EindhovenAirport

Slot tolerance Eindhoven Airport (EIN)

uitgave 1-8-2023

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1. Introduction

Eindhoven Airport is a Level 3 coordinated airport (according to IATA WASG) for all commercial flights.

Capacity of Eindhoven Airport is based on allowed Noise footprint and maximum available flights per calendar year.
Number of available flights per year are fixed at 41.500 flight per year and Noise footprint is determined every year. Additionally, Noise footprint has to be reduced by approximately 30% until 2030, comparing to a referent year 2019.
Maintaining within the allowed noise footprint is very challenging, due to several reasons. One of them is the Noise calculation method of **Ke** that is used at Eindhoven Airport (described later in article 3.2.1), which has a very complex and strict night penalty factor regime.
Second reason is that Noise performance depends heavily on the airlines performance and fleet that is used at Eindhoven Airport.

This slot tolerance policy has been developed in order to maintain and maximize the capacity of Eindhoven Airport and it is advised to be used from summer season 2024 (S24)

Parameters observed in this policy have a direct influence to the future capacity of EIN, therefore these parameters are main focus of this slot tolerance policy. These parameters are also to be found in the **Slots Enforcement Code** under sections **4.5** and **4.8.**
EIN is aware that all flights, but especially evening flights are influenced by a lot of external factors such as congestions at other airports or congestions in the European airspace.
Therefore, it is possible that this given slot tolerance policy would require an update in the near future.

2. Observed parameters

Parameters that will be mentioned in this Slot tolerance policy are also part of Chapter 4 of the Slot Enforcement Code under sections:

- 4.5 - Operating a flight in a significantly different way to the allocated slot – including a different service type, aircraft subtype, aircraft capacity, or origin/destination - **Different way OPS**

- 4.8 - Operating a flight at a significantly different time from the allocated slot - **Different time OPS**

2.1 Different way OPS

Different way OPS or operating a flight in a significantly different way to the allocated slot including a different service type, aircraft subtype, aircraft capacity, or origin/destination has an significant impact to our noise footprint, because allowed Noise footprint and therefore the capacity (in the Licence to operate) is also based on the fleet that is expected during the calendar year (2023 capacity was based on 18% fleet renewal, which means that at least 18% of commercial flights will be flown with the new aircraft generation). Expected fleet is derived from the slots request and granted list.
Using older generation aircraft instead of new aircraft generation has a significant impact to our Noise performance and footprint.
Therefore a tolerance based on Different way OPS has to be set in order to maximise our capacity and to stay within the Noise boundaries.

2.2 Different time OPS

Different time OPS or operating a flight at a significantly different time from the allocated slot has a significant impact to our noise footprint, because allowed Noise footprint and therefore the capacity depends on a well-planned schedule. The reason for that is our **Ke noise** calculation method, which is based on the night penalty factor, it is very strict and leaves no room for high slots deviation tolerance.

2.2.1 Night penalty factor Ke

The nuisance experienced as a result of air traffic depends, among other things, on the time of the flight. In order to reflect this in the calculation of the noise load, a time-dependent penalty factor is applied. This factor is called night penalty factor and aims to express the greater degree of annoyance experienced in the evening, night and early morning. The value of the night penalty factor for different times is included in Table 1 ***(wetten.nl - Regeling - Regeling berekening geluidsbelasting militaire luchthavens in Kosteneenheden - BWBR0031639 (overheid.nl)***.

Time (LT)	Night penalty factor
07:00 – 07:59	4 x
08:00 – 17:59	1 x
18:00 – 18:59	2 x
19:00 – 19:59	3 x
20:00 – 20:59	4 x
21:00 – 21:59	6 x
22:00 – 22:59	8 x
23:00 – 06:59	10 x

Table 1

The night penalty factor is taken into account by multiplying the number of actual aircraft movements in a specific period by the night penalty factor associated with the relevant 24-hour period. This means that if one flight movement takes place at 23:05, it will be calculated as 10 flight movements at 12:00, according to Ke calculations.

3.1 Night penalty factor performance

Planned

Actuals

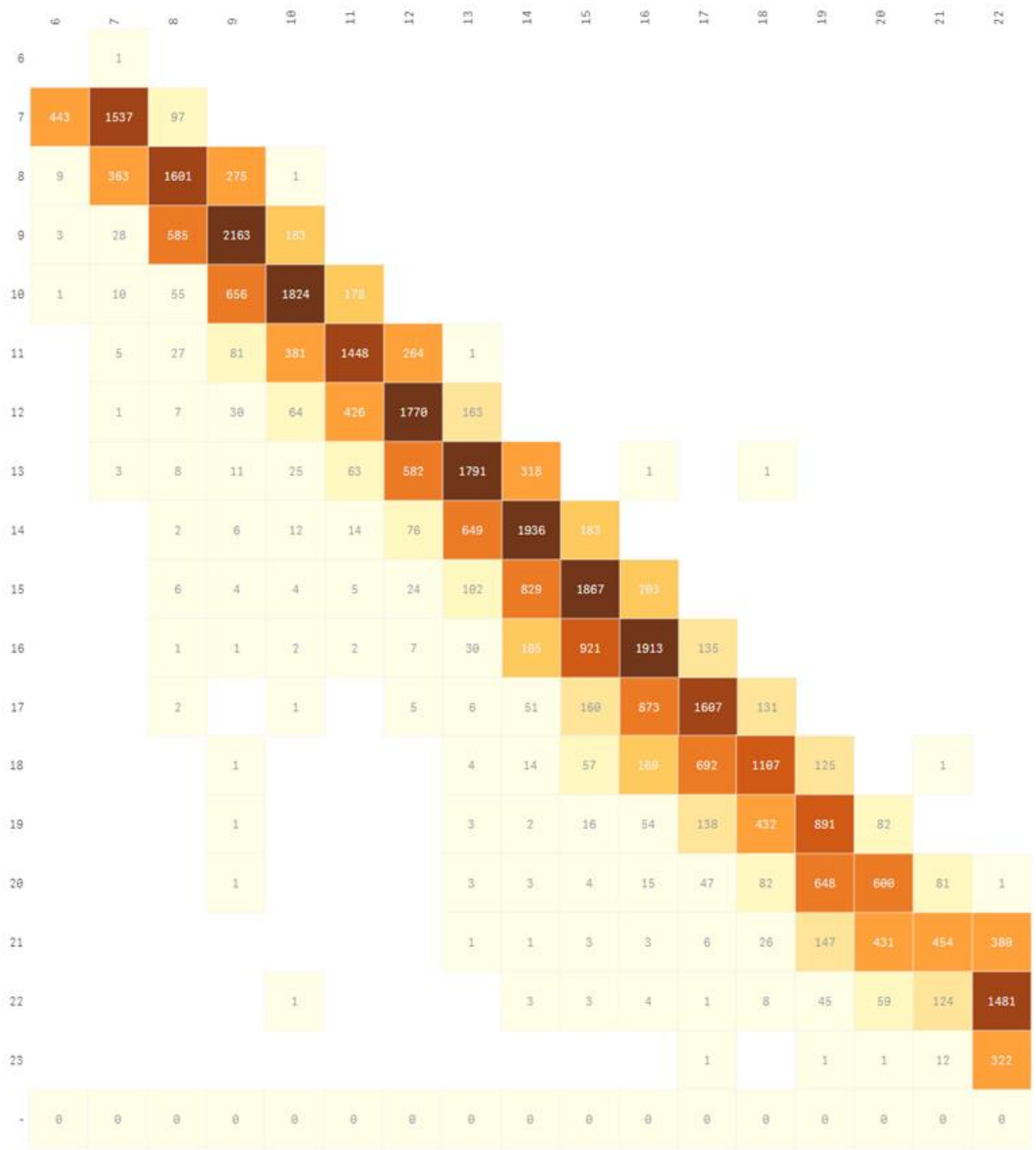


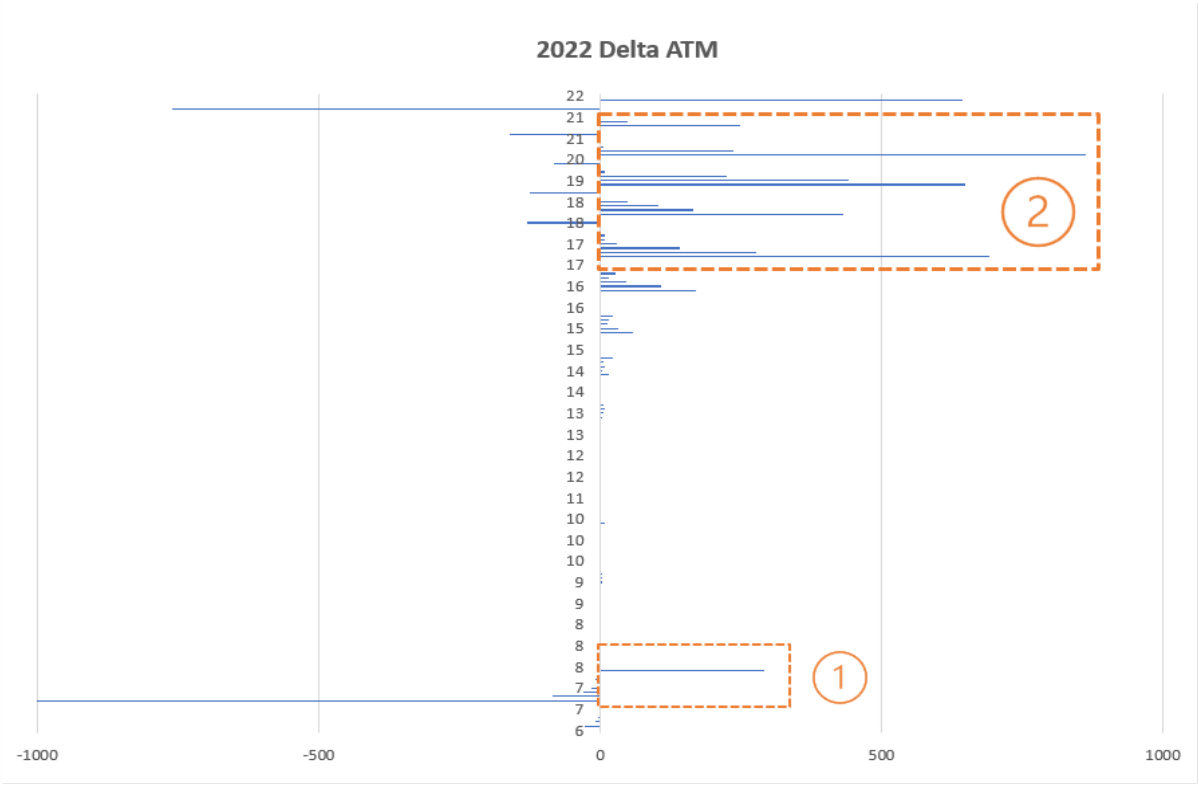
Chart 1.

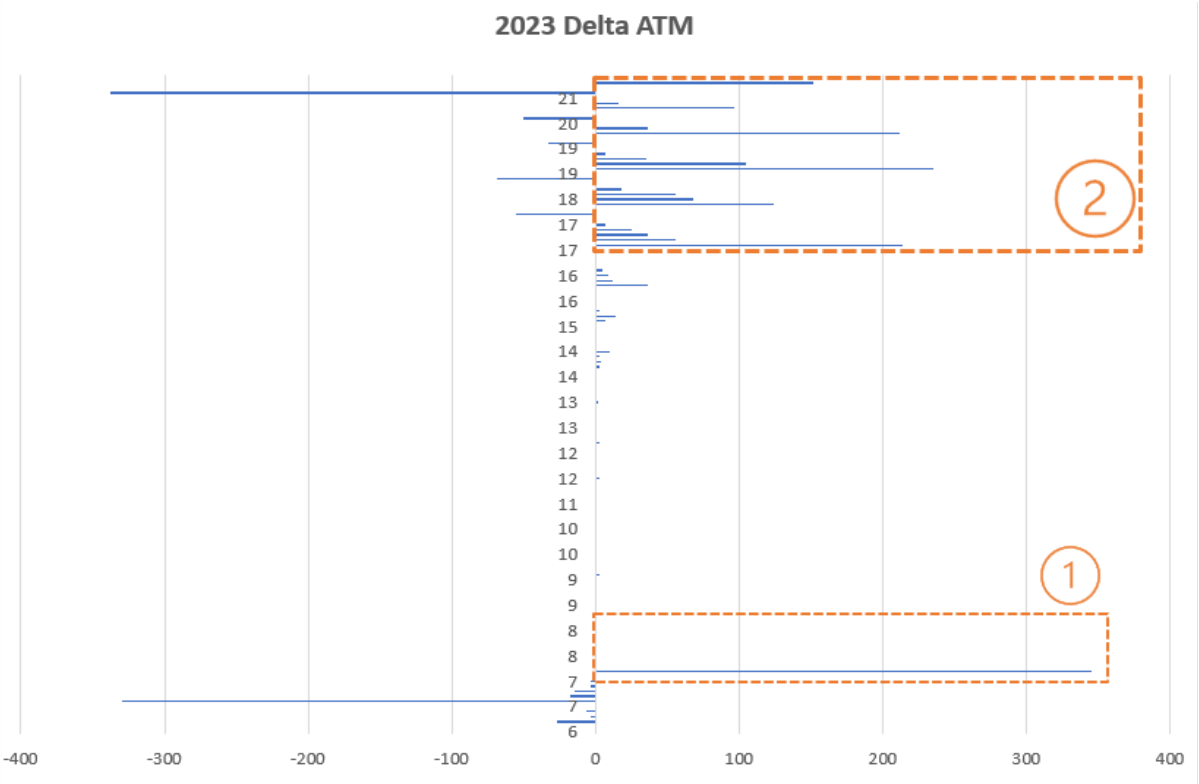
For the 2022 noise calculation due to poor night penalty factor performance, 3.616 more ATM's were calculated for the Noise print than planned. The only reason for that is that many ATM's received higher penalty factor than previously planned , which also means that there were deviations of slot usage.

In 2023, from January until May, again due to poor night penalty factor performance, an additional 1.018 ATM's will be calculated for the noise calculation on top of the planned ATM's.

This trend is very concerning, since there is a high possibility of exceeding the noise limits and boundaries.

During 2022, but also during first months of 2023, there are 2 focus areas that have the most impact on our performance and Noise footprint. The first morning arrival wave (between 08:00 – 08:59 LT) and afternoon/evening wave (between 17:00 – 21:59 LT).





3.1.1 Morning arrivals

2022

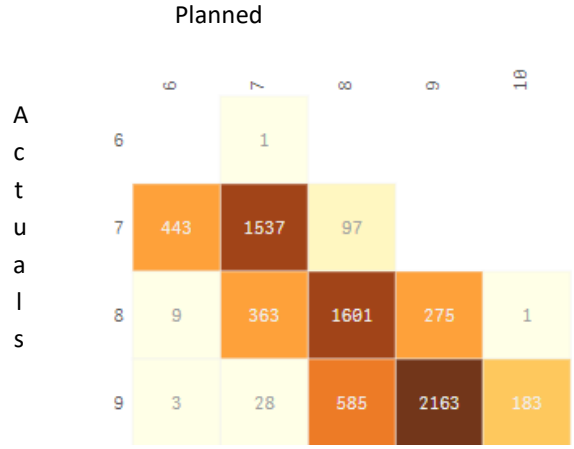


Chart 2.

- 97 ATM's operated actually in the earlier time block than planned in time block from 08:00 – 08:59
- These 97 ATM's received night penalty factor of 4 instead of 1

2023 January – May

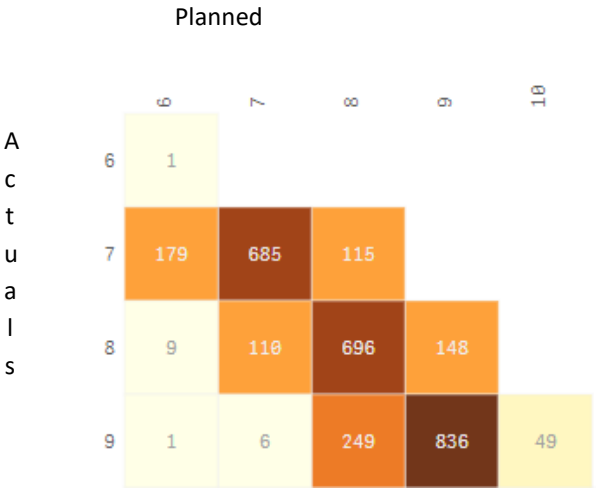


Chart 3.

- 115 ATM's operated actually in the earlier time block than planned in time block from 08:00 – 08:59, which is more that the whole 2022.
- These 115 ATM's received night penalty factor of 4 instead of 1

3.1.2 Evening arrivals & departures

2022

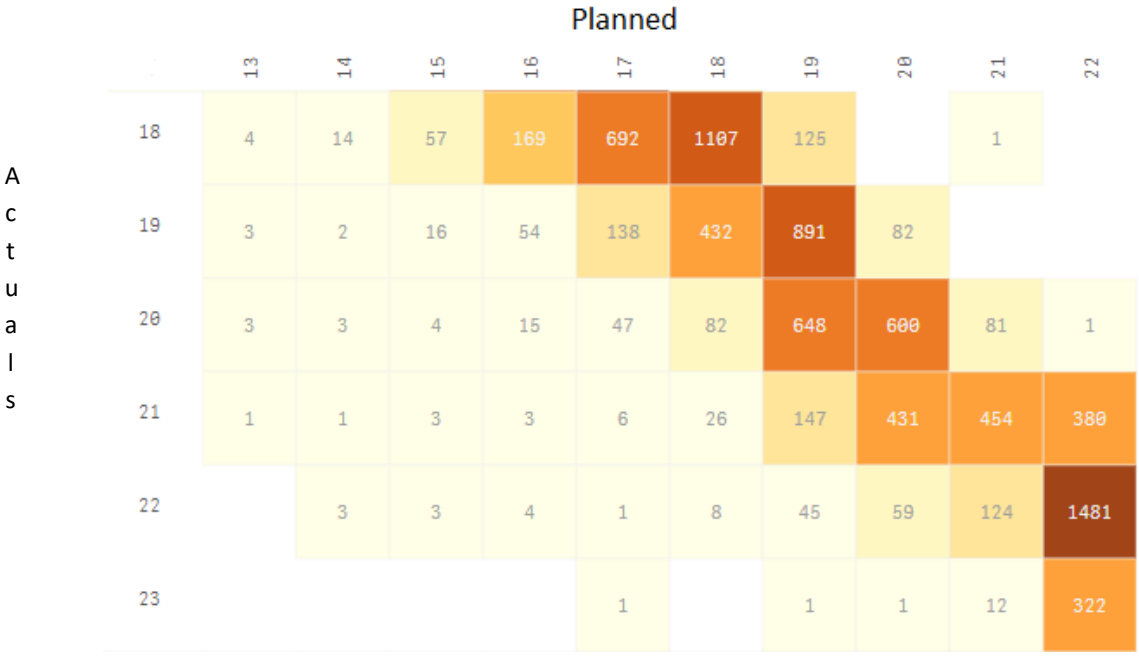


Chart 4.

2023 January – May

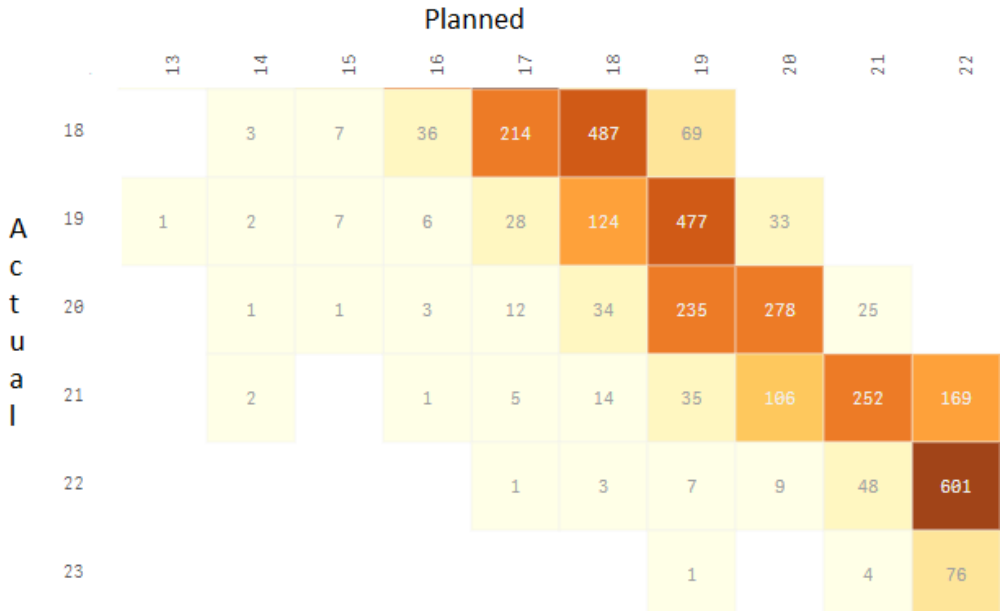
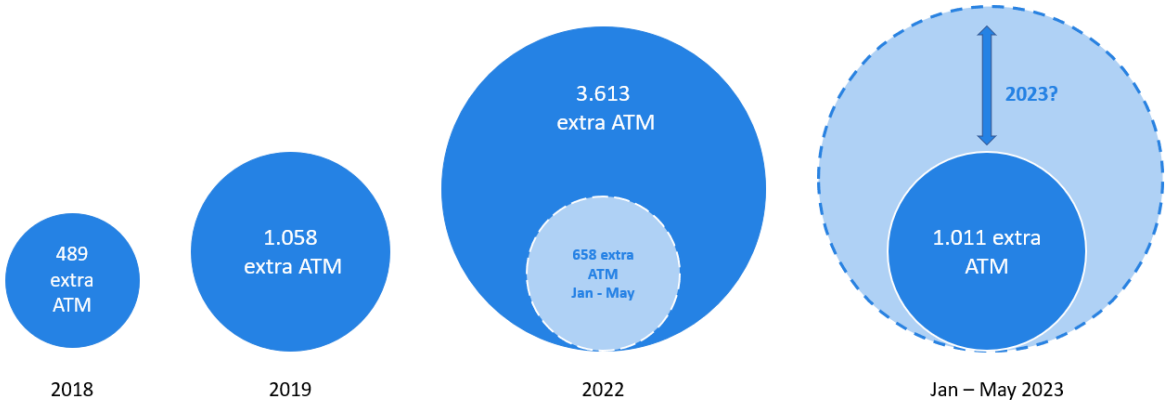


Chart 5.

3.2 Trend 2018 – 2023

The graphic below shows how many additional flights are calculated for our Noise footprint due to deviations of slot planned timings.
This trend is very concerning, since there is a clear path of increase in additional flights that are calculated for our Noise footprint.
In order to stay within our Noise footprint and therefore keep our slot capacity, it is necessary to improve night penalty factor performance.



4. Advice slot tolerance from S24

4.1 Definitions

For the sole purpose of determining the slot threshold and subsequently the slot tolerance policy, EIN defined two different aspects of the slot tolerance that both should be met.

- **Time tolerance** – determined as a period of time with a time frame before and after given slot time.
- **Fleet deviation tolerance** – a maximum deviation (changes) to the fleet after Initial slot allocation
- **Trend** - definition as in Slot Enforcement Code

4.2 Slot tolerance advice

4.2.1 Different way OPS

Changing the fleet from new generation aircraft to old generation aircraft is lowering Noise performance, but at the same time, changing from an old generation to a new generation is improving Noise performance at Eindhoven Airport. Advised tolerance is shown in table 2.

Slot time (LT) Summer season LT = UTC + 2 Winter season LT = UTC + 1	Tolerance	Remarks
06:55 – 22:59	**as stated in SEC 4.5**	Using new aircraft generation instead of old aircraft generation leads to a lower noise footprint, therefore, changes from old to new aircraft generation are allowed and no monitoring is needed.
23:00 – 23:59	There are no allocated slots in this period, but limitations for actual landings are set in the **License to operate of Eindhoven Airport** *(Vergunning burgermedegebruik Eindhoven Airport).*	

Table 2.

List of aircraft that are usually operating at Eindhoven Airport are shown in table 3:

New Aircraft generation	Old aircraft generation
Airbus A320NEO Airbus A21NEO Boeing 737 MAX (7 - 10) Airbus A220 Embraer E190(5) - E2	Airbus A320 CEO Airbus A321 CEO Boeing 737 – 700 Boeing 737 – 800 Boeing 737 – 900 Embraer E190(5)

Table 3.

4.2.2 Different time OPS

Based on the Eindhoven Airport capacity and the fact that Eindhoven Airport is just above or close to this capacity, Eindhoven Airport has a following proposal for differentiation of slot tolerance (Table 4.)
Previous suggested tolerance Different time OPS, haven't led to better performance, actually trend (as seen at page 10.) is significantly worse than previous years and very concerning.
This is the main reason to introduce this time tolerance.

Slot time (LT) Summer season LT = UTC + 2 Winter season LT = UTC + 1	Time tolerance	Remarks
06:55 – 22:59	**+/- 15 min.**	Deviations that lead to a lower night penalty factor is allowed, due to lower impact to Noise footprint and no monitoring is needed.
23:00 – 23:59	There are no allocated slots in this period, but limitations for actual landings are set in the **License to operate of Eindhoven Airport** *(Vergunning burgermedegebruik Eindhoven Airport).*	

Table 4.

4.3 Slot tolerance explanation (LT times)

4.3.1 Different way OPS

06:55 – 22:59

A tolerance is set according to **Slot Enforcement Code**, with one additional remark. It is always allowed to deviate from original schedule and to use new aircraft generation instead of old one. The reason is that new aircraft generation are producing less noise, thus it has lower impact to Noise footprint and the capacity of Eindhoven Airport.

4.3.2 Different time OPS

06:55 – 22:59

A tolerance of 15 minutes is set in order to avoid surpassing our allowed Noise footprint capacity as much as reasonably possible. It is noticed that a substantial deviation of slot usage leads to a higher night penalty factors than planned for our **Licence to operate**, which means that for the noise calculation purposes extra flights are calculated than previously planned (3.613 flights during 2022 or about 5%). These deviations have a major influence to the noise calculations and therefore capacity. At the other hand, deviations that lead to a lower night penalty factor is allowed, due to lower impact to Noise footprint.
Furthermore, this given tolerance will stimulate airlines to operate within their given time blocks and avoid future additional restrictions if EIN exceeds the given noise footprint.

4.4. Conclusion

At this point, Eindhoven airport is on its absolute maximum of flights and its noise footprint. This means that additional effort and mitigation measures are necessary to stay within the given boundaries and current license limitation, but also future developments in terms of its capacity.
This slot tolerance policy is about to set an operational framework of slot tolerance in order to increase efficiency of Eindhoven Airport but also to stay within the boundaries of its agreed noise footprint. Furthermore, purpose of this slot tolerance policy is to mitigate and to avoid continuous planning flights outside of given slots timings and planned fleet.