

saercosafety



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<https://www.telegraph.co.uk/travel/what-is-a-near-miss>

S a f e t y N e w s l e t t e r

In air traffic control, separation is the name given to the concept of keeping one aircraft at a minimum distance from another to reduce the risk of these aircraft colliding, as well as to avoid the occurrence of accidents due to other factors, such as wake turbulence. When this minimum distance that aircraft must maintain in controlled airspace is violated, what occurs is known as loss of separation or separation minima infringement.

The separation minima are standardized and defined by the ATS authorities based on the regulation of ICAO (International Civil Aviation Organization) Doc 4444. If there are deviations from these standardized minima, it is published in the national AIPs.

In Spain, the distances proposed by ICAO are followed, which in route are normally 5NM of horizontal separation (in radar surveillance) and 1000 feet (300m) of vertical separation. It is considered that two aircrafts are separated when the horizontal or vertical separation minimums are met. In other words, either may be violated for an event to be classified as a loss of separation. Therefore, if a situation occurs in which the minimum separation distance is not met, it is classified as loss of separation.

Therefore, if a situation occurs in which the minimum vertical separation distance is not met but the aircraft are 5NM or more apart, separation would be guaranteed because one of the two minimum separation requirements mentioned would be met. There could also be a situation where, although the minimum separation is lost, the trajectories of the traffic diverge; in this case separation would be reestablished.

In many cases, loss of separation is not a hazard in itself. However, if the situation is not corrected quickly (by restoring the applicable minimums), an incident can end up resulting in an accident, with different typologies depending on the type of loss of separation that occurs:

- Loss of separation between aircraft in flight, the worst credible effect is a Mid Air Collision (MAC).



<https://www.einfochips.com/blog/preventing-mid-air-collisions>

- Loss of separation between an aircraft on the ground and another in the air, which may result in a runway collision.

Generally, a loss of separation incident implies that specific separation criteria have been violated.

However, there are certain airspaces and circumstances where there is no applicable minimum distance. For example, in uncontrolled airspace or in particular controlled airspaces, such as D and ATZ/CTR under TWR control. In such cases, "separation minima infringement" classification wouldn't be applicable and instead is used the term AIRPROX or inadequate separation, defined by ICAO Doc 4444 as follows:

"An AIRPROX is a situation where, in the opinion of a pilot or air traffic services personnel, the distance between aircraft, as well as their relative positions and speed, have been such that their safety may have been compromised".

<https://skybrary.aero/loss-separation>

<https://skybrary.aero/ICAO-Doc-4444-EN.pdf>

<https://skybrary.aero/articles/airprox>

[https://en.wikipedia.org/wiki/Separation_\(aeronautics\)](https://en.wikipedia.org/wiki/Separation_(aeronautics))

ICAO Doc 4444 defines a classification for AIRPROX occurrences, which in turn EUROCONTROL has taken as a reference in its classification scheme ESARR 2: "Reporting and Assessment of Safety Occurrences in ATM", resulting in the following classification:

SEVERITY Classification As per ESARR 2	ICAO AIRPROX Classification
Accident	Accident according to ICAO Annex 13
Serious Incident (A)	AIRPROX CAT A ICAO Doc 4444 : AIRPROX – Risk of collision. Risk classification of an aircraft proximity situation in which there has been a serious risk of collision.
Major Incident (B)	AIRPROX CAT B ICAO Doc 4444 : AIRPROX – Safety not assured. Risk classification of an aircraft proximity situation in which the aircraft safety could have been compromised.
Significant Incident (C)	AIRPROX CAT C ICAO Doc 4444 : AIRPROX – No risk of collision. Risk classification of an aircraft proximity situation in which there hasn't been risk of collision.
No safety effect (E)	Events without safety effect. No direct correspondence in ICAO.
Not determined (D)	ICAO Doc 4444 : AIRPROX – Risk not determined. Risk classification of an aircraft proximity situation in which there was insufficient information available to determine the risk involved, or the data did not allow for a determination of the risk due to contradictory or inconclusive data.

ESARR 2 consists of the implementation by States of an events reporting and assessment system for air traffic management (ATM) safety. It defines a list of ATM occurrences that, as a minimum, must be reported and evaluated. It also provides the minimum contextual data that must be collected and recorded for each occurrence. For the events which need a detailed analysis, provides a guide with the results to be obtained from the investigation such as causes, severity and safety recommendations.

"Inadequate separation" or "separation minima infringement" incidents are included within this list. SAERCO, as an air navigation service provider uses ESARR 2 as a reference in its reporting procedures, and loss of separation and inadequate separation events are defined as mandatory reports according to EU2015/1018.

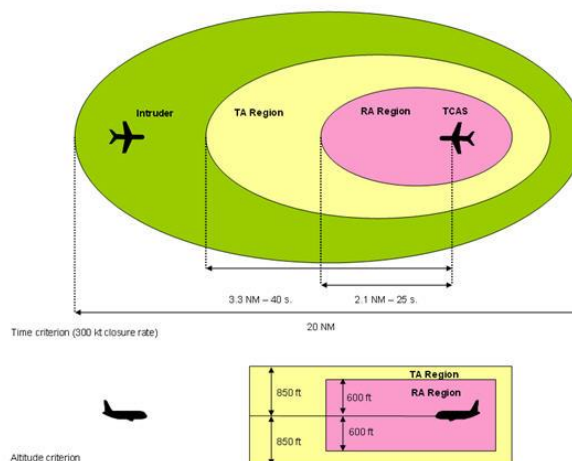
<https://www.eurocontrol.int/ESARR2/reporting>

In an “inadequate separation” or “loss of separation” event, there are safety nets that can mitigate the resulting collision risk, the best known being ACAS/TCAS (Airborne Collision Avoidance System/Traffic Alert and Collision Avoidance System) and STCA (Short Term Conflict Alert).

TCAS was introduced to reduce the risk of mid-air collisions or near-collisions by tracking other aircraft in the surrounding airspace through their transponder responses. It serves as a safety net of last resort regardless of any separation regulations. It consists of on-board equipment that warns of a possible collision with other aircraft and enables a procedural response appropriate to the risk. It works as follows: if the system diagnoses an imminent collision risk, it send out a resolution advisory (RA) to the flight crew, which instructs pilots how best to regulate or adjust their vertical speed to avoid a collision.

The ACAS/TCAS can send out two types of alerts:

- Traffic Advisory (TA), which are intended to assist pilots in the visual detection of any intruder aircraft and alert them to be prepared for a possible resolution advisory.
- Resolution Advisory (RA), which are avoidance manoeuvres recommended to the pilot. RAs indicate to the pilot the vertical speed range at which the aircraft should fly to avoid the danger aircraft. The visual indication is accompanied by an audible message indicating the RA intention.



Example of ACAS Protection Volume between 5000 and 10000 feet

Experience and studies have shown that, when followed promptly and accurately, the RAs sent out by ACAS/TCAS systems reduce significantly the risk of a mid-air collision. However, it should be kept in mind that not all aircraft are required to be equipped with ACAS: only turbine-powered aircraft with a maximum certificated take-off mass greater than 5,700 kg or authorized to carry more than 19 passengers (Annex 6, Part I, ICAO). Another system equivalent to TCAS but on the ground is the STCA, whose objective is to assist the air traffic controller in preventing a potential collision between aircraft by generating, timely, an alert of a potential or actual infringement of separation minima. This is accomplished by a visual alert on the radar screen, although some systems also provide an audible alert.

<https://skybrary.aero/articles/acas-resolution-and-traffic-advisories>

<https://skybrary.aero/articles/airborne-collision-avoidance-system-acas>

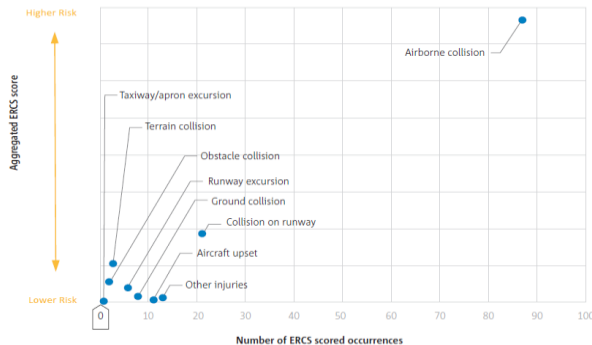
EASA, in its 2022 Safety Annual Review, identifies air collisions and runway collisions as the key areas of risk in the ATM/ANS field, reflecting the role of ATM/ANS in aircraft guidance and separation. Air collisions include all events related to separation caused by air traffic control (ATC) or cabin crew, AIRPROX reports and ACAS alerts.

The safety problems appear due to fragmented knowledge of the traffic situation, because some traffic is under ATC clearance (IFR in class E air space) and some is not (VFR in class E and G airspace). ATC may not be aware of VFR flights or their intentions and therefore may not transmit traffic information to IFR flights.

In addition, part of VFR traffic may not be equipped with an Airborne Collision Avoidance System (ACAS) or even a transponder (mode C or mode S), which reduces the ability to detect this traffic. As a result, both IFR and VFR traffic must rely on visual observation by the flight crew to keep separation.

Another issue of growing concern from a safety perspective is the possibility of a mid-air collision between an unmanned aircraft system (UAS), also known as drones, and other aircraft.

The growing popularity of drones has caused an increased risk of mid-air collisions between drones and manned aircraft. This is primarily due to unauthorized drone activity on commercial airline take-off and approach trajectories. The increasing use of these devices, especially among the public who may not be aware of UAS regulations, can lead to incidents of airspace intrusions, procedural deviations and altitude deviations (increasing in that way the risk of mid-air collision).



At the same time, within the area of air collision risk the document indicates that one of the main safety issues to be kept in mind is the conflict between IFR and VFR flights in airspace classes where one or more traffics could be uncontrolled (E and G classes), which could give rise to AIRPROX incidents and air collisions.

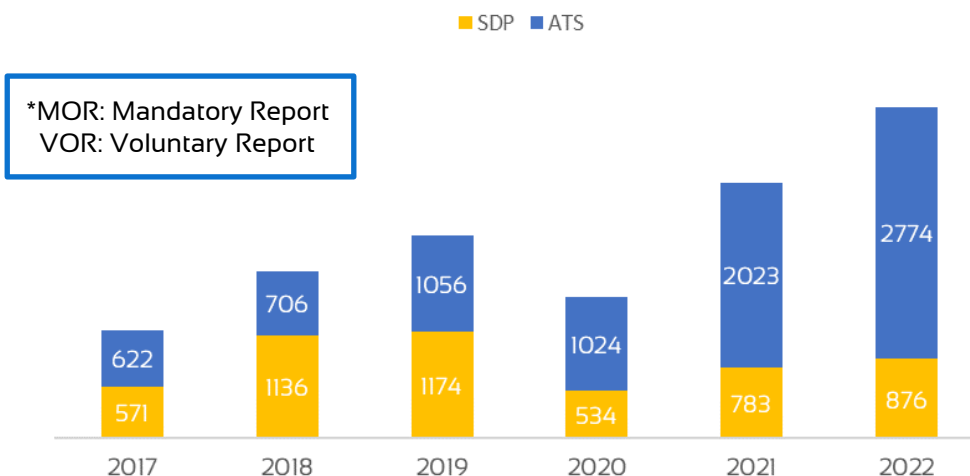
<https://www.easa.europa.eu/easa-issues-guidelines-management-drone-incidents-airports>

<https://www.easa.europa.eu/easa-annual-safety-review-2022-published>

Safety Reporting ATS SAERCO 2022 (total)		
MOR/VOR	Media time to report	Media time to MOR/VOR*
2774	2:30:48	31:56:06

Safety Reporting SDP SAERCO 2022		
MOR/VOR	Media time to report	Media time to MOR/VOR
876	1:41:31	31:23:03

Evolution of reporting: saerco 2017-2022



SAERCO, thanks to the continuous improvement of its event reporting tools and the implication of all employees in this task, manages to continue exceeding year after year the number of notifications made on the events occurring in the different ATS/CNS/MET units, besides SDP service of Adolfo Suárez Madrid-Barajas airport, keeping strictly to the notification times required by AESA.

In the reporting statistics it can be seen that, after a widespread decline in 2020 on air traffic because of the COVID-19 pandemic, the number of ATS reports has increased very significantly in the years 2021 and 2022, being double or even higher compared to previous years. This increase in notifications is also associated with a large increase in the number of operations. The main reason for this growth is the start of service provision in 5 new units throughout 2021. On the other hand, it is also observed that the number of SDP reports has been approaching the levels it had in the pre-pandemic period.

It should be noted that, although there has been a large increase in the number of notifications, the average reporting times have been kept or even reduced, proving the efficacy of SAERCO's events reporting system, a consolidated tool that works as a basis for improving the safety level in all its units.

"Achieving a reporting system where proactivity is the norm is not easy, it requires the effort and commitment of the entire organization, especially the operational personnel"

Air Accidents/Incidents because of proximity between aircraft

In the ATM environment, incidents related to loss of separation in the air (which include incidents of separation minima infringement, TCAS alerts, inadequate separation, loss of runway separation) constitute one of the main risk areas and are a safety priority. Most of these losses of separation generally have no safety consequences, but there may be cases where if separation is not adequately reestablished the consequences can be catastrophic, the worst is known as a Mid Air Collision (MAC). An example is given below:

On July 1, 2002, an accident occurred in which two aircraft (a Boeing 757-200 operated by DHL on a cargo flight and a Tupolev Tu154M operated by Bashkirian Airlines on a non-scheduled passenger flight) collided in mid flight over the German town of Überlingen, causing the total loss of life of passengers and crew. One of the main causes of the accident were the contradictory instructions between the air traffic controller and TCAS system.



The Tupolev crew decided to ignore the TCAS instruction indicating an ascent to the pilots, and the crew followed the ground controller's indications to descend, a common practice amongst Russian pilots at the time. Meanwhile, the DHL flight followed the TCAS order to make the same descent to the same flight level, without knowing what the air traffic control orders were. Other causes identified were that the ATCO didn't detect the loss of separation on time, because of the excess workload of the controller, who was dealing with two radars on his own while a colleague was taking a break. As a result of this accident, a safety recommendation was issued in which the requirements of the ICAO Annexes were modified so that pilots are obliged to obey the TCAS Resolution Advisory (RA), independently of any opposing ATC instruction.

Accidents as the one described above are isolated cases, considering that most losses of separation don't result in terrible consequences.

One example is an AIRPROX incident that occurred between an Air France Airbus A318-100 and a Ryanair Boeing 737-800. It was determined that the incident occurred as a result of an error made by ATCO who was on training. He cleared the A318 to descend to FL360, which was not detected by the instructor. The instructor did not notice this clearance, and the STCA alerted to the possible collision with the B737 heading towards the same position at FL370, at that time he assumed traffic control. Both aircraft received TCAS resolution advisory, which were followed by the crews and the conflict was resolved without personal injury to the passengers during the evasive manoeuvres performed. Finally, the aircraft crossed with a lateral distance of 1.4 NM and a vertical distance of 725 ft.

<https://www.skybrary.aero/accidents-and-incidents/t154-b752-en-route-uberlingen>

<https://skybrary.aero/accidents-and-incidents/a318-b738-en-route>

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