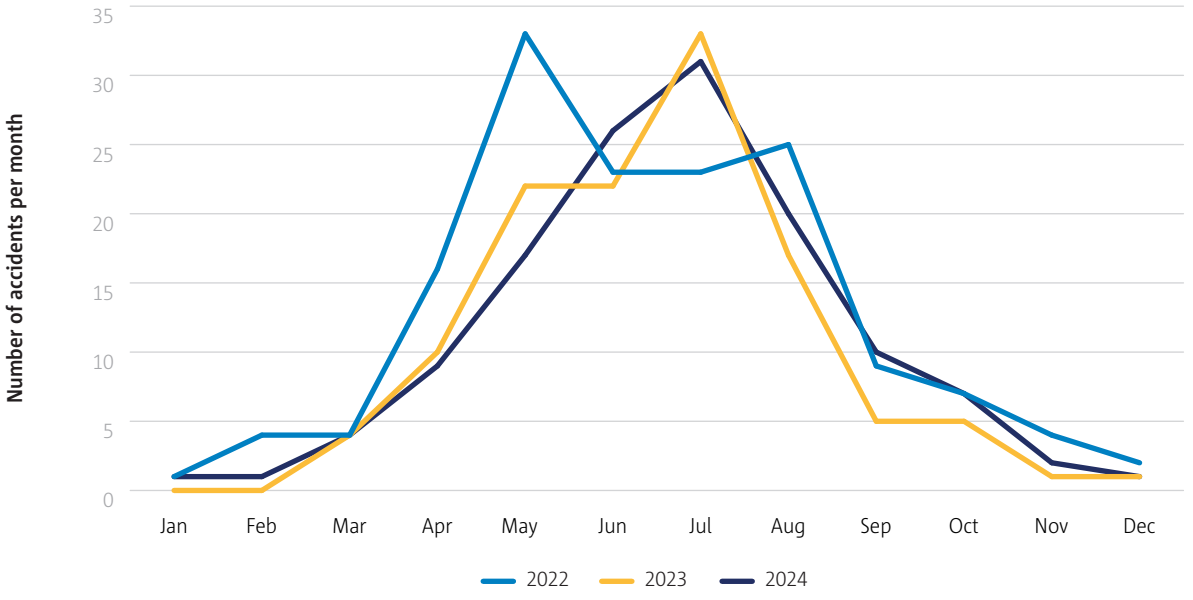
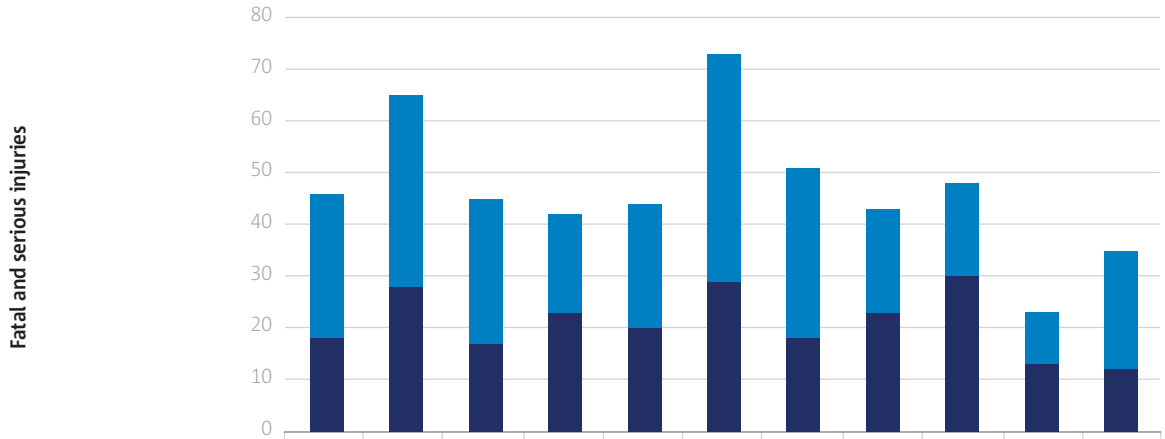



**Figure 5.2** Comparison of number of accidents involving sailplanes per month from 2022-2024

Figure 5.3 shows the number of fatalities and serious injuries over the period.

The number of fatalities peaked at 30 in 2022, decreasing to 13 in 2023 and 12 fatalities in 2024 - the lowest number of fatalities compared to previous years. There were 23 serious injuries in 2024, the number is more than double then 2023, but it remains below the 10-year average.



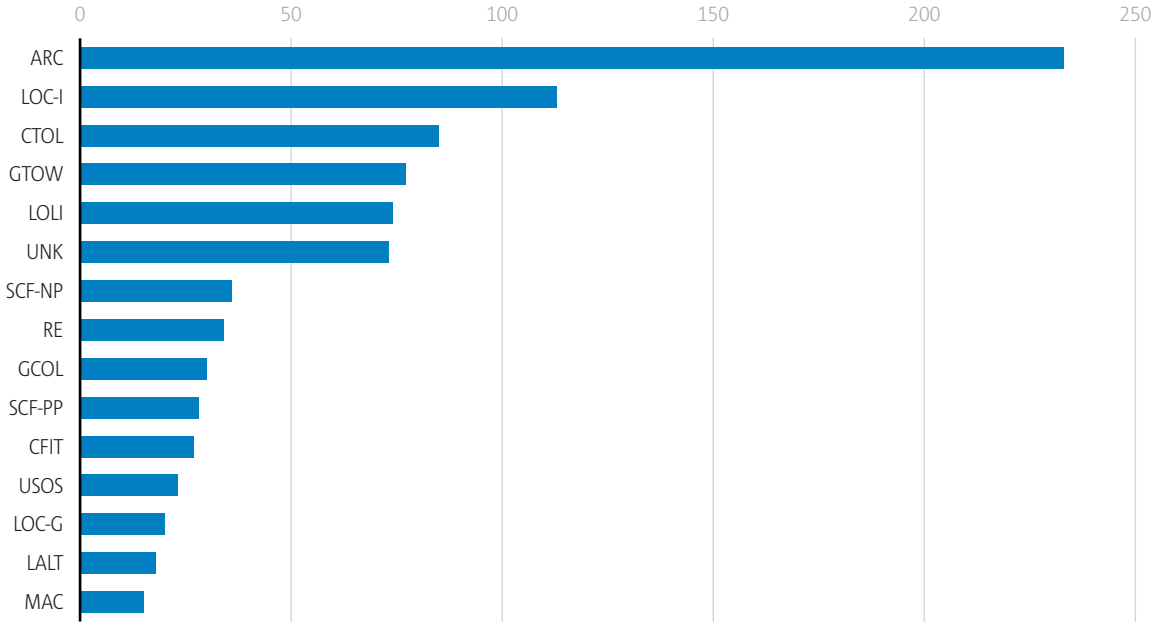

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 28 | 37 | 28 | 19 | 24 | 44 | 33 | 20 | 18 | 10 | 23 |
| Fatalities | 18 | 28 | 17 | 23 | 20 | 29 | 18 | 23 | 30 | 13 | 12 |

**Figure 5.3** Fatal and serious injuries per year involving sailplanes

## Occurrence categories

Figure 5.4 outlines the top 15 categories assigned to the accidents in the past five years. Occurrences are categorised using the Commercial Aviation Safety Team (CAST)/ICAO Common Taxonomy Team (CICTT) taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed. The unique nature of sailplane operations does not always align with this taxonomy, requiring some reinterpretation to better understand its broader implications for sailplane operations. Categories are of different natures, e.g., operational such as low altitude operations (LALT), environmental such as turbulence encounter (TURB), technical such as system/component failure or malfunction [non-powerplant] (SCF-NP), consequential such as fire/smoke resulting from impact (F-POST), etc. Multiple categories may therefore be assigned to a single occurrence, pointing towards the root cause of the accident. For example, if an engine failure occurred, and loss of control followed, the occurrence would be coded in both categories, i.e., SCF-PP: powerplant failure or malfunction and LOC-I: loss of control in flight. The sum of the number of occurrences per category may therefore be greater than the total number of occurrences that occurred in the period.

For the period 2020-2024, the main occurrence categories are abnormal runway contact – which in many cases leads to damage due to collision with objects in the outfield landing area. The second in line are loss of control occurrences, and the third category shows collision with obstacle(s) during take-off and landing.



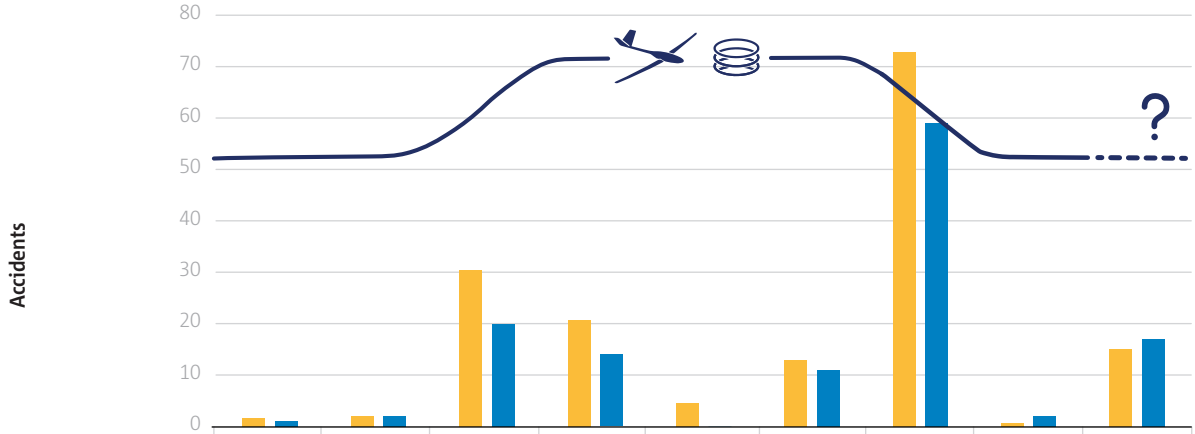

*ARC: Abnormal runway contact; LOC-I: Loss of control - inflight; CTOL: Collision with obstacle(s) during take-off and landing; GTOW: Glider towing related events; LOLI: Loss of lifting conditions en-route; UNK: Unknown or undetermined; SCF-NP: System/ component failure or malfunction [non-powerplant]; RE: Runway excursion; GCOL: Ground Collision; SCF-PP: powerplant failure or malfunction; CFIT: Controlled flight into or toward terrain; USOS: Undershoot/ overshoot; LOC-G: Loss of control – ground; LALT: Low altitude operations; MAC: Airprox/ ACAS alert/ loss of separation/ (near) mid-air collisions;*

**Figure 5.4** Numbers of occurrences by occurrence category involving sailplanes

# Phase of flight

The nature of gliding creates a different set of challenges for sailplane pilots compared to flights using motorised aircraft. This includes both a different means of take-off and the need for the sailplane pilot to frequently plan for possible landing areas during the flight. Figure 5.5 provides an overview of the accidents per phase of flight.

Landing is the highest risk phase in sailplane operations, averaging 72.9 (2014–2023) and dropping to 59 in 2024. Take-off accidents rank second, averaging 30.4 and declining to 20 in 2024. En route accidents decreased from 20.7 to 14, while no accidents were reported in manoeuvring in 2024. Unknown accidents rose slightly from 15.2 to 17, indicating gaps in classification across flight phases.

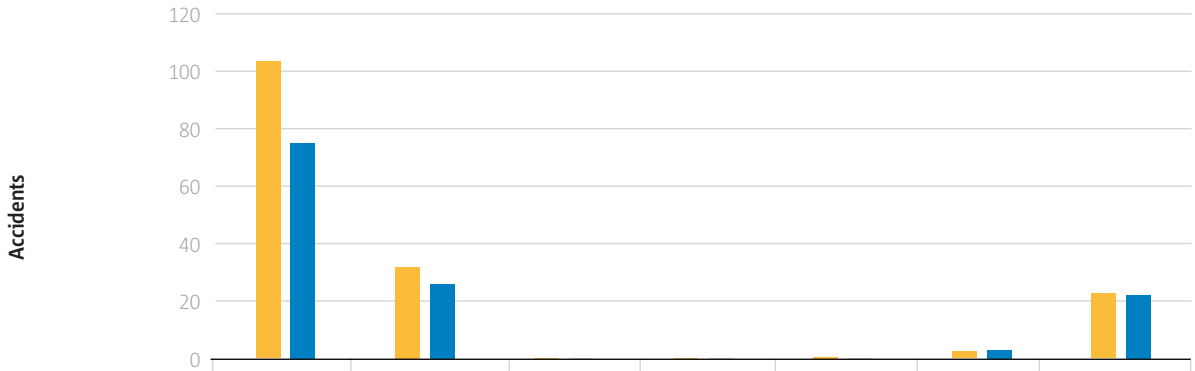



| | Standing | Taxi | Take-off | En route | Manoevring | Approach | Landing | Tow | Unknown/ blank |
|---|---|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 1.7 | 2.0 | 30.4 | 20.7 | 4.6 | 12.9 | 72.9 | 0.6 | 15.1 |
| 2024 | 1 | 2 | 20 | 14 | 0 | 11 | 59 | 2 | 17 |

**Figure 5.5** Accidents by phase of flight involving sailplanes

# Operation type

Most sailplane accidents occurred during leisure/private flight. Accidents during flight training come next but in 2024 there was a significant reduction of leisure/private flight accidents compared to the 10-year average. Flight training accidents are slightly below the 10-year average showing a similar trend as leisure/private flights It should be noted that many of the unknown/blank phases of flight have not been categorised due to a lack of information as these accidents are still being investigated by the national safety investigation authorities.




| | Pleasure | Flight Training/ instructional | Relocation | Testflight | Demonstration | Other | Unknown/blank |
|---|---|---|---|---|---|---|---|
| Average 2014-2023 | 103.4 | 31.7 | 0.2 | 0.2 | 0.4 | 2.4 | 22.6 |
| 2024 | 75 | 26 | 0 | 0 | 0 | 3 | 22 |

**Figure 5.6** Accidents by operation type involving sailplanes

# Safety risks

The safety risks for sailplanes identified by EASA are derived from occurrences data recorded in the ECR, covering the two-year period 2023-2024. From the 1 705 occurrences in 2023 and 2024, only 760 occurrences were completed with the KRA and ERCS safety risk score, representing an ERCS completion rate of 44.6% for the domain. The hereafter information is solely based on this restricted dataset.

The KRAs for sailplanes are shown in Figure 5.7. KRAs and occurrence categories (refer to core document Figure 5.4) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

Aircraft upset is the KRA with the highest ERCS safety risk score over the 2-year period, from a total number of 164 occurrences. Airborne collision is second, although 316 occurrences have been assigned to airborne collision KRA, their ERCS safety risk score is lower compared with aircraft upset occurrences.

The third KRA based on the overall ERCS safety risk score is obstacle collision in flight from only 15 occurrences in the same time period.

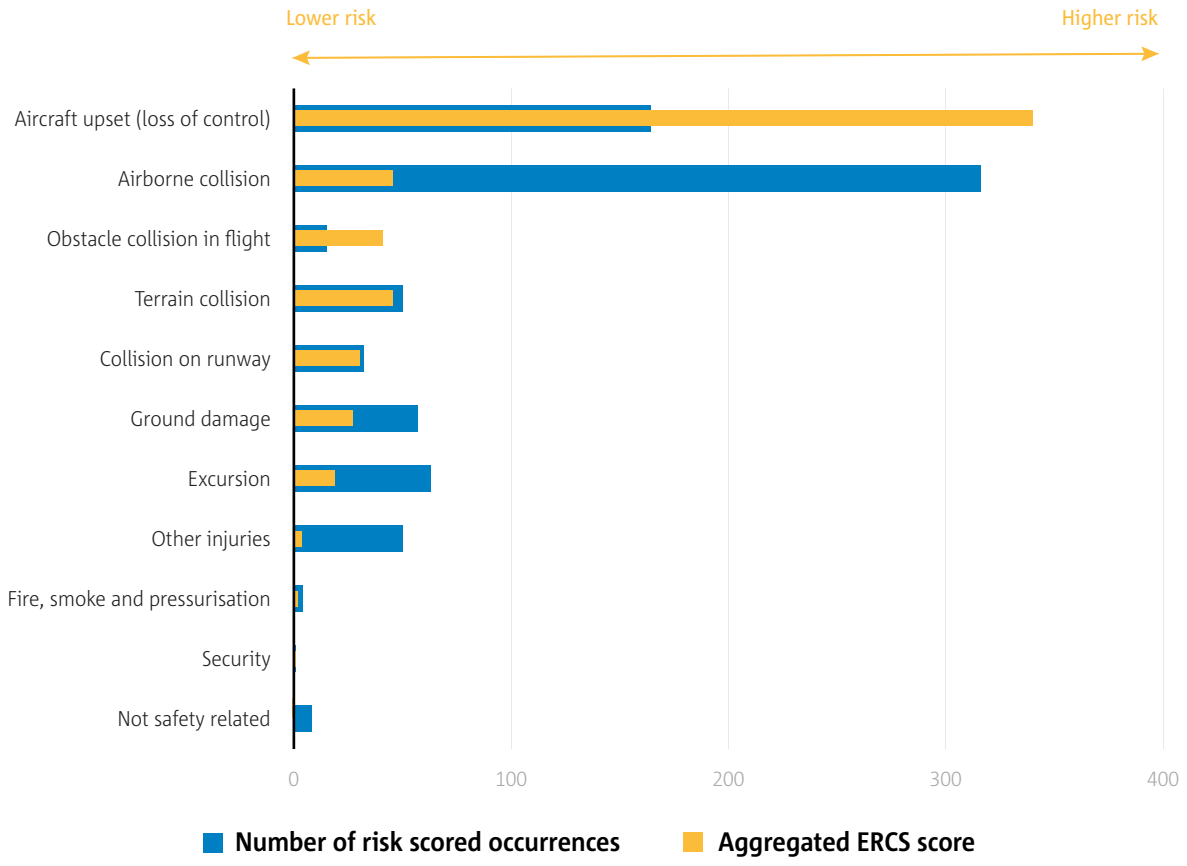



**Figure 5.7** KRAs by aggregated ERCS score and number of risk-scored occurrences involving sailplanes

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Chapter 6

# Unmanned aircraft systems (UAS)

ANNUAL SAFETY REVIEW 2025

For the second time the Annual Safety Review (ASR) covers the new domain of unmanned aircraft systems (UAS) and their operations. The chapter is based on accidents and serious incidents involving UAS where the state of occurrence is an EASA Member State.

The data presented are based on the accidents and serious incidents notified to the Agency in accordance with Regulation (EU) 996/2010 on accident and serious incident investigation, and those reported to the European Central Repository (ECR) in accordance with Regulation (EU) 376/2014 on occurrence reporting. The occurrence class of the events found in the ECR were cross-checked with the relevant NAAs and thus verified.

The European legislator limited mandatory occurrence reporting in this domain: occurrences involving UAS for which no certificate or declaration is required is not mandatory, unless the occurrence or other safety-related information involving such unmanned aircraft resulted in a fatal or serious injury to a person or it involved aircraft other than unmanned aircraft[13]. But since the ECR also contains voluntary reports of accidents by UAS, these have also been considered in this chapter, even if they did not lead to fatal or serious injuries.

This UAS chapter focuses on the state of occurrence being the EASA Member States, where the detailed European regulatory framework for UAS operations is applicable. Consequently, accidents and serious incidents involving EU-registered manned aircraft and UAS but occurring outside EASA Member States are not included here. Such occurrences would be found among the accidents and serious incidents covered in other chapters of this ASR, namely Chapter 2 – Aeroplanes and Chapter 3 – Helicopters. Different from other chapters the dataset underlying this chapter includes accidents and serious incidents by experimental UAS during test flights because in this domain such aircraft are within the remit of the EASA Basic Regulation and therefore also in the remit of Regulation (EU) 376/2014, since such UAS operations are not included in the Annex I of the EASA Basic Regulation. Furthermore, this chapter covers accidents and serious incidents caused by model aircraft, because such aircraft are also considered UAS based on the definition of 'unmanned aircraft' found in the EASA Basic Regulation[14], the definition of 'unmanned aircraft system' in the European rules for UAS[15], as well as the specific rule found therein addressing operations of UAS in the framework of model aircraft clubs and associations[16]. As the ASR focuses on civil aviation only, this chapter excludes accidents and serious incidents involving UAS operated by the state, i.e. the military, police or other governmental agencies unless the occurrence also involved a civil aircraft. However, accidents by UAS involved in search and rescue and firefighting are included.

Notwithstanding the above limitations, exclusions and considerations, this chapter presents the key statistics and occurrence categories for UAS operations.

The list of fatal accidents associated with the scope of this chapter is provided in Appendix 1 of this document. This list contains the fatal accident in 2023.

13 See Article 3.2 of Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation: "This Regulation applies to occurrences and other safety-related information involving civil aircraft to which Regulation (EU) 2018/1139 of the European Parliament and of the Council (1) applies". However, this Regulation shall not apply to occurrences and other safety-related information involving unmanned aircraft for which a certificate or declaration is not required pursuant to Article 56(1) and (5) of Regulation (EU) 2018/1139, unless the occurrence or other safety-related information involving such unmanned aircraft resulted in a fatal or serious injury to a person or it involved aircraft other than unmanned aircraft.

14 Article 3 - Definitions, (30) 'unmanned aircraft' means any aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board, see Regulation (EU) 2018/1139 of the European Parliament and of the Council on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency.

15 Article 2 – Definitions under (1) ´Unmanned aircraft system' ('UAS') means an unmanned aircraft and the equipment to control it remotely´ in Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, as well as article 16 - UAS operations in the framework of model aircraft clubs and associations in of the same regulation.

16 Such operations take place in areas managed by nationally authorized model aircraft clubs and associations. Model clubs and associations must comply with national rules and with the rules described in article 16 of the Regulation (EU) no 2019/947.

# Key statistics

The key statistics for this domain are in Table 6.1 and Table 6.2. The first table depicts the number of accidents (fatal and non-fatal) and serious incidents for the year 2023 and 2024. The second table shows the number of fatalities and serious injuries sustained in those accidents during 2023 and 2024.

| | Number of occurrences per occurrence class in 2023 | Number of occurrences per occurrence class in 2024 |
|---|---|---|
| **Fatal accidents** | **1** | **0** |
| **Non-fatal accidents** | **15**[17] | **15** |
| **Serious incidents** | **4** | **6** |

**Table 6.1** Key statistics for unmanned aircraft systems (UAS)

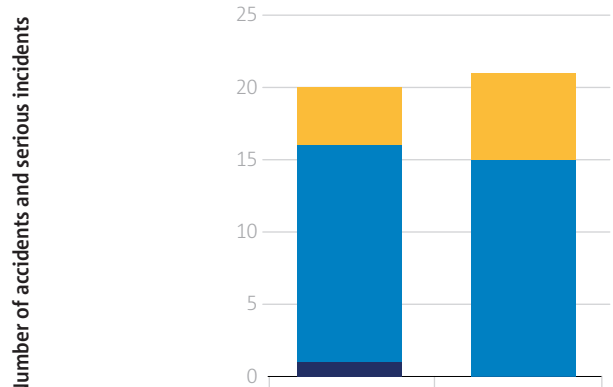
In 2024 no fatal accident involving UAS occurred. None of the non-fatal accidents in 2024 resulted in serious injuries on ground.

| | Number of fatalities - ground | Number of serious injuries - ground |
|---|---|---|
| **Total number in 2023** | **1** | **1** |
| **Total number in 2024** | **0** | **0** |

**Table 6.2** Fatalities and serious injuries involving UAS

17 Compared to last year's UAS chapter, the number of non-fatal accidents reported for 2023 has risen from nine to 15. This is because the Agency has now processed all relevant Member States´ notifications it had received under Regulation (EU) 996/2010. For the same reason, the number of serious incidents for the year 2023 has risen from two to four.

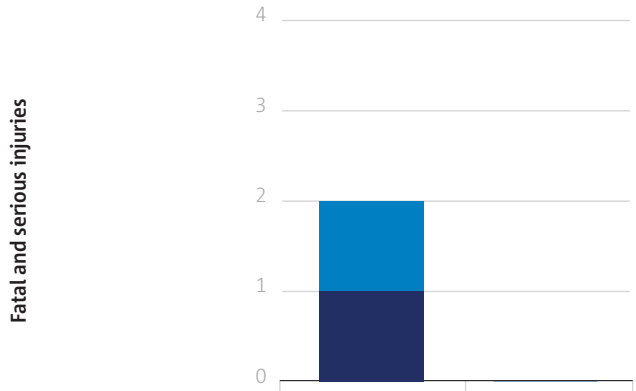
Figure 6.1 plots the total number of fatal accidents, non-fatal accidents, and serious incidents in 2023 and 2024 for the UAS domain.




| | 2023 | 2024 |
|---|---|---|
| Serious incidents | 4 | 6 |
| Non-fatal accidents | 15 | 15 |
| Fatal accidents | 1 | 0 |

**Figure 6.1** Fatal accidents and non-fatal accidents per year involving UAS

Figure 6.2 shows the number of fatalities and serious injuries in 2023 and 2024 for the UAS domain. Notably, this year saw no accidents which resulted in fatalities or serious injuries.




| | 2023 | 2024 |
|---|---|---|
| Fatalities | 1 | 0 |
| Serious injuries | 1 | 0 |

**Figure 6.2** Fatal and serious injuries per year involving UAS

## Involvement of persons on the ground in accidents with UAS

Due to the special characteristics of the UAS domain it is important to monitor the risk to persons on the ground being injured by a UAS. Table 6.2 and Figure 6.2 above include one fatality, and one case of a serious injury caused by UAS in the year 2023[18]. The details of these accidents were given in last year's ASR. In 2024 however there was neither a fatality nor a serious injury that was caused by an accident involving a UAS.

## Involvement of manned aviation in accidents and serious incidents with UAS

It is important to monitor the number of occurrences by UAS in which manned aviation was involved. In the year 2024 the domain recorded seven such occurrences. These seven occurrences were one accident and six serious incidents. The accident involved a collision between a small UAS (250gr) and a small, non-certified aircraft over a lake in Switzerland at ca. 100 m AGL. The aircraft sustained minor damage and was able to continue its flight. The six serious incidents occurred in Austria (two), Germany (one), the Netherlands (two) and Switzerland (one) and represented five Airprox and one Loss of control-in flight events. The manned aircraft involved in these occurrences were A320, A321, A340, one Robinson helicopter (R44) and one Bombardier (BD500), as well as one non-power sailplane glider. In all cases the size and the origin of the UAS encountered remained unknown or was not coded in the occurrence report. As regards their safety risks, one event was given a ERCS score[19]. of X4 (yellow). Under the Occurrence reporting regulation, a remote pilot of UAS causing such an encounter is required to report such events, but such self-reporting of UAS flown outside their legally permitted height and/ or geographic zones is extremely rare.

In summary, Table 6.3 shows that 2024 33% of the total number of 21 occurrences in the UAS domain involved a manned aircraft. This is an increase from 10% in the year 2023.

| | Total number of accidents and serious incidents | Number of accidents and serious incidents in which manned aircraft were involved |
|---|---|---|
| **2023** | **20** | **2** |
| **2024** | **21** | **7** |

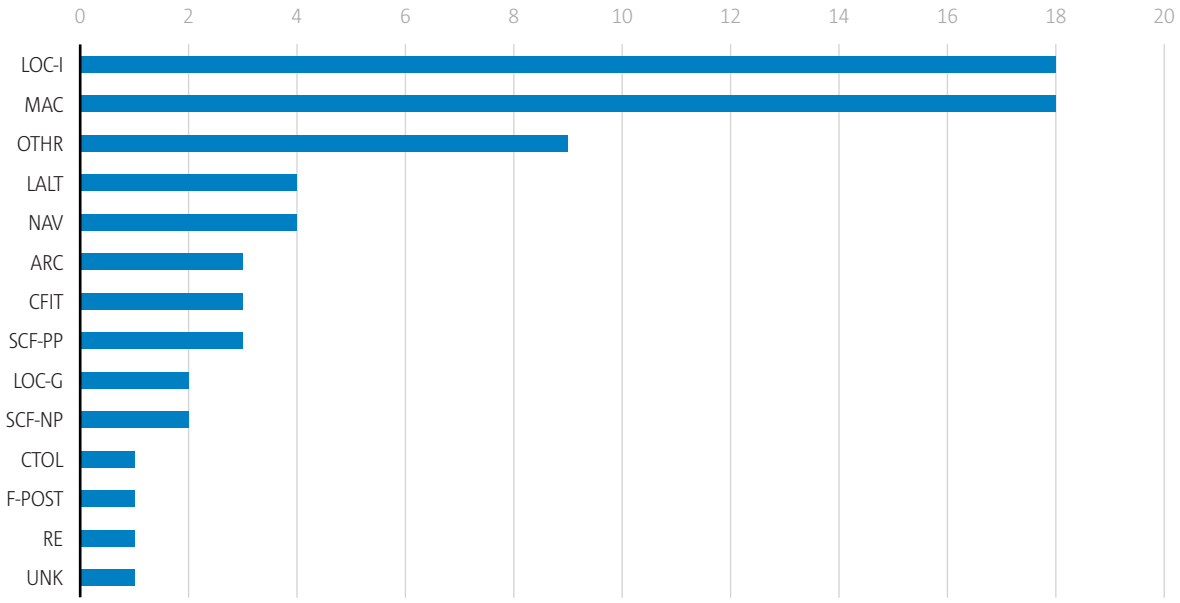
**Table 6.3** Number of occurrences by UAS in which manned aircraft were involved

## Occurrence categories

Figure 6.3 below depicts the occurrence categories assigned to the serious incidents and accidents for the UAS domain in 2023 and 2024. Occurrences are categorised using the ICAO Accident Incident Data Reporting (ADREP) taxonomy for occurrence categories, developed to support the common coding of the main elements of an occurrence that should be investigated, recorded, and analysed. Categories are of different nature, e.g., operational such as an abrupt manoeuvre (AMAN), or environmental such as windshear or thunderstorm (WSTRW), technical such as system/ component failure or malfunction [non-powerplant] (SCF-NP), but they may also be consequential such as fire/ smoke resulting from impact (F-POST). Therefore, multiple categories may be assigned to a single occurrence. For example, if an engine failure occurred, and loss of control followed, the occurrence would be coded in both categories i.e., SCF-PP: powerplant failure or malfunction and LOC-I: loss of control in flight. The sum of the number of occurrences per category may therefore be greater than the total number of occurrences realised in the period.

18 Based on Article 5 of Regulation (EU) No 996/2010, as amended by Regulation (EU) 2018/1139 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, a safety investigation by the responsible safety investigation authority would be required for accidents involving UAS resulting in fatal or serious injuries.

19 European risk classification scheme or ERCS means the methodology applied for the assessment of the risk posed by an occurrence to civil aviation in the form of a safety risk score; see Commission Delegated Regulation (EU) 2020/2034 of 6 October 2020 supplementing Regulation (EU) No 376/2014 of the European Parliament and of the Council as regards the common European risk classification scheme.




*LOC-I: Loss of control - inflight; MAC: Airprox/ACAS alert/loss of separation/(near) midair collisions; OTHR: Other; LALT: Low altitude operations; NAV: Navigation error; ARC: Abnormal runway contact; CFIT: Controlled flight into or toward terrain; SCF-PP: powerplant failure or malfunction; LOC:-G: Loss of control – ground; SCF-NP: System/component failure or malfunction [non-powerplant; CTOL: Collision with obstacle(s) during take-off and landing; F-POST: Fire/ smoke (post impact); RE: Runway excursion; UNK: Unknown or undetermined.*

**Figure 6.3** Numbers of occurrences by occurrence category involving UAS

In the years 2023-2024, there were 41 accidents and serious incidents involving UAS. The most common occurrence categories are 'LOC-I: Loss of control – inflight' and 'MAC: Airprox/ACAS alert/loss of separation/ (near) mid-air collisions' which were assigned 18 times respectively to the serious incidents and non-fatal accidents of 2023 and 2024. The occurrence category 'OTHR: Other' was assigned to nine serious incidents and accidents, of which one resulted in the fatality of 2023 involving the model aircraft/UAS on a model aircraft terrain. The category 'OTHR' is meant for 'any occurrence not covered under another category'[20]. The high usage of this category, also in combination with other categories, could mean that the reporters wanted to express the unusual character of the occurrence involving UAS or, when used alone, that the occurrence was so unique that they would not fit another category. The occurrence category ´NAV: Navigation error´ and 'LALT: Low altitude operations' were each assigned to four of the non-fatal accidents, one of which resulted in the serious injury recorded in Table 6.2 and Figure 6.2.

In conclusion, the use of the occurrence category OTHR: Other; ´ for different types of occurrences with UAS should be studied and if need be, the assignment of the most appropriate occurrence categories should be clarified to the UAS community.

20 Aviation Occurrence Categories, Definitions and Usage, ICAO Common Taxonomy Team, May 2021.

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Chapter 7

# Aerodromes and ground handling

ANNUAL SAFETY REVIEW 2025

This chapter covers the aerodrome and ground handling domain in the EASA Member States. The data presented is based on accidents notified to the Agency in accordance with Regulation (EU) 996/2010 on the investigation and prevention of accidents and incidents in civil aviation.

The accidents that would be considered in this chapter are the following:

- Runway excursions and runway incursions whenever relating to aerodrome operations and the aerodrome infrastructure;
- Occurrences happening on the apron and on the taxiway, including occurrences related to ground handling operations;
- Occurrences with the aircraft being airborne, whenever the aerodrome operations, infrastructure or ground handling operations may have been contributors to these occurrences.

Accidents related to occupational health and safety are not considered in this chapter. This chapter only includes accidents that are in line with the definition of accident in Regulation (EU) 996/2010, that stipulates that such an occurrence *"takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked"*[21].

This chapter only includes accidents that occurred at aerodromes located in the EASA Member States. This means that the data may stem from aerodromes that fall under the scope of the EASA Basic Regulation[22], but also from aerodromes that fall under the scope of national regulations. Moreover, it is important to keep in mind that the occurrences shown here are those where the analysis of the accident concluded that the aerodrome design, aerodrome or ground handling operations contributed to the event. Conversely, events of runway excursions and incursions where the aircraft and its operation caused the occurrence would be found in the chapters covering the respective products (e.g. Chapter 2 – Aeroplanes).

The key statistics, occurrence categories and safety risks for the aerodromes and ground handling domain are presented in this document. The overview of the safety risks is solely derived from occurrence data taken from the ECR. It must be borne in mind that it is not possible to thoroughly clean the data, so that the causation of the occurrences is not necessarily all aerodrome and ground handling related.

The list of fatal accidents associated with the scope of this domain is provided in Appendix 1 of this document. However, in the last decade there has not been a fatal accident that was attributable to the domain.

21 Article 2(1) of Regulation (EU) 996/2010. For information, this definition changes in the case of an unmanned aircraft, where an accident would "take place between the time the aircraft is ready to move with the purpose of flight until such time it comes to rest at the end of the flight and the primary propulsion system is shut down".

22 As per Article 2(1)(e) of the EASA Basic Regulation (Regulation (EU) 2018/1139).

# Key statistics

The key statistics for the domain of aerodromes and ground handling are shown in Table 7.1 and Table 7.2. The number of accidents in 2024 was lower than the average of the preceding decade. In 2024, there were no fatal accidents related to aerodrome and ground handling in EASA Member States. However, in 2024 three accidents causing serious injuries occurred, but this is in line with the yearly average of the preceding decade.

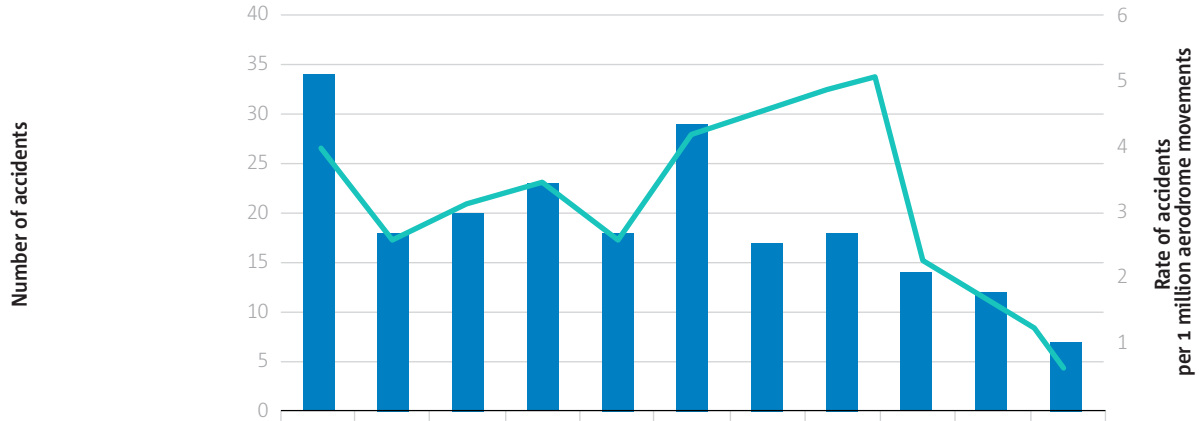
| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **0** | **0** | = |
| **Non-fatal accidents** | **203** | **7** | ↓ |

**Table 7.1** Key statistics for aerodromes and ground handling

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **0** | **23** |
| **Yearly max number over 2014-2023** | **0** | **5** |
| **Yearly min number over 2014-2023** | **0** | **0** |
| **Total number in 2024** | **0** | **3** |

**Table 7.2** Fatalities and serious injuries for aerodromes and ground handling

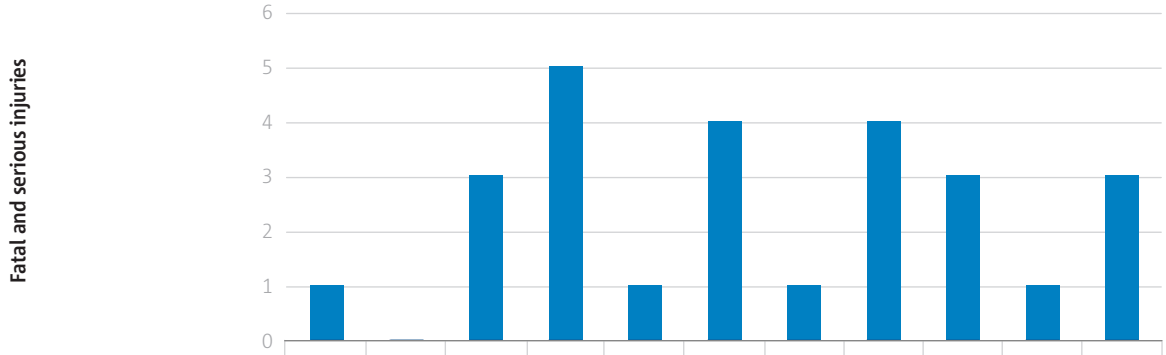
Figure 7.1 shows the number of accidents per year over the last decade, as well as the rate of these occurrences per 1 million aerodrome flight movements in the EASA Member States. In 2024, European aerodromes saw a continued recovery in air traffic (10.3 million aircraft arrivals and departures) building on the progress made in 2023 and 2022. The number of accidents for the year 2024 is the lowest observed over the time frame analysed. The accident rate has more than halved compared to 2023, from 1.7 to 0.7 accidents per million aerodrome flight movements. This confirms the downward trend of the last three years. EASA will continue to monitor the rate over the next few years to determine if this positive development is sustainable.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-fatal accidents | 34 | 18 | 20 | 23 | 18 | 29 | 17 | 18 | 14 | 12 | 7 |
| Fatal accidents | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Accident Rate | 3.9 | 2.6 | 3.2 | 3.4 | 2.6 | 4.1 | 4.7 | 5.1 | 2.3 | 1.7 | 0.7 |

**Figure 7.1** Numbers of fatal and non-fatal accidents involving aerodromes and ground handling, and rates per million aerodrome movements

The number of fatalities and serious injuries per year is shown in Figure 7.2. In 2024 there were three cases of serious injuries. Two accidents were related to ground handling, one occurred at an aerodrome in the scope of the EASA Basic Regulation where the European aerodrome rules[23] are applied and where also the new European ground handling rules will be fully applicable as of 2028. The other accident occurred at a smaller aerodrome where the previously mentioned European rules do not apply. In addition, there was also one serious injury caused by an abrupt manoeuvre of an aircraft on the ground which was in turn caused by a taxiway incursion by a ground vehicle.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 1 | 0 | 3 | 5 | 1 | 4 | 1 | 4 | 3 | 1 | 3 |
| Fatalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

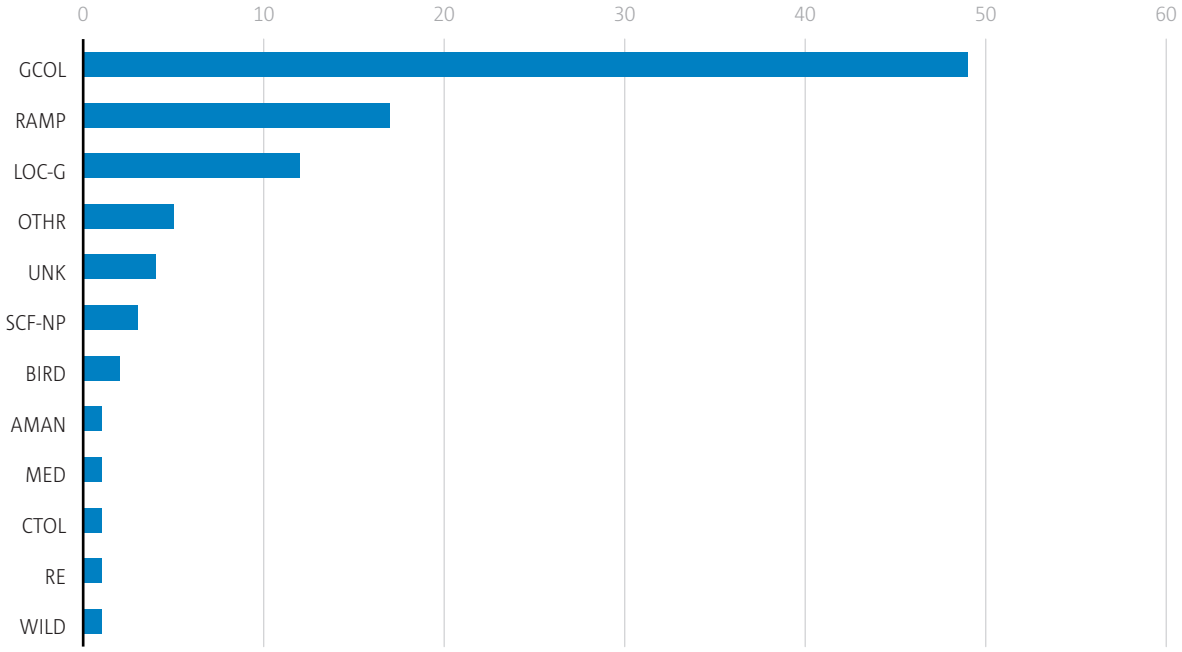
**Figure 7.2** Fatal and serious injuries per year involving aerodromes and ground handling

23 COMMISSION REGULATION (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.

## Occurrence categories

Figure 7.3 shows the occurrence categories assigned to the accidents in the past five years. Occurrences are categorised using the ICAO Accident Incident Data Reporting (ADREP) taxonomy for occurrence categories, developed for supporting common coding of the main elements of an occurrence that should be investigated, recorded, and analysed. Categories are of different natures, e.g., operational such as low altitude operations (LALT), environmental such as turbulence encounter (TURB), technical such as system/ component failure or malfunction [non-powerplant] (SCF-NP), consequential such as fire/smoke resulting from impact (F-POST), etc. Multiple categories may therefore be assigned to a single occurrence. For example, if an engine failure occurred, and loss of control followed, the occurrence would be coded in both categories, i.e., SCF- PP: powerplant failure or malfunction and LOC-I: loss of control in flight. The sum of the number of occurrences per category may therefore be greater than the total number of occurrences that were realised in the period.

For the period 2020-2024, ground collisions are by far the most frequent type of accident, followed by ramp/ ground handling occurrences.




*GCOL: Ground Collision; RAMP: Ground Handling; LOC-G: Loss of control – ground; OTHR: Other; UNK: Unknown or undetermined; SCF-NP: System/component failure or malfunction [non-powerplant]; BIRD: Bird; AMAN: Abrupt manoeuvre; MED: Medical; CTOL: Collision with obstacle(s) during take-off and landing; RE: Runway excursion; WILD: Collision Wildlife.*

**Figure 7.3** Number of accidents by occurrence category involving aerodromes and ground handling

## Safety risks

The safety risks for aerodrome and ground handling operations identified by EASA are derived from occurrences data recorded in the ECR, covering the two-year period 2023-2024. From the total of 146 055 occurrences in the domain in the years 2023 and 2024, 74 532 occurrences were completed with the Key Risk Area (KRA) and the ERCS safety risk score. This represents a completion rate of 51% for the domain. This being the case the information hereafter is solely based on this restricted dataset of 2023-2024.

The KRAs for aerodrome and ground handling operations are shown in Figure 7.4.

The KRAs and occurrence categories (in the Figure 7.3 above) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence escalated or could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the introduction to this ASR.

In the two-year period 2023-2024, the KRA ground damage was the most likely type of accident to which occurrences escalated or could have escalated (with a total of 22 829 occurrences). This KRA did however only represent the third highest cumulative safety risk (as represented by the yellow bar) in the domain. The KRA with the highest safety risk was fire, smoke and pressurisation, which was also the second most likely accident to which occurrences escalated or could have escalated (with a total of 17 978 occurrences). In the last issue of the ASR this KRA was ranked fifth. The rise of fire, smoke and pressurisation to the top safety risk of the domain appears to be related to certain Member States having reported much more occurrences in relation to dangerous goods/ batteries found in the checked luggage of passengers in 2024. Furthermore, it can be noted that aircraft upset, and ground damage are the second and third highest safety risk, with ground damage seeing more occurrences than aircraft upset, but the KRA aircraft upset having a higher aggregated ERCS score. Collision on the runway is the fourth highest cumulative safety risk, even though there have been fewer occurrences (1 173) that escalated/could have escalated to such an outcome than compared to the fifth highest risk, the KRA excursion. Finally, it should be noted that the KRA other Injuries moved from the third rank in 2023 to the seventh rank of safety risk in the aerodrome and ground handling domain for the combined years 2023-2024. This KRA saw more occurrences than excursions, but the events assigned to the KRA other injuries escalated or could have escalated to less risky outcomes.

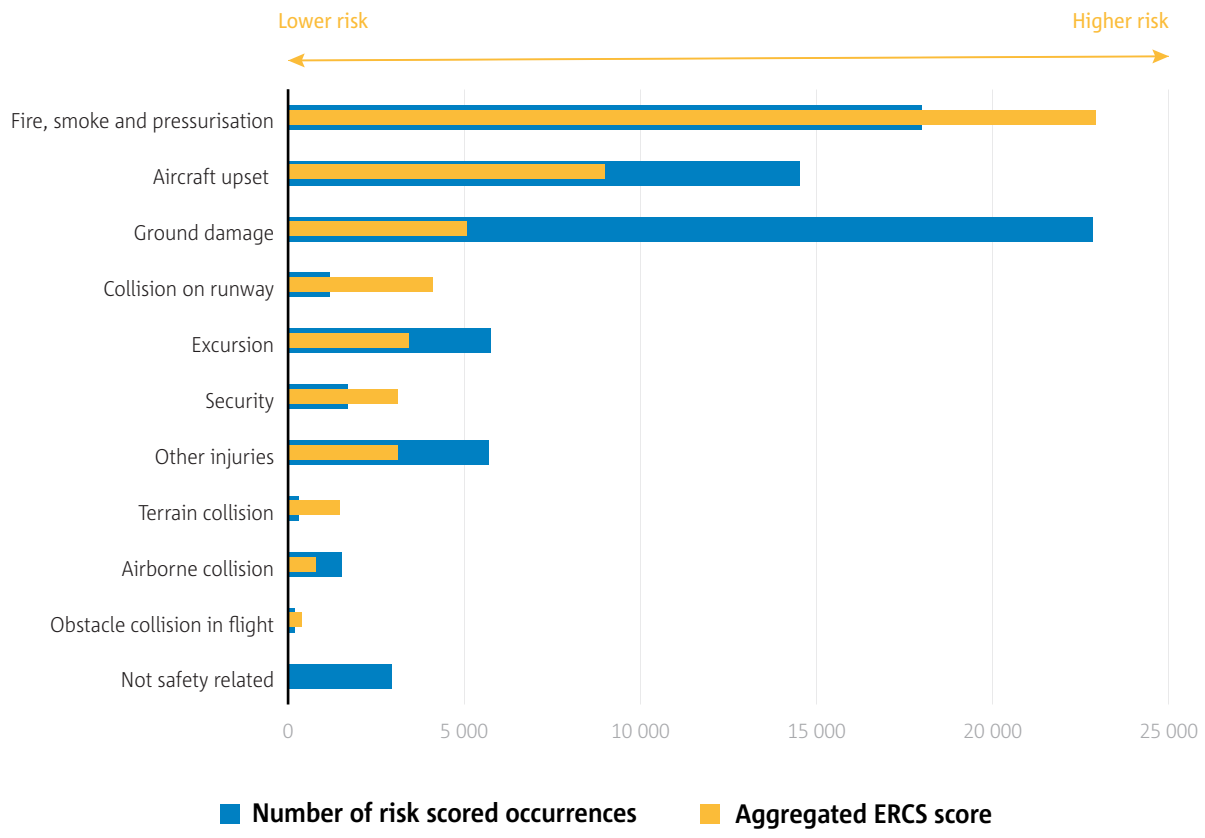



**Figure 7.4** KRAs by aggregated ERCS score and number of risk-scored occurrences involving aerodromes and ground handling

# Number of certified aerodromes in the EASA Member States

Regulation (EU) 2018/1139 (the EASA Basic Regulation), in its Article 2(1)(e) establishes which aerodromes fall under the scope of the European aviation safety rules and must therefore be certified for the safety of their design and operations in accordance with Regulation (EU) 139/2014, the Aerodromes Regulation (EASA ADR), which lays down the detailed requirements for the certification and operation of those aerodromes located in the EASA Member States.

As of 31 December 2024, 535 aerodromes are within the scope of the EASA Basic Regulation, 412 of which are certified and 123 are granted an exemption in accordance with Article 2(7) of the EASA Basic Regulation, due to low traffic volumes. Since the end of 2023 no aerodrome remained uncertified, when it should have been certified. Figure 7.5 shows the number of aerodromes per EASA Member State as either certified in accordance with the European aviation safety rules or exempted due to low traffic volumes[24]. Certain specified ground handling services are also in the scope of the EASA Basic Regulation. The delegated acts laying down the detailed rules for the provision and oversight of these ground handling services came into force on 27 March 2025 and shall be applicable from 27 March 2028. These rules shall apply to the ground handling organizations that provide any of the specified ground handling services at one or more aerodromes within the scope of the EASA Basic Regulation, unless the aerodrome is exempted, as per the Article 2(7).

24 The detailed list of aerodromes falling under EU rules can be accessed via the EASA website under the following link: https://www.easa. europa.eu/en/datasets/aerodromes-falling-scope-regulation-eu-20181139

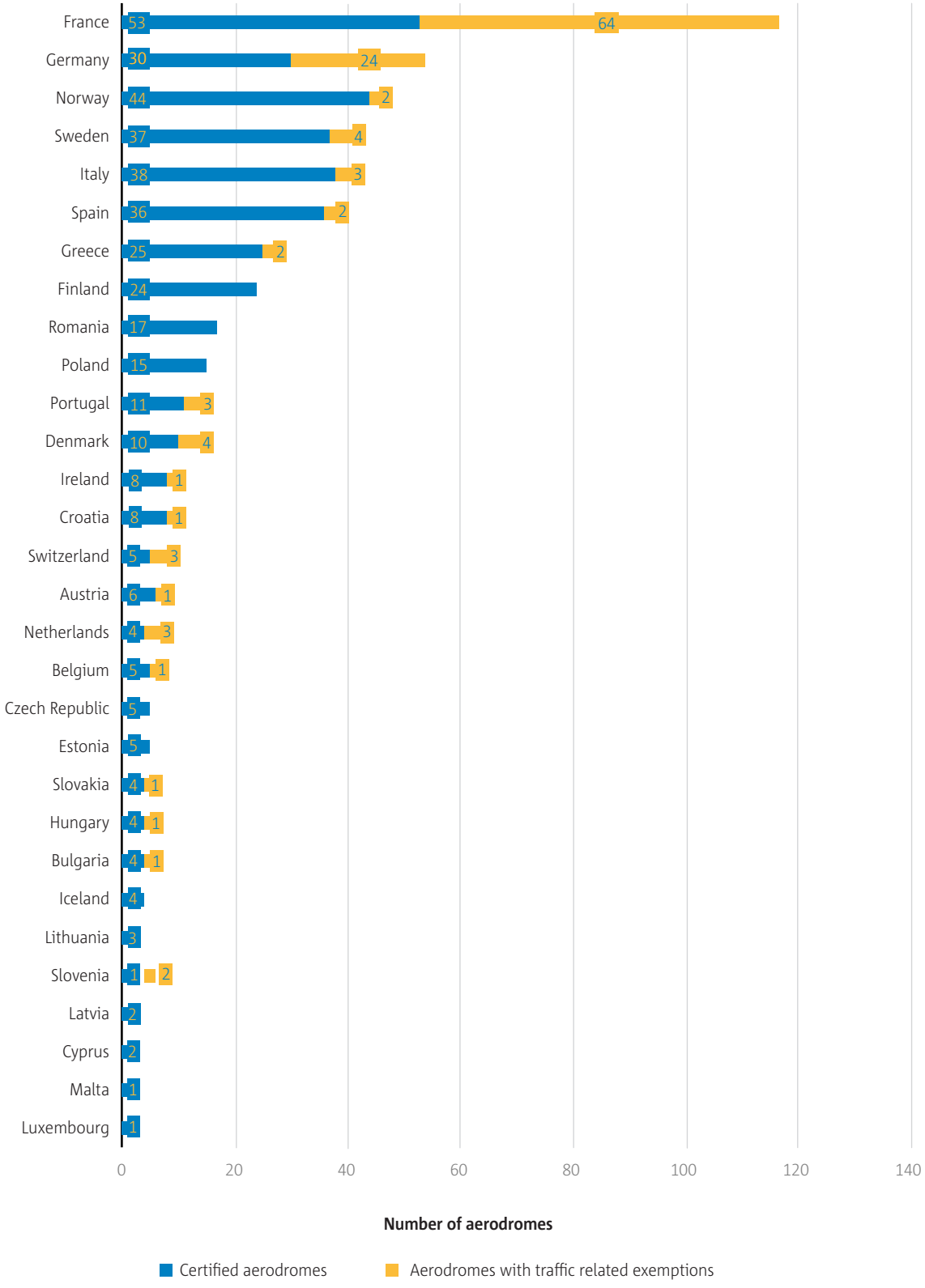



**Figure 7.5** Aerodromes by EASA Member State in the scope of the EASA Basic Regulation to which the Aerodrome rules in Regulation (EU) 139/2014 are applicable

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Chapter 8

# Air Traffic Management or Air Navigation Services (ATM/ANS)

ANNUAL SAFETY REVIEW 2025

This chapter covers accidents related to the provision of Air Traffic Management or Air Navigation Services (ATM/ANS) in EASA Member States. The data are based on accidents collected by EASA under ICAO Annex 13, Regulation (EU) 996/2010 on accident and serious incident investigation and Regulation (EU) 376/2014 on occurrence reporting, analysis and follow-up.

Accidents in this chapter involve at least one Commercial air transport (CAT) aircraft, either fixed-wing aeroplanes with a maximum take-off mass of at least 2 250 kg, or small (CS-27) or large (CS-29) helicopters, which occurred in an EASA Member State.

Accidents reviewed in this chapter comprise occurrences where the provision of services by the ATM/ANS was, directly or indirectly, a contributing factor in the occurrence or played a role in aggravating the occurrence encountered by the aircraft.

This chapter introduces the key statistics, and safety risks of ATM/ANS occurrences. As no accidents with ATM/ANS contribution occurred during the last five years, no occurrence categories are listed for the ATM/ANS domain. The overview of the safety risks is solely derived from occurrence data from the European Central Repository (ECR).

The list of fatal accidents (if any) associated with the scope of this chapter is provided in Appendix 1 of this document.

# Key statistics

The key statistics for this domain are in Table 8.1. They include a comparison of the number of fatal and non-fatal accidents for the last year and the previous 10-year period.

No fatal accidents in 2024 and the preceding period 2014-2023, where ATM/ANS was a contributing factor (ATM involved or ATM indirectly involved) were recorded. As was already the case in the years 2020 to 2023, no non-fatal accidents were reported in 2024. In the last decade, four non-fatal accidents with ATM contribution were recorded.

| | Total number of occurrences per occurrence class over 2014-2023 | Number of occurrences per occurrence class in 2024 | Comparison 2024 vs yearly average of 2014-2023 per occurrence class |
|---|---|---|---|
| **Fatal accidents** | **0** | **0** | = |
| **Non-fatal accidents** | **4** | **0** | ↓ |

**Table 8.1** Key statistics for ATM/ANS contribution accidents

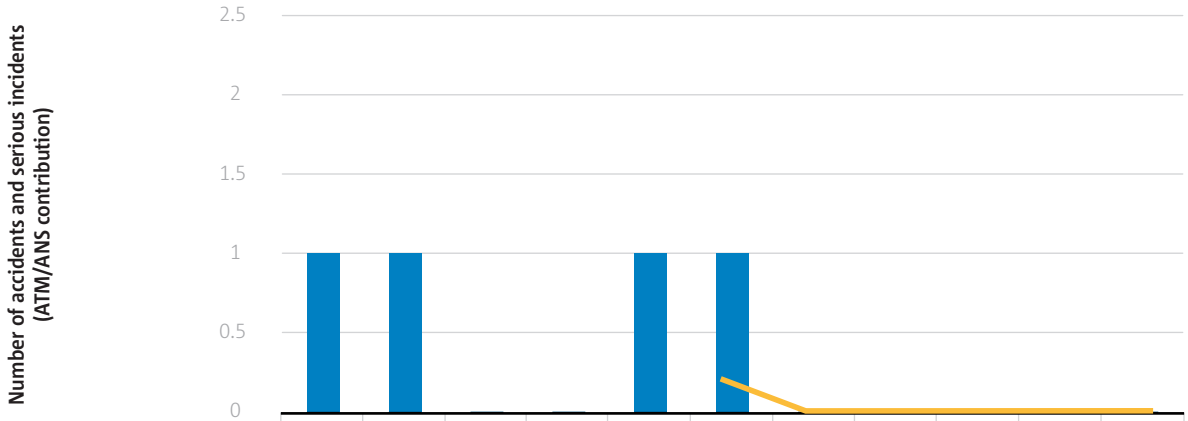
Table 8.2 shows the fatalities and serious injuries sustained in those accidents during the same timeframe.

As shown in Table 8.2, no fatalities with ATM/ANS contributions were recorded in 2024. Only one occurrence with serious injuries with ATM contribution (directly or indirectly involved) was recorded during the last decade.

| | Number of fatalities | Number of serious injuries |
|---|---|---|
| **Total number over 2014-2023** | **0** | **1** |
| **Yearly max number over 2014-2023** | **0** | **1** |
| **Yearly min number over 2014-2023** | **0** | **0** |
| **Total number in 2024** | **0** | **0** |

**Table 8.2** Number of fatalities and serious injuries involving ATM/ANS contribution

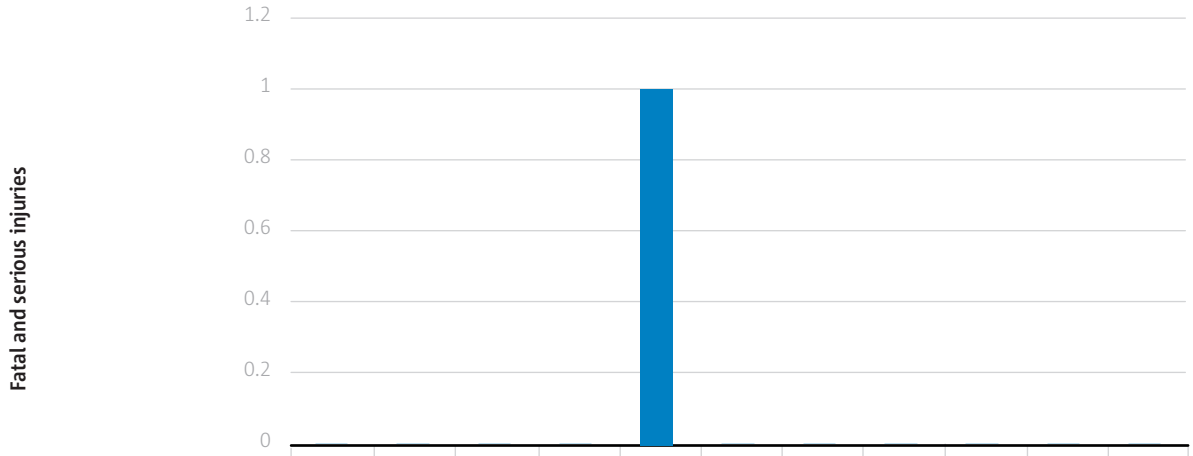
Figure 8.1 shows the number of accidents for 2014-2024 and accidents rates per one million flights for 2019-2024. The geographical scope for the reference data chosen for the accident rate calculation is the airspace considered for the third reference period (RP3) of the Single European Sky (SES). Therefore only 2019-2024 are considered for the accident rate calculation. In the past decade, no fatal accidents with ATM contributions were recorded. The accident rate has declined since 2019, as there has not been an accident with ATM direct or indirect contribution since that year.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fatal accidents | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Non-fatal accidents | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Accident rate | | | | | | 0.1 | 0 | 0 | 0 | 0 | 0 |

**Figure 8.1** Number of accidents per year and accident rate per one million flights

The number of fatalities and serious injuries per year are shown in Figure 8.2. Only in 2018 there was one occurrence where a serious injury s was reported.




| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Serious Injuries | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fatalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Figure 8.2** Fatalities and serious injuries per year involving ATM/ANS contribution

## Occurrence categories

No accidents marked with ATM/ANS contribution (ATM directly or indirectly involved have been recorded during the time frame 2020-2024.

## Safety risks

The safety risks for ATM/ANS are derived from occurrences data recorded in the ECR, covering the two-year period 2023-2024. From the 19 880 occurrences in 2023 and 2024, only 9 533 occurrences were completed with the KRA and ERCS safety risk score, representing an ERCS completion rate of 48% for the domain. The hereafter information is solely based on this restricted dataset.

The KRAs for ATM/ANS are shown in Figure 8.3. KRAs and occurrence categories have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

For the ATM/ ANS domain it can be stated that the occurrences with the KRA airborne collision had the highest risk score. 3 786 out of 9 533 occurrences were reported with this KRA. The occurrences with the second highest risk score are occurrences with the KRA collision on runway. 903 out of 9 533 occurrences were reported with this KRA. Occurrences with the KRA terrain collision had the third highest risk score. 289 occurrences were reported with this KRA. The KRAs ground damage, aircraft upset, and other injuries had more occurrences, however their risk score was rated lower.

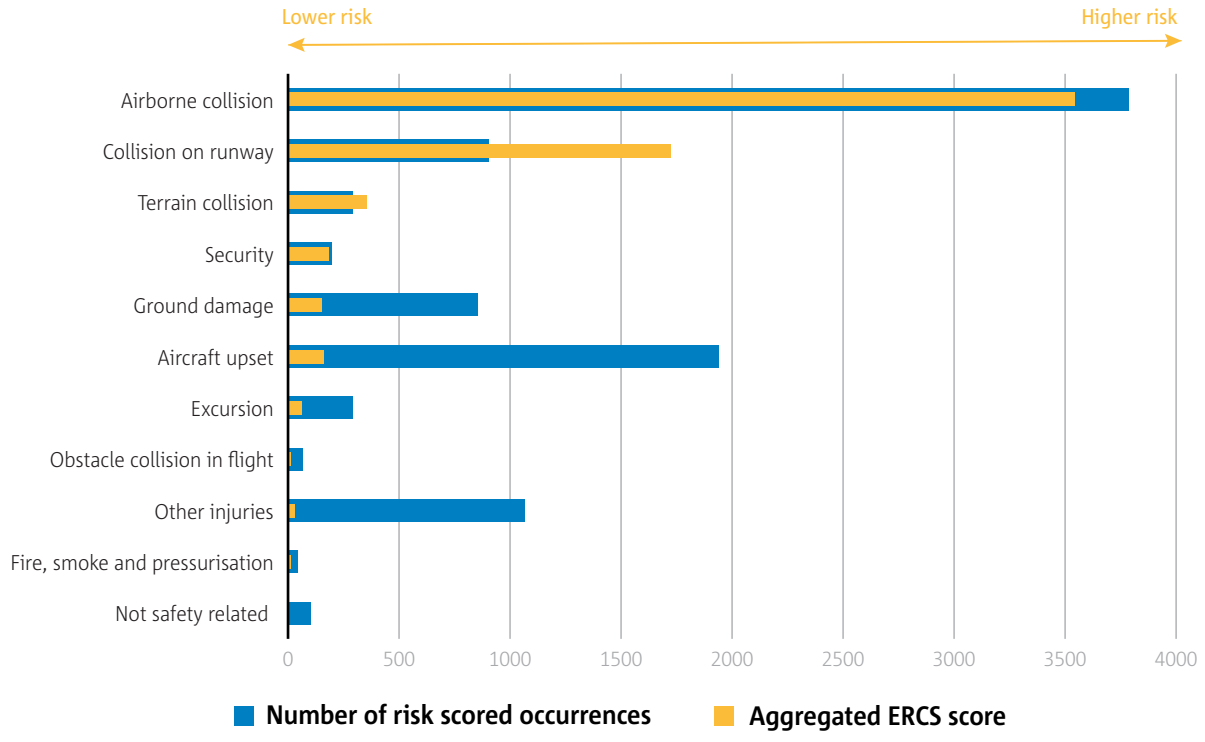



**Figure 8.3** KRAs by aggregated ERCS score and number of risk-scored ATM/ANS occurrences

The top KRAs in the ATM/ANS domain are airborne collision and collision on runway reflecting the role of ATM/ANS in guiding and separating aircraft.

The top KRAs in the ATM/ANS domain are defined as:

- **Airborne collision.** This includes occurrences involving actual or potential airborne collisions between aircraft, and occurrences involving an aircraft and other controllable airborne objects, such as drones, thereby excluding birds. Therefore, it includes all separation-related occurrences regardless of the cause. It does not include false TCAS/ACAS alerts that are caused by equipment malfunctions or loss of separation with at least one aircraft on the ground.
- **Collision on runway.** This includes all occurrences involving actual or potential runway collisions between an aircraft and another aircraft, vehicle or person that occur on the runway of an aerodrome or other designated landing area. This includes occurrences involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and take-off of aircraft. It does not include occurrences involving wildlife on the runway.

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Chapter 9

# Occurrence reporting and risk classification

ANNUAL SAFETY REVIEW 2025

This chapter intends to measure the volume of occurrence reports collected in the European Central Repository (ECR) under Regulation (EU) 376/2014 over the period 2016-2024 and to put the changing levels of occurrence reporting in perspective with changes to the level of aviation activity in Europe. It also intends to measure the volume of occurrence records that were risk-classified in accordance with the European Risk Classification Scheme (ERCS) over 2023-2024.

## 9.1 Overall levels of occurrence reporting and levels of traffic

Occurrence reporting rates are important to monitor as they are an indicator of the changes to safety culture in Europe. A large number of reports can be regarded as a sign of a good safety culture. In this respect, whereas in the rest of the annual safety review, a higher number of accidents and serious incidents may be viewed in as negative; in this section an increase in overall occurrence reporting, which includes incidents, can be viewed as a positive development.

This section had initially been developed for the 2021 annual safety review by the safety performance indicators working group (SPI WG), under the Network of aviation safety Analysts (NoA), which is established under Article 14 of Regulation (EU) 376/2014.

For all figures in this section, the number of reports should be interpreted as the number of reports from distinct reporting entities. For a single occurrence record, if more than one report is reported by the same reporting entity (e.g., in case of follow-up or final reports), the record is counted as one report. For reports from two different reporting entities about a single occurrence, the record is counted as two reports, etc. The counting of distinct reports was performed using a software platform different from last year, therefore the numbers were recomputed in a consistent manner from 2016 onwards, and they may slightly vary compared with last years' edition.

The traffic data used in this section were provided by Eurocontrol. The extent of the data scope is the 27 EU Member States (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden) plus Norway and Switzerland (29 States in total). The data include both EU and non-EU operators, and cumulate instrument flight rules (IFR) air transport movements at airports with 80 000 IFR air transport movements or more per year, and at other airports reported on a voluntary basis.

It should be highlighted that the figures shown in this section are highly dependent on the quality and completeness of the coding of the occurrences collected in the ECR, on the attribute ‘Reporting Entity’.

To reach more accurate figures from which more solid interpretations can be built, it is important that reporting organisations and competent authorities continue their effort to improve the coding quality of occurrence records submitted under Regulation (EU) 376/2014.

The hereafter paragraphs give a high-level quantitative analysis of the total number of reports collected in the ECR over the period 2016-2024, in parallel with the evolution of the level of traffic in Europe. The data were extracted from the ECR on April 28, 2025.

## Annual evolution over the period 2016-2024

The total number of reports collected in the ECR over the period 2016-2024 is shown in Figure 9.1, and the number of cumulated airport movements for the same period is illustrated in Figure 9.2. Reporting rates were then calculated by normalising the volumes of reports with the airport movements, as shown in Figure 9.3.

After the entry into force of Regulation (EU) 376/2014 at the end of 2015, the number of reports in the ECR steadily increased from 2016 to 2019, with the figure for 2019 being approximately 45% higher than for 2016. By contrast, the level of traffic increased at a slower pace, with +8% of airport movements in 2019 compared to 2016. The overall reporting rate, therefore, increased over this period from 15 to 20 reports per 1 000 airport movements.

In 2020, the COVID-19 pandemic caused a drastic decrease in the level of traffic, which then recovered only partially in 2021. The total number of reports also dropped substantially in 2020, but this drop was less pronounced than the drop in traffic. Also, in 2021, the number of reports increased rapidly compared to 2020, reaching back to the volumes reported in 2018. As a result, the overall reporting rate continued to increase significantly in 2020 and 2021, reaching 34 reports per 1 000 airport movements, which is more than double the rate in 2016.

In 2022, the reporting rate remained above 30 reports per 1 000 airport movements, but was slightly lower than in the previous year, with 32 reports per 1 000 airport movements. The reporting rate increased again in 2023, returning to the level observed in 2021.

The volume of reports in 2024 was the highest observed since 2016. In terms of activity, the traffic continued its recovery in 2024, reaching 91% of the level in 2019. With 35 reports per 1 000 airport movements, the reporting rate in 2024 was also the highest observed since 2016. Over the last four years, since the start of the recovery from the COVID-19 pandemic, the overall reporting rate has stabilised at over 30 reports per 1000 airport movements, fluctuating between 32 and 35 reports per 1000 airport movements.

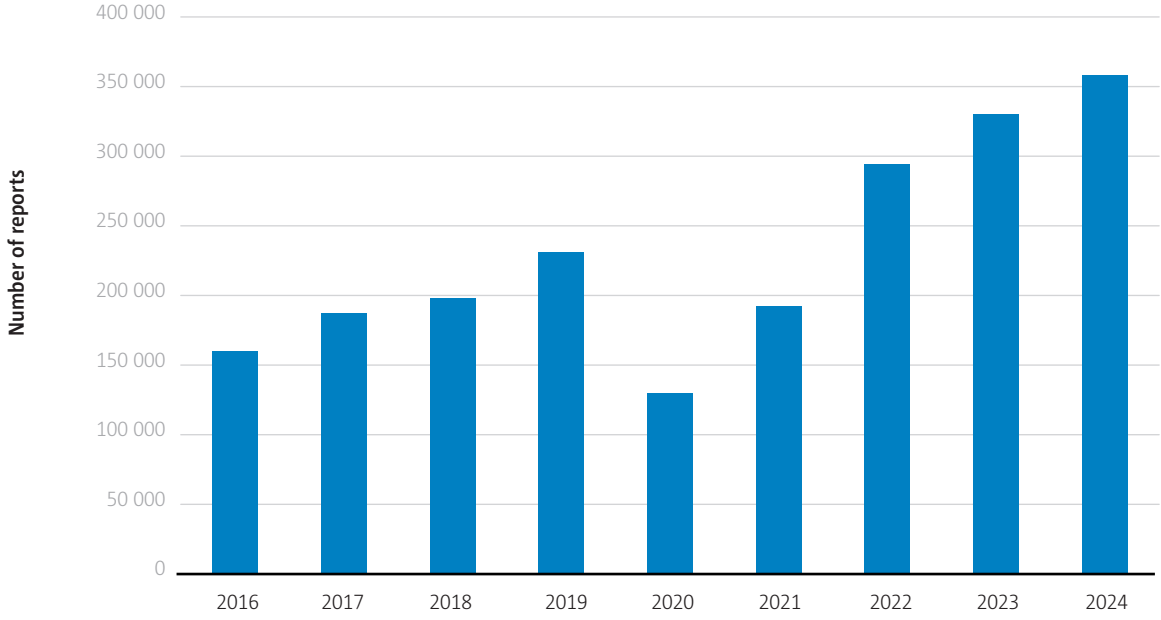



**Figure 9.1** Number of reports collected in the ECR per year

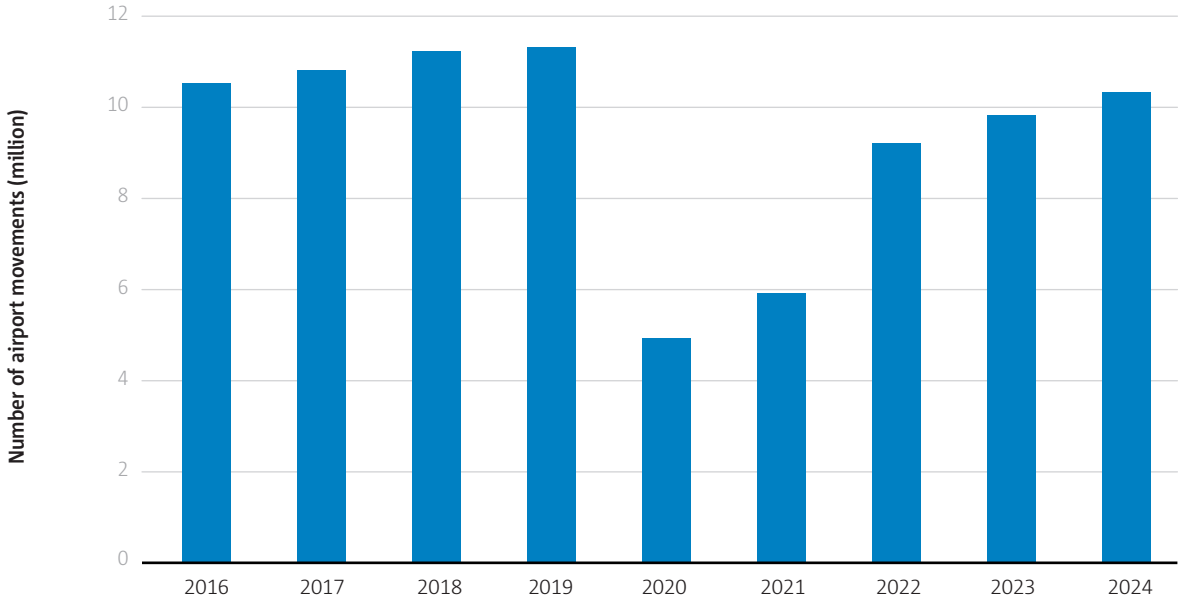



**Figure 9.2** Number of airport movements per year

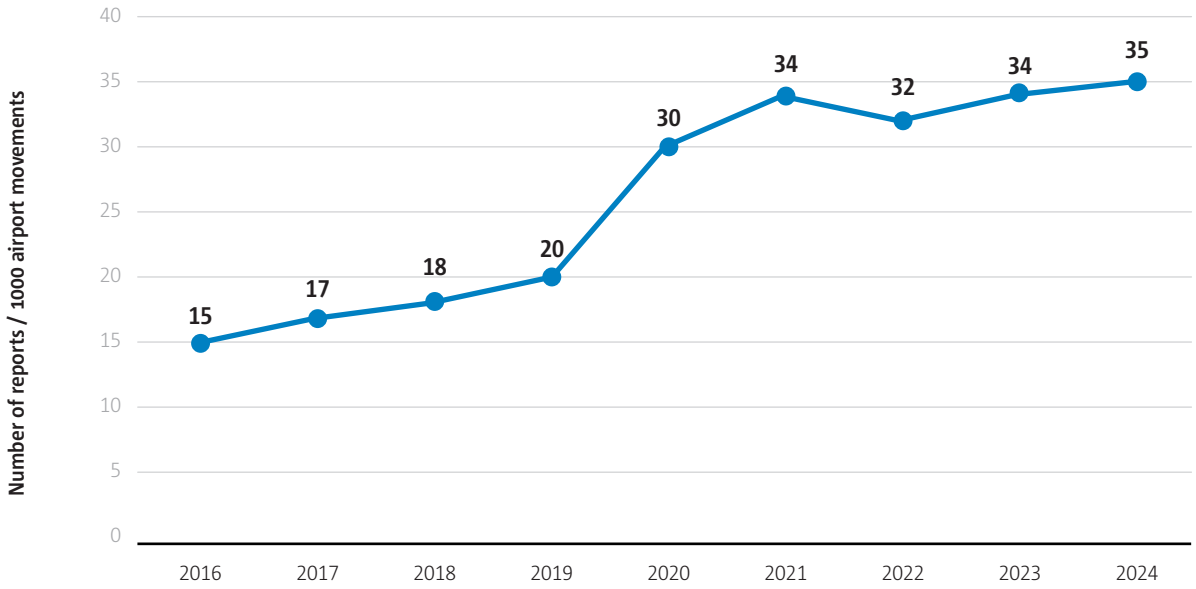



**Figure 9.3** Reporting rate (number of reports/1 000 airport movements) per year

# Monthly variation for each year

Figure 9.4 shows the number of reports by month for each year over the period 2016-2024.

The steady increase in reporting levels is clearly visible from 2016 to 2019. 2020 shows a very different profile, with a substantial drop in the number of reports from March 2020, which coincides with the even more pronounced drop in traffic, as shown in Figure 9.5. In 2021, whereas the first months of the year showed a lower number of reports compared to the preceding years, the number of reports progressively caught up with the levels of 2019 and were even alike 2019 for the second semester of the year. This trend for reports in 2021 was not observed in the number of airport movements which stayed lower than the pre-pandemic levels despite a visible increase over the year. Since 2022, the evolution of airport traffic went back to a more usual seasonal profile, which was still slightly below the pre-pandemic years, however very similar to the level of traffic in 2016. The number of reports was the highest observed in 2024, all along the year.

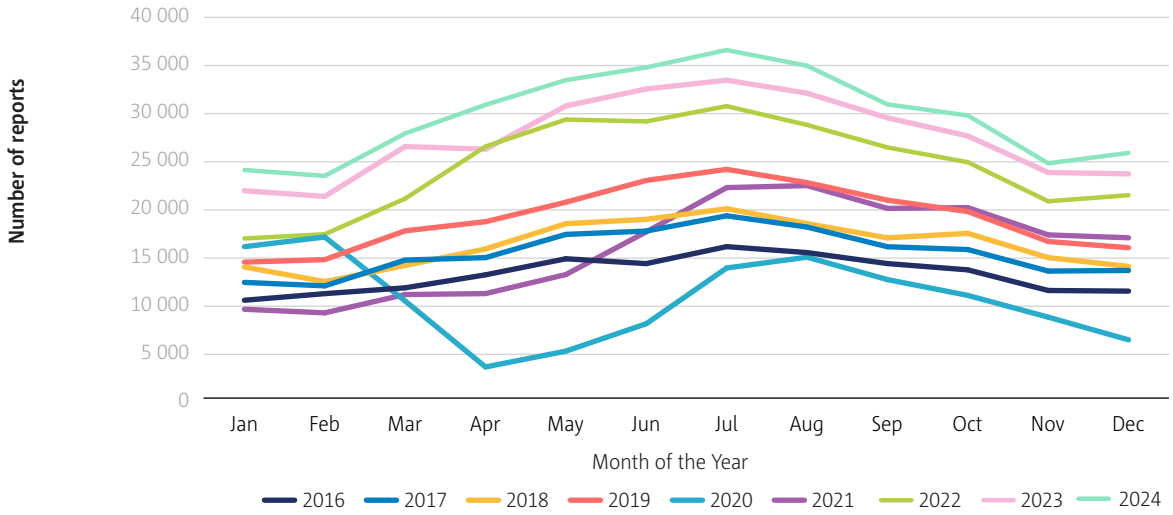



**Figure 9.4** Number of reports collected in the ECR per month per year

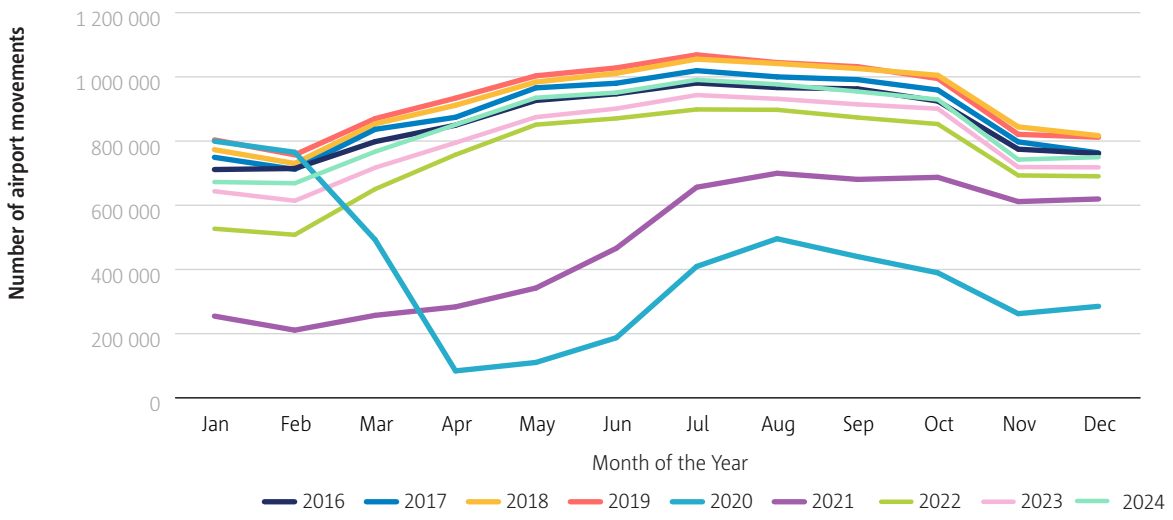



**Figure 9.5** Number of airport movements per month per year

# 9.2 Volumes of reporting for the main types of organisations

This section provides data split by the main type of reporting organisations, to better identify which organisations are the main contributors to safety occurrence reporting and evaluate how their relative contributions have evolved over the period 2016-2024.

## Comparison of the volume of reporting

In Figure 9.6, the total number of reports was split into five main categories of reporting organisations, using the ECR attribute 'Reporting Entity'. These five categories are as follows:

- Aircraft operators;
- Air navigation service providers (ANSPs);
- Aerodrome operators;
- Other types of reporting entities, such as design organisations, maintenance organisations, ground handling organisations, production organisations, individuals;
- Unknown: the reports for which the 'Reporting Entity' value was not completed.

For the three main types of organisations, following a progressive increase from 2016 to 2019, and lower numbers during 2020 and 2021, the number of reports in 2022 was the highest observed since 2016. In 2023 and 2024, however, while the total number of reports continued to increase, the number of reports from ANSPs decreased. Compared to the last pre-pandemic year 2019, the number of reports in 2024 is almost double for aircraft operators, 4% lower for ANSPs, and more than double for aerodrome operators.

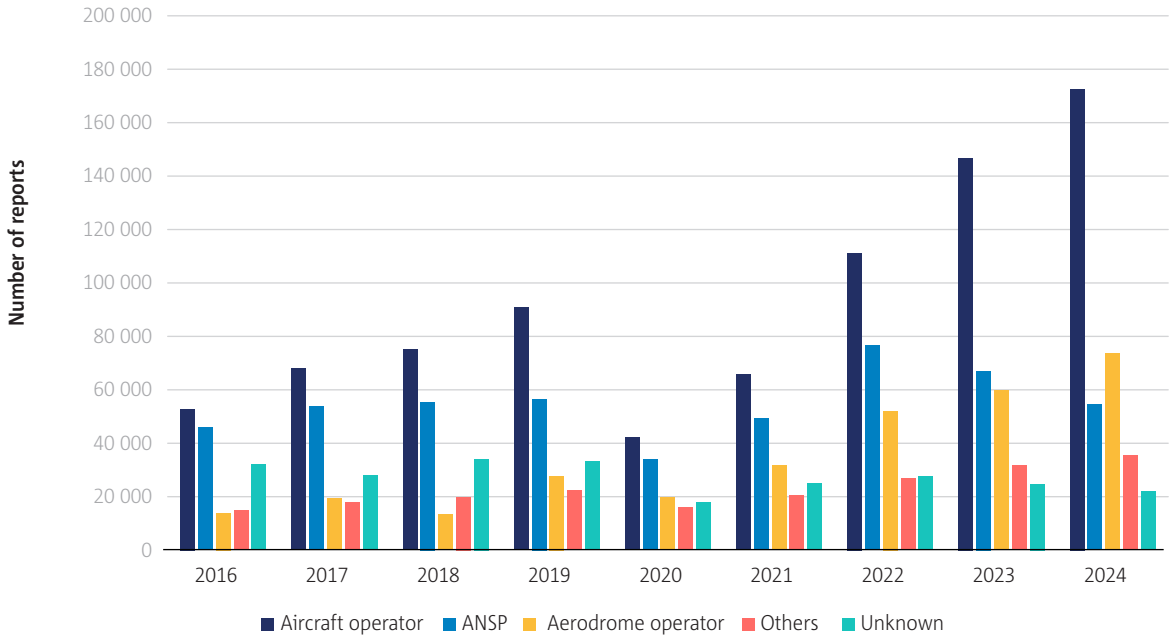



**Figure 9.6** Number of reports collected in the ECR per type of reporting organisation

Figure 9.7 brings an additional perspective on the trend in occurrence reporting, by showing the relative proportion of reports for the five categories defined in Figure 9.6.

The proportion of reports from aircraft operators increased from 33% to 48% of all reports over the period 2016-2024, with an exceptional drop to 33% in 2020. For the ANSPs, the proportion of reports slightly decreased since 2016 to stabilise around 25% of the total reports over 2020-2022, though dropping to 20% in 2023 and 15% in 2024. The proportion of aerodrome reports had a regular increase since 2016, starting from 9% of the total reports in 2016 to reach 18-21% of the overall reports over the last three years.

It is important to highlight that the accuracy of the figures and trends described here are affected by the proportion of reports for which the type of reporting entity is unknown. The number of reports in the ECR with no reporting entity value oscillated between 13% and 20% of the overall reports for each year between 2016 and 2021. Over the last three years, this proportion has been reduced to less than 10% of the overall reports, which is encouraging, but still a limiting factor in the interpretability of the ECR data.

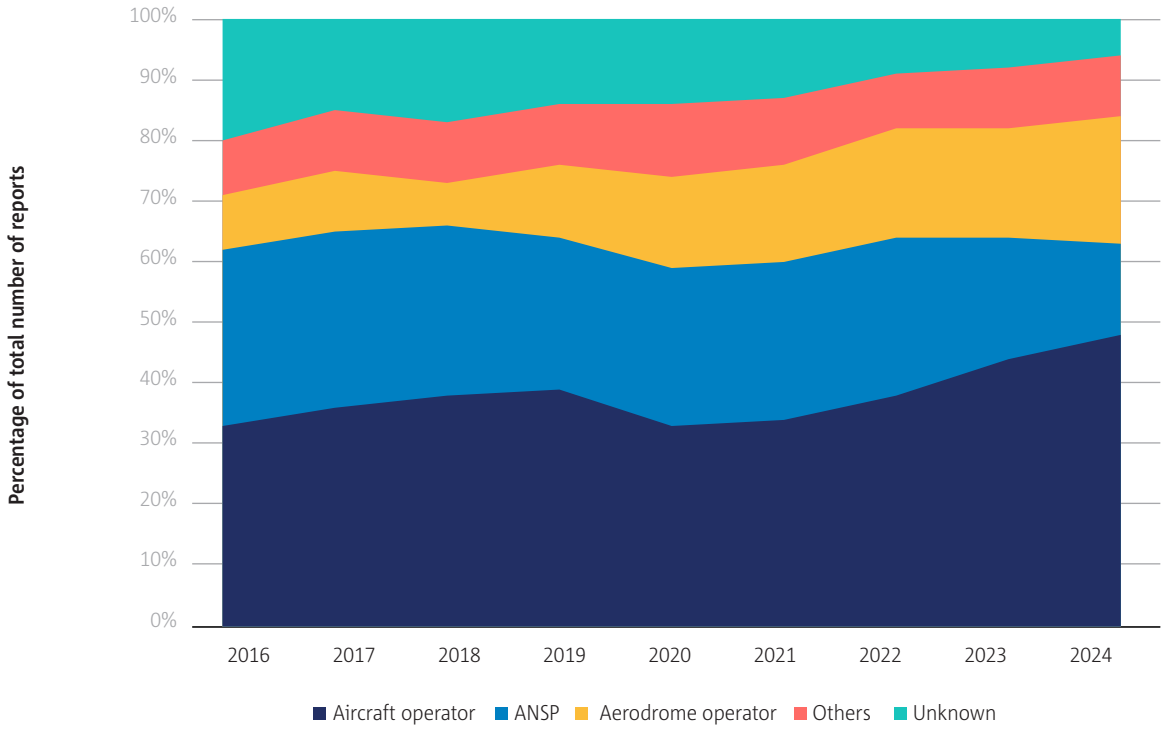



**Figure 9.7** Proportion of reports (in % of the total number of reports) per type of reporting organisation

# 9.3 Overall levels of occurrence risk classification

Regulation (EU) 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation introduced the requirement for a common risk classification of occurrences at the national and EASA levels. As a result, the ERCS was developed to risk-classify occurrences.

Within the risk classification scheme of the ERCS, the severity component is addressed by identifying the worst likely accident outcome that would have resulted if the occurrence had escalated into an accident, which considers both the most likely type of accident -called key risk area (KRA)- and the potential loss of life, considering, for example, the size of the aircraft involved. The likelihood component is then measured, by looking at how close the occurrence was to the worst likely accident outcome, based on a weighted barrier model. The resulting ERCS score is shown as a two-digit value where the first digit corresponds to the alphabetic value resulting from the calculation of the severity of the occurrence (severity score A to X) and the second digit represents the numerical value from the calculation of the corresponding score of the occurrence (0 to 9). Table 9.1 provides the ERCS matrix reflecting the different possible ERCS scores.

The ERCS is part of the legal framework of Regulation (EU) 376/2014, through a Commission Delegated Regulation published in 2020 and later a Commission Implementing Regulation, published in 2021. The application of the ERCS is mandatory as of January 1, 2023.

| SEVERITY | | | CLASSIFICATION (ERCS Score) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Potential Accident Outcome** | **Score** | | | | | | | | | | | |
| Extreme catastrophic accident with the potential for significant number of fatalities (100+) | **X** | *Pending Risk Assessment* | X9 | X8 | X7 | X6 | X5 | X4 | X3 | X2 | X1 | X0 |
| Significant accident with potential for fatalities and injuries (20-100) | **S** | | S9 | S8 | S7 | S6 | S5 | S4 | S3 | S2 | S1 | S0 |
| Major accident with limited amount of fatalities (2-19), life changing injuries or destruction of the aircraft | **M** | | M9 | M8 | M7 | M6 | M5 | M4 | M3 | M2 | M1 | M0 |
| An accident involving single individual fatality, life changing injury or substantial aircraft damage | **I** | | I9 | I8 | I7 | I6 | I5 | I4 | I3 | I2 | I1 | I0 |
| An accident involving minor and serious injury (not life changing) or minor aircraft damage | **E** | | E9 | E8 | E7 | E6 | E5 | E4 | E3 | E2 | E1 | E0 |
| No likelihood of an accident | **A** | | *No Implication to Safety* | | | | | | | | | |
| | **Corresponding Barrier Score** | | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | **Barrier Weight Sum** | | 17-18 | 15-16 | 13-14 | 11-12 | 9-10 | 7-8 | 5-6 | 3-4 | 1-2 | 0 |
| | | | **PROBABILITY OF THE POTENTIAL ACCIDENT OUTCOME** | | | | | | | | | |

**Table 9.1** ERCS matrix

The hereafter paragraphs give a high-level quantitative analysis of the ERCS completion for the occurrence records collected in the ECR for the period 2023-2024. The data were extracted from the ECR on April 28, 2025.

For the purpose of this analysis, the values ‘unsurvivable environment’ and ‘injuries or damage’ of the KRA attribute were respectively consolidated into ‘fire, smoke and pressurisation’ and ‘other injuries’. The values ‘significant incident’, ‘major incident’, ‘occurrence with no flight intended’, and ‘observation’ of the occurrence class attribute were consolidated into ‘incident’.

# Volumes of occurrence records risk classified in accordance with the ERCS

There were around 690 000 occurrence records collected in the ECR over 2023 and 2024.

Figure 9.8 provides the percentage of occurrence records in the ECR that were risk-classified in accordance with the ERCS.

Although the safety risk classification is a mandatory field in the occurrence reporting regulation, and there is an obligation on the competent authorities to risk-classify the occurrences in accordance with the ERCS, two out of five occurrence records in the ECR do not provide any value for the ERCS score field.

Slightly less than half of the occurrence records are informed with an ERCS score, i.e., not blank/not pending. A similar order of magnitude is observed for accidents and serious incidents.

The risk classification is reported as 'pending' by competent authorities in one out of eight occurrence records. From the 87 391 occurrence records with a pending ERCS score, 83 512 occurrence records are the responsibility of one single Member State.

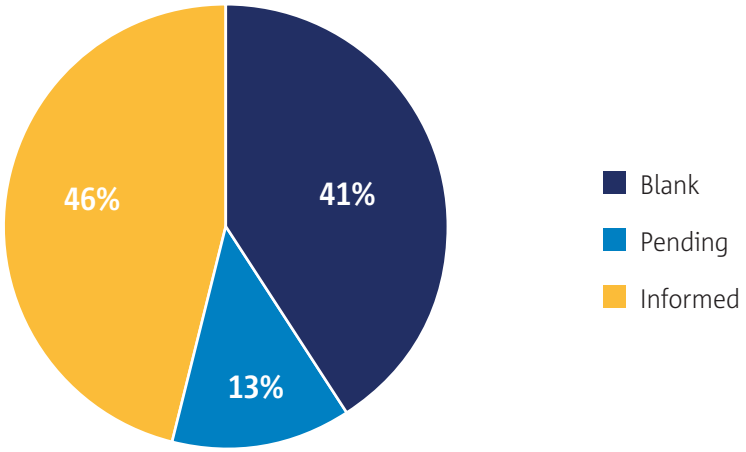



**Figure 9.8** Number of records in 2023-2024 (in % of the total number of records) per ERCS score status

Figure 9.9 shows the percentage of occurrence records where the KRA and the ERCS score are informed. Only about one in four of the occurrence records are reported with both values, the KRA and the ERCS score. Unlike the ERCS score, the KRA is not a mandatory field in the occurrence reporting regulation. Therefore, there is no obligation on the competent authorities to complete this field. Unless conversion procedures are used, the application of the ERCS scheme to an occurrence record includes the determination of the KRA, so it is ultimately just a matter of documenting that KRA in the ECR alongside the ERCS score.

A different order of magnitude is observed for accidents and serious incidents, where almost half of the occurrence records are reported with both values, KRA and ERCS score.

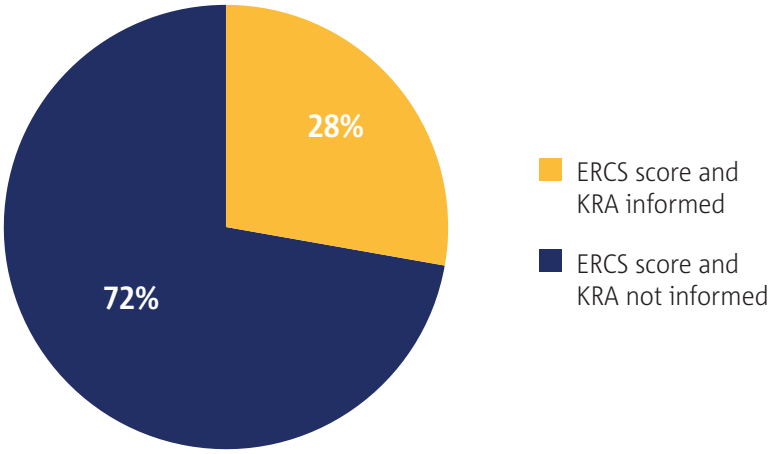



**Figure 9.9** Number of records in 2023-2024 (in % of the total number of records) with an ERCS score and KRA informed

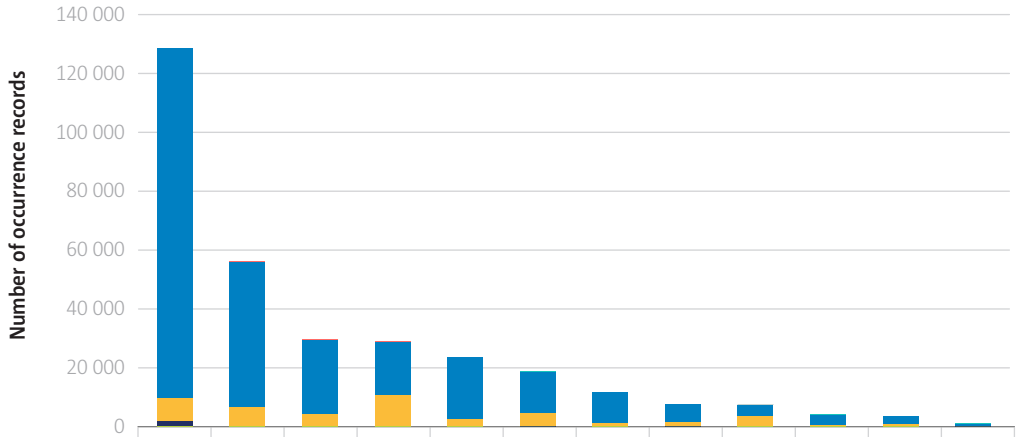
Volumes of occurrence records per KRA, and aggregated ERCS numerical equivalent scores per KRA, are meaningful measures when evaluating the safety performance of an aviation domain. In the context of a safety performance framework, the KRAs are the Tier 2 safety performance indicators (SPIs) for the domain.

While it is acknowledged that 2023 was the first year of ERCS implementation and that it constituted a challenging objective, and while it is also acknowledged that 2024 already shows an improvement in completion rates of the period 2023-2024, it is important that competent authorities continue their efforts to improve the data completeness for the risk classification over the coming years, including safety management essential fields such as the KRA one.

# Volumes of occurrence records per key risk area (KRA)

For the occurrence records where an ERCS score is informed (i.e., not blank/not pending), representing only 46% of the total number of occurrence records collected in the ECR in 2023-2024, Figure 9.10 shows the number of occurrence records per KRA and occurrence class.

As already outlined in Figure 9.9, a considerable number of occurrence records do not provide any value for the KRA (i.e., blank), while the occurrence has been risk classified, and the record informed with an ERCS score. The frequency of KRAs, as shown in the right-hand part of Figure 9.10, is based on a volume of occurrence records representing only 28% of the total number of occurrence records in the ECR in 2023-2024.




| | Blank | Aircraft upset | Other injuries | Airborne collision | Fire, smoke and pressuri-sation | Ground damage | Excursion | Security | Not safety related | Terrain collision | Collision on runway | Obstable collision in flight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accident | 34 | 268 | 71 | 9 | 5 | 37 | 103 | 0 | 0 | 121 | 7 | 43 |
| Serious incident | 42 | 154 | 39 | 176 | 49 | 35 | 103 | 22 | 0 | 30 | 40 | 26 |
| Incident | 118 705 | 49 143 | 25 000 | 17 924 | 21 129 | 14 009 | 2 638 | 6 278 | 4 003 | 3 499 | 2 743 | 698 |
| Occurrence without safety effect | 7 926 | 6 514 | 4 330 | 10 583 | 2 406 | 4 506 | 461 | 1 382 | 3 452 | 467 | 705 | 229 |
| Not determined | 1 623 | 145 | 74 | 127 | 15 | 60 | 15 | 38 | 10 | 56 | 36 | 9 |
| Blank | 199 | 9 | 4 | 9 | 1 | 0 | 0 | 0 | 3 | 3 | 1 | 0 |

**Figure 9.10** Number of occurrence records in 2023-2024 per KRA and occurrence class

Concentrating on accidents and serious incidents, the five most frequent KRAs would become aircraft upset (422), excursion (206), airborne collision (185), terrain collision (151), and other injuries (110).

The value 'not safety related' of the KRA attribute is not regulated. It is shown as an historical value in the European Co-ordination Centre for Accident and Incident Reporting Systems (ECCAIRS 2) reporting platform, and can actually no longer be selected for new occurrences. One exception aside, the use of that KRA value was adequately made in combination with the ERCS score A0 'no implication to safety'. Its use for occurrence classes other than 'occurrence without safety effect' is however questionable.

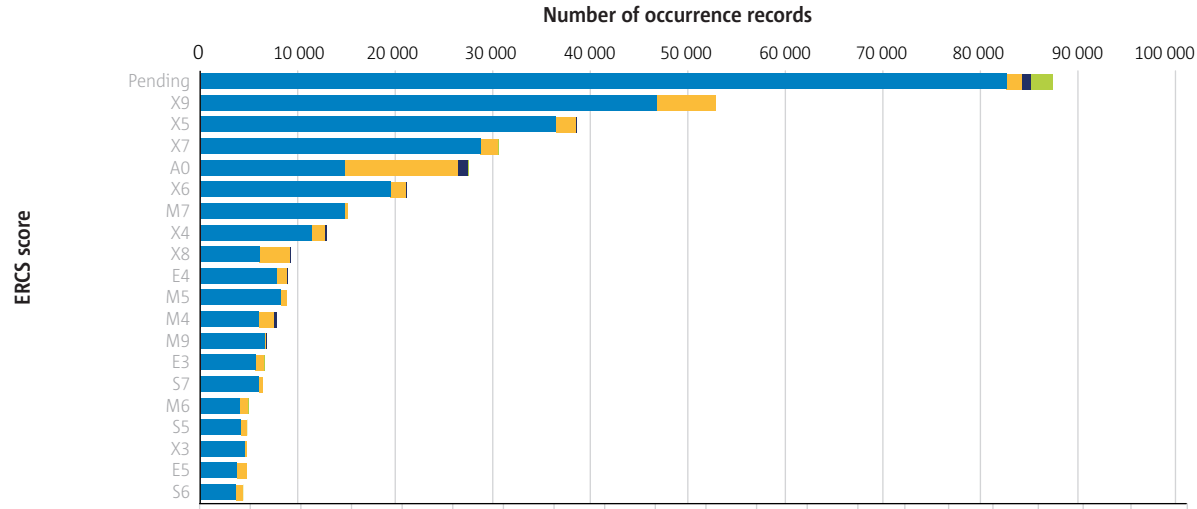
The ERCS numerical equivalent scores aggregated by KRA are to be found in the domain-specific appendices of the ASR. This section rather focuses on the overall data consistency and completeness.

Amongst the approximately 192 500 occurrence records informed with an ERCS score and a KRA, around 150 occurrence records provided more than one ERCS risk classification. Besides the documentation of the KRA, as mentioned in the previous subsection, it is important that competent authorities continue their efforts to make sure that there is only one ERCS risk classification per occurrence record.

# Volumes of occurrence records per ERCS score

For the occurrence records where an ERCS score value is documented in the ECR (i.e., not blank), representing around 60% of the total number of occurrence records collected in 2023-2024, Figure 9.11 shows the number of occurrence records in 2023-2024 per ERCS score and occurrence class. For readability purposes, the figure only outlines the ERCS scores whose frequency is greater than 4 000 occurrence records.

Within this subset of occurrence records, a considerable number of occurrence records provide the value 'pending' in the ERCS score field. The value 'pending' of the safety risk score attribute is not regulated. This value is given in the ECCAIRS 2 reporting platform as an opportunity to complete the mandatory field at an early stage, when information on the occurrence is very limited, thereby complying with the occurrence reporting regulation when transferring the occurrence records into the ECR. Figure 9.11 however, implies a use of the 'pending' value departing from this initial intent. This practice appears to be limited to one single Member State.




| | S6 | E5 | X3 | S5 | M6 | S7 | E3 | M9 | M4 | M5 | E4 | X8 | X4 | M7 | X6 | A0 | X7 | X5 | X9 | Pending |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accident | 0 | 5 | 1 | 0 | 4 | 0 | 2 | 4 | 13 | 7 | 1 | 1 | 2 | 1 | 1 | 6 | 1 | 2 | 0 | 16 |
| Serious incident | 4 | 8 | 77 | 1 | 15 | 1 | 1 | 2 | 53 | 18 | 0 | 5 | 45 | 6 | 6 | 2 | 0 | 20 | 4 | 69 |
| Incident | 3 661 | 3 757 | 4 489 | 4 179 | 4 025 | 6 031 | 5 673 | 6 580 | 5 952 | 8 274 | 7 891 | 6 072 | 11 358 | 14 837 | 19 523 | 14 785 | 28 733 | 36 436 | 46 763 | 82 580 |
| Occurrence without safety effect | 696 | 987 | 195 | 607 | 833 | 377 | 860 | 178 | 1 512 | 555 | 1 009 | 3 156 | 1 360 | 235 | 1 583 | 11 646 | 1 744 | 2 049 | 8 052 | 1 591 |
| Not determined | 39 | 15 | 8 | 14 | 47 | 25 | 12 | 7 | 295 | 23 | 15 | 9 | 183 | 16 | 78 | 1 012 | 64 | 66 | 16 | 901 |
| Blank | 0 | 6 | 20 | 0 | 9 | 9 | 2 | 6 | 6 | 25 | 0 | 1 | 4 | 22 | 0 | 20 | 40 | 33 | 16 | 2 234 |

**Figure 9.11** Number of occurrence records in 2023-2024 per ERCS score and occurrence class

As mentioned earlier in the review, the use of the ERCS score A0 'no implication to safety' for occurrence classes other than 'occurrence without safety effect' is questionable.

While there is no relationship drawn in the regulation between an occurrence class and the ERCS matrix colour scheme, accidents and serious incidents are not expected to be risk classified as low-risk occurrences (green). From the accidents and serious incidents collected in the ECR in 2023-2024, and for which an ERCS score is informed (i.e., not blank/not pending), around one out of five occurrence records is risk classified as low-risk occurrence. Conversely, occurrence records with an occurrence class 'occurrence without safety effect' are not expected to be risk classified as elevated risk occurrences, e.g., 195 (resp. 1 360) occurrence records without safety effect with an X3 (resp. X4) ERCS score. It is therefore important that competent authorities continue their efforts to ensure consistency between occurrence classes and ERCS grades (high-, elevated-, low-risk occurrences).

EASA
European Union Aviation Safety Agency

# Chapter 10
# Standardisation

**ANNUAL SAFETY REVIEW**
**2025**

Safety is the Agency's core business. Standardisation[25] is one of the Agency's main tasks, aimed at maintaining a high and uniform level of safety within the EU. EASA conducts standardisation activities to monitor the application of the requirements of the Basic Regulation[26] and its Implementing Rules, the occurrence reporting regulation[27] and its delegated and implementing rules, as well as their uniform implementation by the National Competent Authorities (NCAs), in order to ensure that:

- Passengers can fly safely to, from and within the EU;
- The EU industry benefits from a level playing field;
- Certificates issued by NCAs are mutually recognised; and
- The European system is recognised by international partners.

Standardisation activities include the continuous assessment of the NCAs' ability to discharge their safety oversight responsibilities (Continuous Monitoring Activities: CMA), as well as conducting standardisation inspections as necessary to directly verify the implementation of the European rules. Such inspections are prioritised, planned and performed using a risk-based approach, based on the Agency's assessment of well-defined indicators. Feedback from stakeholders has shown that NCAs generally see standardisation inspections as a valuable means to discuss implementation issues and share best practices, also facilitated by the participation of NCAs in inspections as team members or observers.

This chapter summarises the standardisation activities conducted by EASA in 2024. During 2024, the Agency performed standardisation inspections and CMA in the following domains:

- Aerodromes (ADR).
- Aircrew - Licensing (FCL).
- Aircrew - Medical (MED).
- Aircrew - Flight Simulation Training Devices (FSTD).
- Air Operations (OPS).
- Airworthiness (Production and Maintenance) (AIR).
- Air Traffic Management/Air Navigation Services (ATM/ANS).
- Ramp inspections (RAMP).
- Systemic Enablers for Safety Management (SYS).
- Unmanned Aircraft Systems (UAS).

During the year the Agency continued the build-up of its standardisation activities in the UAS domain. In addition, the scope of the inspection programmes has continued to grow, with new elements such as U-Space, the European Risk Classification Scheme (ERCS), as well as the extension of safety management systems (SMS) requirements to production and maintenance. In the future, the new domains of information security and ground handling will be integrated to the standardisation process.

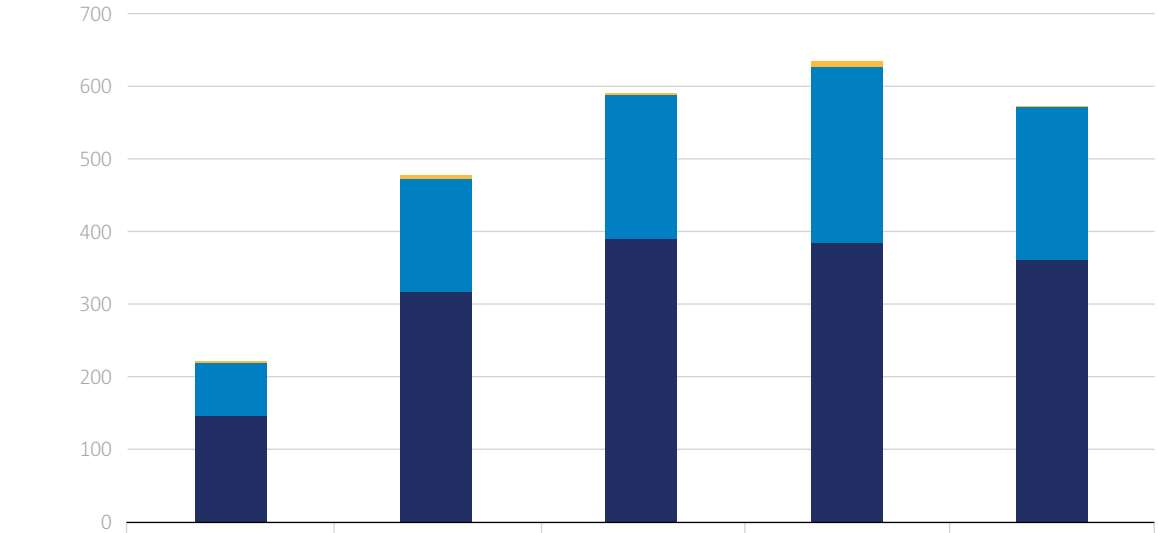
25 The Agency defines standardisation as the process of monitoring how each Member State applies the common EU rules on aviation safety. The process is based on Commission Implementing Regulation (EU) No 628/2013 of 28 June 2013

26 Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018

27 Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014. Since 2018, the Agency has conducted standardisation of Regulation (EU) No 376/2014 and its delegated and implementing regulations on a specific mandate from the European Commission

A significant effort is being made to adapt the standardisation method to cope with the continuous expansion of scope, the volume of rules to be monitored and the corresponding workload. The approach to this issue is to enhance the standardisation continuous monitoring approach (CMA) and toreplace the current model with a more risk based one. The objective is to implement a maturity model that credits mature Member States for the good performance of their State Safety Management. The maturity assessment will enable to establish a State Monitoring Programme (SMP) with the perspective to reduce the number of on-site inspections and have more combined inspections for mature States, while releasing resources to more closely monitor others.

While these efforts are underway and are being tested, in 2024 standardisation activity continued to rely on the established CMA. In 2024 the number of new findings decreased to 574 findings of non-compliance, including 1 immediate safety concern (ISC), see Figure 10.1.




| | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| Class G | 3 | 6 | 2 | 7 | 1 |
| Class D | 72 | 155 | 198 | 243 | 212 |
| Class C | 147 | 318 | 391 | 385 | 361 |

**Figure 10.1** Number of findings by class and year

Class C findings (361 in 2024) raise mainly standardisation concerns, whereas class D findings (212 in 2024) also raise safety concerns, if not timely corrected, and class G findings (1 in 2024) represent immediate safety concerns (ISCs) requiring the concerned NCA to take immediate corrective actions.

Comparing 2024 and 2023 figures shows that the number of findings in 2024 has decreased. Class C findings decreased by 12.7% and class D findings by 6.2% during the same period. The decrease of findings is observed mainly in AIR and ADR due to more focused inspections. A decrease is also noticeable in OPS where several non-compliances were grouped under one single finding, generally one or two per critical element, to facilitate a root cause analysis by NCAs. The reduction of findings of administrative nature with no direct safety relevance was also achieved by grouping them or converting them into observations when they relate to minor administrative details. As a result, the global number of findings decreased in 2024. Only the domain of ATM/ANS saw a slight increase in findings, primarily due to a rise in the number of focused inspections conducted; here the number is 11 in 2024 compared to 9 in 2023.

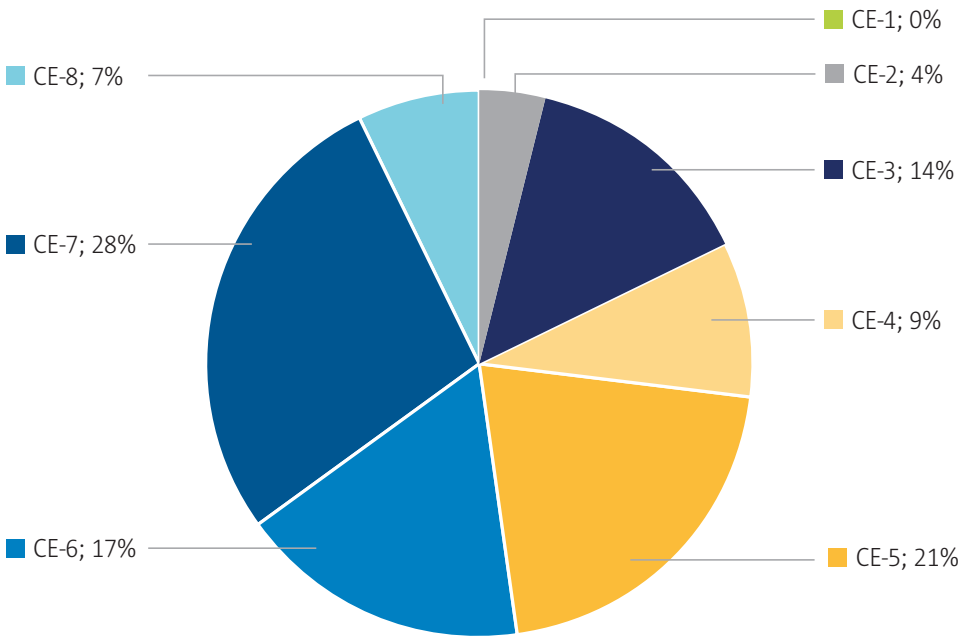



**Figure 10.2** Distribution of Class C findings by Critical Element

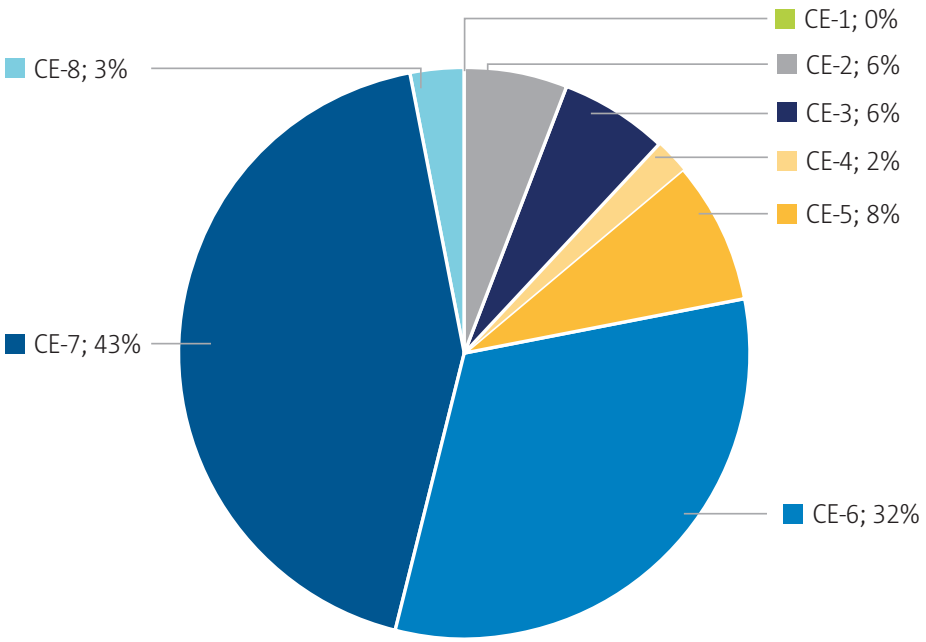



**Figure 10.3** Distribution of Class D findings by Critical Element

Figure 10.2 and Figure 10.3 illustrate the distribution of class C and D findings raised in 2024 according to the eight Critical Elements (CEs) of a State's Safety Oversight System defined by the International Civil Aviation Organisation (ICAO) in its Doc 9734 'Safety Oversight Manual'. The ICAO CEs are the main constituents of a safety oversight system. They encompass the whole spectrum of civil aviation oversight activities, and their effective implementation is an indication of a State's capability in providing safety oversight. The eight CEs are:

**CE-1** Primary aviation legislation.

**CE-2** Specific operating regulations.

**CE-3** State civil aviation system and safety oversight functions.

**CE-4** Technical personnel qualification and training.

**CE-5** Technical guidance, tools and the provision of safety-critical information.

**CE-6** Licensing, certification, authorisation and approval obligations.

**CE-7** Surveillance obligations.

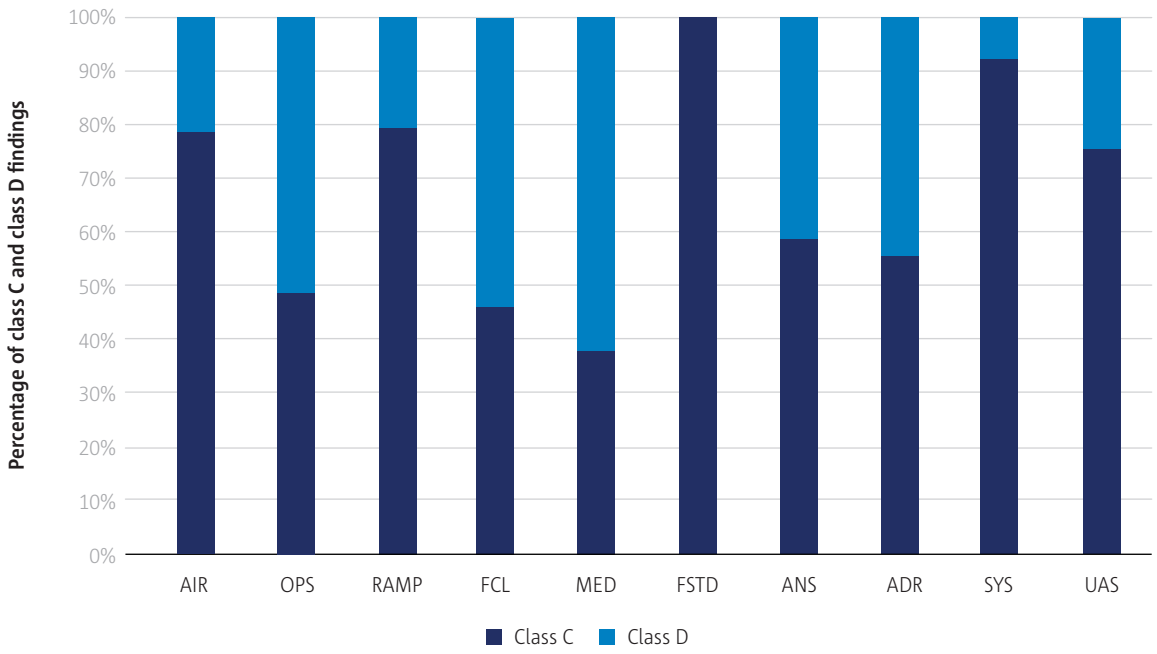
**CE-8** Resolution of safety concerns.

As in previous years, most class D findings (75%) relate to CE-6 (initial certification/approval) and CE-7 (continued oversight/surveillance). This confirms the continued safety impact of the inadequacy of certification and oversight processes that was already observed in the previous years; it represents a standing concern, and it is a focus area for standardisation inspections

For class C findings, the main areas of concern are CE-5 and CE-7, followed by CE-6, CE-3 and CE-4; combined, they account for 89% of all class C findings. Besides certification and oversight, the unavailability of proper procedures and tools and technical training and qualification of personnel (CE-5), remain a source of standardisation concern.

In 2024 a single ISC was raised in the OPS domain. This is a decrease compared to the 7 raised in 2023, and it is the lowest number of ISCs in the last five years. The ISC related to a lack of effective verification of compliance with the applicable requirements for flight crew training and checking during the NCA's oversight activities at one of the visited operators. This resulted in operations with flight crews who were not qualified.

The distribution of findings between the classes varies from year to year. In 2024, 36.9% of the findings were classified as D, compared with 38.3% in 2023 and 33.5% in 2022. For class C findings, the ratio in 2024 is 62.9% compared with 60.6% in 2023 and 66.2% in 2022. Class G findings, immediate safety concerns, decreased from 7 (1.1%) in 2023 to 1 (0.2%) in 2024. For 2022 the number was 2 (0.3%). This distribution varies by domain, see Figure 10.4.




*AIR - Airworthiness; OPS - Air Operations; RAMP - Ramp inspections; FCL - Aircrew Licencing; MED - Aircrew Medical; FSTD - Flight Simulation Training Devices; ANS - Air Traffic Management/Air Navigation Services; ADR – Aerodromes, SYS - Systemic Enablers for Safety Management; UAS - Unmanned Aircraft Systems*

**Figure 10.4** Ratio of class C and D findings per domain in 2024

More generally, the key outcomes of standardisation activities in 2024 can be summarised as follows:

- **Lack of effective oversight.** As in previous years, the NCAs' performance of certification and oversight tasks (ICAO Critical Elements CE-6 and CE-7), remains the most challenging issue. This is visible in almost all technical domains, with certificates or approvals granted without sufficient investigation, missing verification of compliance or not being in accordance with procedures. The management of deviations from Certification Specifications (CS) in ADR is also problematic. The Agency will keep monitoring the evidence of verification of compliance. On oversight, the inadequate planning or scope of the oversight programme, or the lack of its completion remain areas for improvement. Risk based oversight fails to consider the out-base, complex or novel operations. The lack of effectiveness of oversight is evidenced by the repetitive number of non-compliances found during visits to the undertakings, despite the list of known issues being published in the standardisation annual report. It was also due in some cases to over-reliance on desktop and remote inspections. One immediate safety concern was raised against approved operations with flight crews not being properly qualified. The Agency will monitor annually the planned and performed oversight programme in a systematic way as part of the novel standardisation mode.
- **Difficulty to recruit and retain competent personnel.** The competence of personnel and the turn-over of qualified staff remain a concern. Inspectors are attracted by higher salaries in the industry. Recently trained inspectors don't have the experience, thus leading to superficial oversight. Some NCAs are hiring ad-hoc experts from the industry on short term contracts but miss continuity and consistency in their training and the correct application of procedures. Larger NCAs exposed to a high number of long-lasting activities are better equipped to continuously provide quality training and coaching to build experience.

- **Lack of sufficiently detailed procedures.** Authority procedures do not sufficiently detail how to perform surveillance and how the organisations and related procedures are to be overseen. Investing in a more comprehensive assessment of organisation procedures would result in higher standards. This problem is accentuated when the authority is struggling with lack of competences at the same time. Management of changes are also not timely reflected to keep documented policies and procedures updated, particularly regarding the latest amendments of the relevant regulation. The oversight toolbox developed and shared by EASA in OPS aims at supporting NCAs on the verification of compliance of operations manuals.

- **More support on corrective action plan.** In several domains (OPS, ADR, AIR), NCAs report challenges in establishing an adequate Corrective Action Plan (CAP), often trying to eliminate the findings with superficial corrections that fail to consider systemic root causes and do not prevent reoccurrence. Reaching a final agreement between the NCA and EASA often requires a significant investment of time and resources on both sides with a growing amount of disagreements and overdue CAPs. Best practices on CAPs have been presented by Spain to all authorities and has been included in the Standardisation Mutual Expectation Paper. A related issue identified by standardisation are NCAs oversight findings failing to address root causes and therefore only correct symptoms rather than taking structural, corrective actions.

- **Enforcement actions are driving improvements.** Some states continue to lag in correcting their non-conformities. This is illustrated by safety-related findings (class D) that remain open and overdue for more than three months.

- **Challenges in coping with growth and complexity of responsibilities.** NCAs face difficulties to adapt to changing and expanding activities. While the calculation of their resource needs has globally improved, regulatory changes are often considered late in the process and some domains, like Unmanned Aircraft Systems (UAS), are facing an exponential growth of activity and innovation. The UAS scope is ranging from light leisure drones up to complex commercial operations. The European industry is launching more complex operations using larger drones, flying over people conducting beyond visual line of sight (BVLOS) operations. These developments will require more risk-based oversight from NCAs. In parallel, the scope of ATM/ANS expands with two trial inspections on U-space in 2024 and the new ground equipment regulations with a transition period until 2028.

- **Progress in implementing occurrence reporting, State Safety Programme and Plan.** The second cycle of SYS phase II and annual EPAS ECMA desktop survey show that many States have now established a State Safety Programme (SSP), a State Plan for Aviation Safety (SPAS) and occurrence reporting and analysis function. This is an important and noticeable achievement. The most common outstanding issue is the holistic State dimension, where coordination mechanisms between the NCA, the safety investigation authority or the military services remain underdeveloped.

EASA
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