



GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION
TECHNICAL CENTRE, OPP. SAFDURJUNG AIRPORT, NEW DELHI

CIVIL AVIATION REQUIREMENTS
SECTION 10 – AVIATION ENVIRONMENT PROTECTION
SERIES ‘A’ PART I
ISSUE I, 18TH DECEMBER, 2014

EFFECTIVE: FORTHWITH

F. No. 04-01/2010-AED (Vol. II)

Subject: **Noise Management of Aircraft Operations at Airports.**

1. INTRODUCTION

1.1 Noise represents one of the most significant environmental challenges associated with aircraft and airport operations. Over the years, there have been significant improvements based on technology evolution, effective noise abatement procedures and other measures. At the same time, given the industry’s growth and the presence of population agglomerations near airports, large parts of population are still affected by aircraft noise.

1.2 Reducing the effect of aircraft noise on people and communities is one of ICAO’s main priorities. ICAO had adopted the “Balanced Approach” to address aircraft noise which is based on four pillars: 1) Reduction of noise at source; 2) Land use planning and management; 3) Noise abatement operational procedures; and 4) Operating restrictions. It provides ICAO Contracting States with an internationally agreed method for addressing aircraft noise in a comprehensive manner.

1.3 To address the aircraft noise related issue in an objective manner, this Civil Aviation Requirements (CAR) is issued in compliance to Section 5A sub-section 1 of the Aircraft Act, 1934 in conjunction with rule 29C of the Aircraft Rules, 1937.

1.4 This CAR stipulates the general requirements, procedures and practices to be adhered to by the stakeholders in order to manage the noise generated from aircraft operations inside and in the vicinity of all airports and to reduce its adverse impact on human beings and the environment without hampering the sustainable growth of the industry.

2 APPLICABILITY

The provisions of this CAR shall be applicable to the following:

2.1 Airports meeting the criteria as mentioned in the *Requirement and Procedure for Monitoring Ambient Noise Level due to Aircrafts* issued by the Central Pollution Control Board, Ministry of Environment & Forest (MOEF) in June 2008.

2.2 All Indian scheduled and non-scheduled passenger and cargo aircraft operators engaged in commercial operations including General Aviation.

2.3 The provisions of this CAR are not applicable to flights undertaken by Ministry of Defence in the national interest and for carrying VVIP, Head of States and other eminent personalities and under any emergency situation where it is not possible to follow noise abatement procedure due to technical reasons from safety point of view. Further, flights engaged in search & rescue, patrolling, fire-fighting, humanitarian missions, emergency medical service purposes are also exempted from the requirements mentioned in this CAR.

3 REQUIREMENTS

3.1 Airports

3.1.1 Airport operators shall carry out a noise mapping study around their airports including the areas directly under the flight paths, to assess the existing noise loads and the population affected within the various noise contours/maps using an internationally accepted noise model and actual data (e.g. flights, aircraft types, routes used, radar tracks, etc.). Noise maps shall be validated with actual field noise measurements data.

3.1.2 Airport operators shall develop a Noise Management Action Plan based on the outcome of the noise mapping study. The airport operator shall implement the same to reduce the noise generated from aircraft operations at airports.

3.1.3 Airport operators shall update their noise maps and noise management action plans in view of the forecasted traffic growth to their airports at least once in five years.

3.1.4 For the purpose of noise mapping and noise management action plan, airport operators shall follow guidelines contained in Annexure I to this CAR.

3.1.5 Airport operators shall establish a fully operational real-time permanent Noise Monitoring System (NMS) in accordance to the provisions of the '*Requirement and Procedure for Monitoring Ambient Noise Level due to Aircraft*' issued by the Central

Pollution Control Board of Ministry of Environment & Forest (MOEF) in June 2008 and the Minimum Technical Characteristics of the NMS as contained in Annexure II to this CAR.

3.1.6 Airport operators shall use additional mobile NMTs (e.g. portable/mobile) for monitoring of noise in sensitive areas such as residential/silence zones in the vicinity of the airport.

3.1.7 Airport operators shall develop a system of monitoring permissible noise limits prescribed by the Central Pollution Control Board, State Pollution Control Board or any other applicable authority in respect to a particular airport. The airport operators shall take necessary corrective action against any exceedences to prescribed noise limits.

3.1.8 The report on noise monitoring from the NMS shall be submitted to DGCA on annual basis. The noise monitoring reporting requirements are contained in Annexure III to this CAR.

3.1.9 Airport operator shall develop following noise abatement procedures specific to their airport, jointly with AAI/ATC in order to reduce/minimize the noise generated through aircraft operations at their airports:

- i) Continuous Descent Approach (CDA) at all airports in place of step down approaches and Continuous Climb Operations (CCO).
- ii) Optimum and efficient utilization of all the operational runways on a fixed hourly basis in order to evenly distribute the noise generated during take-offs and landings. It will be the sole responsibility of the airport operator to identify the sensitive runways and the flight paths from community annoyance point of view.
- iii) Engine run up management procedure by identifying such locations where engine run-ups can be performed along with information about aircraft orientation, permissible time of day, maximum permissible thrust level and duration, etc.
- iv) GPU/APU Management procedure and provision of Fixed Electrical Ground Power (wherever applicable) in order to minimize the use of Ground Power Unit (GPU) and Auxiliary Power Unit (APU) during aircraft parking at bay.

3.2 Aircraft Operators

3.2.1 Aircraft operators shall develop procedure to adopt low power and low drag operation in conjunction with Continuous Climb and Descent Approach, wherever

such procedures have been developed by the airport operator/ATC and are in place. In this regard, the airlines shall follow noise abatement take-off or approach procedures designed to optimize the distribution of noise on the ground while maintaining the required level of safety. Pilot must plan the continuous descent in such a manner that the aircraft does not fly level for 2nm during any stage of descent. Further, thrust reduction altitude for all aircraft should be not later than 1500 ft AGL.

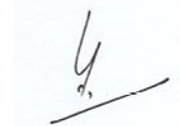
3.2.2 Aircraft operators shall also develop safe operating procedures to land at any airport with minimal use of thrust reverse. Such procedures shall be developed for compliance without compromising with the safety of aircraft and its occupants as well as without compromising the runway capacity. The flight crew shall have the final authority to decide on use of thrust reverser on case to case basis. It shall be the sole responsibility of the airlines to provide enough training to their pilots in this regard.

3.2.3 Aircraft operators shall carry out all engine run-up only at locations earmarked by airport operator for this purpose.

3.2.4 Aircraft operators shall follow use of noise preferential routes to avoid noise-sensitive areas on departure and arrival, including the use of turns to direct aircraft away from noise-sensitive areas located under or adjacent to the usual take-off flight paths as designed by airport operator/ATC/AAI for this purpose. It will be the sole responsibility of the aircraft operators to provide enough training to their pilots in this regard.

4 MONITORING AND SURVEILLANCE

The DGCA shall monitor the information provided by the airports and airlines to ensure proper compliance with the provisions contained in the said CAR from time to time.



(Dr. Prabhat Kumar)
Director General of Civil Aviation

Annexure I

Minimum Requirements for Noise Studies and Noise Management Action Plans

Phase 1: Noise Mapping & Validation

i) Noise maps shall be developed with the use of specialized software (such as INM 7 or higher, CadnaA, IMMI, or others) The noise maps shall take into consideration actual air traffic data (e.g., types of aircraft, number of movements, distribution of runway use, landing and take-off paths), meteorological data, sensitive receptors, and (if necessary/possible) 3D terrain model and land uses.

ii) Following indices may be calculated: Lden (where day is 0600-1800, evening 1800-2200, and night 2200-0600), Lday, Levening, Lnight, LDE (where day is 0600-1800 and evening 1800-2200 with no penalty), Leq-24h, DNL (where day is 0600-2200 and night 2200-0600), and LAm_{ax}.

iii) The noise mapping/validation phase and the relevant detailed report shall include at least the following:

a) Background information about the airport (e.g., location, runways, number of flights and passengers, runway usage, flight movements per aircraft type for day and night time, main take-off and landing flight paths, past noise measurement history (if any), existing noise abatement procedures, population and land-use information in the vicinity of the airport, other noise sources and sensitive receptors, description of the Noise Monitoring System, if available).

b) Detailed description of the noise model and the methodology, including actual model input data (e.g., number of flights, aircraft categories/types, flight paths used, flight procedures, radar tracks if used), assumptions, calculation process, metrics, preliminary results, etc.

c) Results of noise mapping shall be validated using actual measurements of aircraft noise around the airport, preferably at the points as chosen during the modeling. For airports with established NMS, data for the same calendar year for which the model was run shall be used plus additional 24 hour measurements for all the above indices, where required. If data from an NMS are not available, 24 hour measurements should be carried out using mobile units. Depending on the validation results and especially the comparison/evaluation of measured data vs theoretical data from the model computed at the exact measurement location for the air traffic volumes and characteristics of the measurement period, an update of noise-mapping may be required.

d) Presentation and assessment of the noise mapping results, including calculations of the area and population in each noise zone, as well as at sensitive receptors (e.g., hospitals, schools, archaeological sites, protected areas). The results will be calculated and presented at least for the following noise indices: Lden, Lday, Levening, Lnight, LDE, Leq-24h, DNL, and LAmax. The presentation of results in the form of noise contour maps and tables will be based on 5 dBA intervals starting from 55 dBA to >75 dBA for all metrics, except for Lnight which should start from 45 dBA. The report should include a comparison with the limits set in the Ministry of Environment and Forests, Noise Pollution Rules of 2000 and other guidelines or limits.

Phase 2: Action Plan

The Action Plan shall be created following the review/approval of Phase 1 by the DGCA. The airport operator shall ensure the involvement of the stakeholders that will be responsible for the implementation of the action plan. The Action Plan should include at least the following:

- a) Executive summary.
- b) Description of the airport.
- c) Legal context, including limits and assessment criteria.
- d) Summary of Phase 1 results.
- e) Evaluation of the area and estimated number of people in each noise zone, identification of problematic areas and situations that require improvement. Description of noise abatement measures already in force.
- f) Presentation of noise-reduction measures based on international best practices and subsequently formulation of measures to reduce the noise impact, including environmental, operational and financial assessment of each of the proposed measures. The measures to be evaluated shall include, depending on the specific airport operations: noise abatement operational procedures, operating restrictions, land use planning and management, and other initiatives. For the proposed measures (where relevant) new calculation of the noise curves is required to determine expected improvements in terms of area covered, exposed population, etc.

During the development of this section, ICAO's DOC 9821 AN/451 *Guidance on the Balanced Approach to Aircraft Noise Management* (latest edition) should be taken into consideration.

Annexure II

Minimum Technical Characteristics of Noise Monitoring Systems (NMS)

- a) The establishment of the NMS shall be in accordance to the *Requirement and Procedure for Monitoring Ambient Noise Level due to Aircrafts* issued by the Central Pollution Control Board of MOEF in June 2008. The establishment of the NMS shall also consider the requirements of ISO20906: 2009 “*Acoustics: Unattended monitoring of aircraft sound in the vicinity of airport*” or other similar standard.
- b) At least two permanent Noise Monitoring Terminals (NMTs) shall be installed per runway with more than 25,000 movements (where a movement is a take-off or a landing). The permanent NMTs shall be located on both sides of the runway, in the nearest residential area and, as far as possible, under the flight paths of the aircraft. At least one mobile NMT (e.g., portable/mobile) shall be used for measurements in the residential areas/silence zones and under the flight paths, where noise levels are expected to be high.
- c) Noise monitoring shall be carried out continuously in accordance to the provisions of the ‘*Requirement and Procedure for Monitoring Ambient Noise Level due to Aircraft*’ issued by the Central Pollution Control Board of Ministry of Environment & Forest (MOEF) in June 2008. The NMTs shall be placed in locations to minimize disturbances from other noise sources, obstructions, etc.
- d) The NMS shall be comprised of a central receiving station to download, process, archive and visualize data collected and transmitted from all NMTs as well as from the airport’s flight information system. All the NMTs should be operational in a real time mode and the central station should be able to access the NMTs in network mode. The communication between NMTs and the central receiving station must be two-way. The NMTs should be controllable (on/off, change of parameters) remotely via the central receiving station.
- e) The NMTs should have a stand-alone operating terminal, appropriate for outdoor installation for continuous measurement of aircraft noise. On-site data storage should be available for a minimum of 7 days, in case of communication disruptions.
- f) Data must have portability to the central receiving station.
- g) The software installed on the central receiving station must be user-friendly and able to undertake data acquisition, permanent data archival/storage, data/statistics analysis and display, provision of map background, report generation, and correlation with flights, with the additional possibility of relaying data of flights based on radar data for future update of the system.

h) The NMTs should be field operational and tolerant to extreme environmental conditions in India, in high or low temperatures, high rainfall, high humidity coastal conditions and high temperature desert conditions. The microphone shall be weather-proof and placed at a height of between 6 to 10 meters above ground level.

i) The NMT should have an audio data storage facility for listening and storing noise events. The NMTs should have provisions for optional camera attachment and processing of relevant data.

j) The NMTs shall be capable of recording meteorological data such as wind direction and speed, relative humidity, air temperature, etc.

k) The NMTs (including the microphone) should conform to IEC 61672-1(2002-05) Class 1 standards, self-calibrating option type. Acoustical calibration and verification should be in accordance to the provisions of ISO20906: 2009.

l) The NMS should be able to segregate the noise from other sources, such as vehicle traffic and industrial noise, and the noise generated due to aircraft operations.

m) The NMS should be able to be adjusted for different types of event detection processes (e.g., specific noise level threshold, duration of noise event, consideration of background noise level).

n) The NMS should have the capability to generate daily, weekly, monthly and annual reports for each and all of the stations for at least the following indicators (daily, monthly, annually): L_{day} (0600-1800), L_{evening} (1800-2200), L_{night} (2200-0600), L_{de} (0600-2200), L_{den} (day: 0600-1800, evening: 1800-2200, night: 2200-0600), L_{Amax}, DNL, TDNL, EDNL, BDNL (as defined in the *Requirement and Procedure for Monitoring Ambient Noise Level due to Aircrafts*, CPCB, MOEF, 2008), L_{n10}, L_{n90}, L_{n50}, and L_{min}.

o) The NMS shall have the provision for interface with radar data on real time basis.

Annexure III

Minimum Noise Reporting Requirements

- a) Summary monthly and hourly distribution of flight movements
- b) Summary distribution of flight movements per aircraft type
- c) Runway use statistics
- d) Description of NMS and existing limits
- e) Data on enforcement of Noise Abatement Procedures (including violation data where appropriate).
- f) Noise monitoring results for all relevant metrics, such as Lday, Levening, Lnight, Lde, Lden, LAmax, etc. (including data reliability information)
- g) Engine run-up data (e.g., types of aircraft, airlines)
- h) Noise complaints
- i) Diagnostic and self-testing calibration
- j) Other relevant information (e.g., future plans)