



# Noise Certification Workshop

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## SESSION 2: AIRCRAFT NOISE CERTIFICATION

### Annex 16, Volume I and equivalent procedures

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#### SUMMARY

This paper describes the content of Annex 16, Volume I and also addresses equivalent procedures which are commonly used in noise certification.

## 1. INTRODUCTION

1.1 Aircraft built today have to meet the noise certification requirements as set by the certifying authorities. For most states they are based on Certification Standards adopted by the Council of ICAO. These are contained in Annex 16, *Environmental Protection*, Volume I, *Aircraft Noise* to the Convention on International Civil Aviation. This paper describes the content of Annex 16, Volume I, Part II and also addresses equivalent procedures which are commonly used in noise certification.

## 2. DOCUMENTS

2.1 Since 21 March 2002 the applicable document is ICAO Annex 16, Volume I, Third Edition, Amendment 7. This regulation prescribes applicable rules, reference conditions, initial demonstration procedures and data evaluation procedures. Equivalent procedures are described in ICAO Doc 9501-AN/929 “*Environmental Technical Manual on the Use of Procedures in the Noise certification of Aircraft (ETM)*”. The ETM will be presented in detail in a separate paper.

## 3. CHAPTERS OF ANNEX 16, VOLUME I

3.1 ICAO Annex 16, Volume I, Part II sets the rules for noise certification of jet aeroplanes, propeller-driven aeroplanes and helicopters as follows:

Chapter	Aircraft	Application accepted
2	subsonic jet	until 1977
3	subsonic jet and large* propeller-driven	from 1977 to 2005
4	subsonic jet and large* propeller-driven	from 2006

5	large* propeller-driven	from 1977 to 1985
6	small** propeller-driven	from 1975 to 1988
8	helicopters	from 1985
10	small** propeller-driven	from 1988
11	small*** helicopters	from 1993
12	supersonic	---

- \* MTOM larger than 8618 or 5700 kg  
\*\* MTOM smaller than/equal to 8618 kg  
\*\*\* MTOM smaller than/equal to 3175 kg

#### 4. **REGULATION FOR SUBSONIC JET AND LARGE PROPELLER-DRIVEN AEROPLANES**

4.1 According to the table from above the relevant chapters for noise certification for subsonic jet and large propeller-driven aeroplanes are Chapters 2, 3, 4 and 5. The difference between Chapter 3 and 4 are the more stringent noise limits for Chapter 4. The same holds for comparing Chapters 2 and 5 with Chapter 3: Noise limits for Chapter 3 are more stringent than they are for Chapters 2 and 5. Since Chapter 2 and 5 are “out of date” (see table “application accepted”) the following discussion will focus on Chapters 3 and 4.

4.2 Chapters 3 and 4 contain detailed rules for noise certification. These contains:

- applicability,
- noise evaluation measure,
- reference noise measurement points,
- maximum noise levels,
- trade-offs,
- noise certification reference procedures,
- test procedures.

4.3 For subsonic jet and large propeller-driven aeroplanes Appendix 2 of ICAO Annex 16, Volume I, Part II prescribes the noise evaluation method which includes:

- noise certification and measurement conditions;
- measurement of noise received on the ground;
- calculation of effective perceived noise level from measured noise data; and
- reporting of data to the certificating authority and corrected measured data.

#### 5. **EQUIVALENT PROCEDURES**

5.1 An equivalent procedure is a test or analysis procedure which, while differing from the one specified in Annex 16, Volume I, in the technical judgement of the certificating authority, yields effectively the same noise levels as the procedure specified in Annex 16. Equivalent procedures are used to reduce cost and time and to obtain more information than just the “basic” noise data for a single configuration. When established, equivalent procedures are normally described in the ETM.

5.2 As an example one equivalent procedure shall be described: Chapter 3 of Annex 16, Volume I prescribes the take-off procedure for every noise test run beginning with the start of take-off. However, in practice, in order to reduce cost and time an intercept flight path is used.

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