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A COMPLEX LEGISLATION: THE AIR TRANSPORT NOISE

S. Curcuruto, A. Franchi

National Agency for the Environmental Protection of Italy (ANPA), Via V. Brancati, 48, 00144, Roma,
Italy

Tel.: +39-06-50072827 / Fax: +39-06-50072919 / Email: curcuruto@anpa.it

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ABSTRACT

The Italian framework law on environmental noise pollution of the 26 October 1995, n.447 establishes the general principles but defers to other following decrees the regulation for specific noise sources or noisy activities; in particular, for one of the most important noise sources as the aircraft noise it has been necessary to define five decrees to complete the specific legislative measures. The Italian legislative approach to obtain a reduction of noise produced by air transport is based on different action lines which integrate themselves. In our country, the characteristics of the land together with the strong urbanisation impose the duty of conciliating the necessity of development of the airport infrastructure and the needs of territorial planning of the municipality that can suffer limitations from the fruition of its own territory.

1 - INTRODUCTION

The noise produced from the aircraft in phase of takeoff and landing is surely an important source of disturbance for the population that resides in the proximity of an airport area; moreover, the morphologic and orographic characteristics of our country, together with a strong urbanisation, are not such as to permit of having free areas of remarkable dimensions around the airports; therefore, the rules that provide for the regulation of the noise produced by air transport must wed various requirements: the needs of protection of the population, the necessity to allow the development of the air traffic, whose tendency is of continuous increase, and therefore the expansion of airport infrastructures, the possible limitations to the territorial planning in proximity of such areas.

With such considerations, it is obvious that the predisposition of a normative appears somewhat complex and the number of issued decrees, five, to regulate the matter demonstrates it wide.

2 - ITALIAN LEGISLATIVE APPROACH

The national legislative approach is based on the following lines of action:

- to characterise the areas around the airport fixing noise limits and limitations of the territory use for each area. The decree 31/10/1997 defines the L_{VA} as indicator for the air noise level and the isolevel curve to delimitate the controlled areas around the airport:
 - **A zone**, where the L_{VA} values are comprised between 60 and 65 dBA; in this area all activities are permitted;
 - **B zone**, where the L_{VA} values are comprised between 65 and 75 dBA; in this area only agricultural, industrial and commercial activities are permitted, but adopting suitable measures of sound-proofing;
 - **C zone**, where the L_{VA} values are greater than 75 dBA; in this area only activities joined with airport operations are permitted;

- to define a specific measure methodology of the air transport noise. The L_{VA} value depends on the days of observation time (at least 21 days divided into three weeks in different period of the year), the number of aircraft operations and the SEL of each operation; it is calculated for the day (L_{VA_d}) and for the night (L_{VA_n}), then it is evaluated the L_{VA_j} for each day composed by the two values, and, then, it is possible to have the L_{VA} indicator:

$$L_{VA} = 10 \log \left[\frac{1}{N} \sum_{j=1}^N 10^{L_{VA_j}/10} \right] \text{ dBA}$$

where L_{VA} is the indicator for air noise, N is the number of the days during the observation time of the phenomenon, L_{VA_j} is the daily value of the indicator and it is determined by the following equation:

$$L_{VA_j} = 10 \log \left[\frac{17}{24} 10^{L_{VA_d}/10} + \frac{7}{24} 10^{L_{VA_n}/10} \right] \text{ dBA}$$

where L_{VA_d} is the value of the indicator for the day period, and L_{VA_n} is the value of the indicator for the night period:

$$L_{VA_d} = 10 \log \left[\frac{1}{T_d} \sum_{i=1}^{N_d} 10^{SEL_i/10} \right] \text{ dBA, and}$$

$$L_{VA_n} = 10 \log \left[\frac{1}{T_n} \sum_{k=1}^{N_k} 10^{SEL_k/10} \right] + 10 \text{ dBA,}$$

- T_d is equal to 61,200 sec. (day period),
- N_d is the number of flight operation during the day period,
- SEL_i is the noise level of the i -event,
- T_n is equal to 25,200 sec. (night period),
- N_n is the number of flight operation during this period,
- SEL_k is the noise level of the k -event; the SEL_i is represented as follows:

$$SEL_i = 10 \log \left[\int_{t_1}^{t_2} p_{A,i}^2(t) / p_0 dt \right] = L_{Aeq,T_1} + 10 \log \frac{T_1}{T_0} \text{ dBA}$$

where T_0 is equal to 1 sec., t_1 and t_2 represent the starting and the end of the measure, T_1 represents the event length where the L_{VA} is higher than $L_{A_{fmax}} - 10$ dBA threshold;

- to define for each airport antinoise procedures that must be respected by aircraft during landing and take-off and during in ground operations;
- to impose monitoring in continuous systems around the airport to protect the population controlling the noise emitted by the aircraft and the relative antinoise procedures followed;
- to classify the airports on the basis of the noise pollution levels produced on the surrounding environment. Each airport will be classified on the basis of three numerical indexes, Ia, Ib and Ic;
- to impose reclamation measures in case of non-respect of noise limits; such reclamation measures must be adopted to reduce the above mentioned Ib and Ic indexes;
- to impose the limitation of air traffic during the night period.

All these aspects are contained in the following five rules:

- decree 31/10/1997 "Methodology of measure of air noise";
- decree 11/12/1997 "Rules about the reduction of noise pollution produced by civil aircraft";
- decree 20/05/1999 "Criteria to design monitoring systems to control noise pollution levels near the airports and criteria to classify the airports";
- decree 9/11/1999 "Rules about limitations of air traffic during the night";
- decree 3/12/1999 "Antinoise procedures and respected areas around the airports".

The first two decrees are previewed in the text of framework law n.447/95; the decrees 3 and 5 derive from the contents of the decree 31/10/97, while the decree n.4 has been necessary to modify the art.5 of decree 11/12/97.

3 - LOCAL ACTIONS

According to the norms, in every airport opened to civil traffic it will be necessary to provide for the predisposition of a system of monitoring in continuous that can permit to survey of eventual overcoming of the limits in the surroundings and to connect such information with data and trajectory of the aircraft that has generated the overcoming. This allows to hold under control the "acoustic climate" in around airports but, also, to fine the responsible for the non observance of the limits or of the antinoise procedures. Therefore it will be necessary to institute for each airport a Commission whose tasks will be:

- to proceed to its classification in relation to the produced acoustic pollution, on the base of the following parameters: extension of the airport area, extension of the three areas of the surroundings of the airport, extension of the included residential areas, density of inhabitants in each area. From these parameters it is possible to gain the indexes that permit the classification of the infrastructure;
- to provide for the definition of the antinoise procedures on the base of the general criteria defined with the decree of the Ministry of the Environment; the main objective is to optimise the print of noise of the aircraft to the ground in order to assure the best protection to the exposed population;
- to proceed to the definition of the three areas A, B and C of the infrastructure surroundings, to which correspond specific noise limits established with ministerial decree. This aspect is, perhaps, the most delicate because it obligates Communes to limit use destinations of their territory comprised in the aforesaid areas and to divide in acoustic zone the territory adjacent with A zone (the most external one regarding the area of the airport and therefore with more bottom limits) compatibly with the levels of allowed noisiness permitted. It must be keep in mind that in C zone it is possible to carry on only the activities closely connected with the use of the same infrastructure; in B zone it is possible to do productive activities or trade or agricultural ones, but also offices in case measures of acoustic isolation are adopted; in A zone, instead, it is not imposed any limitation. These conditions consequently involve, for the territory comprised in A zone, the possibility to expose the population to levels of noise comprised between 60 and 65 dBA, while for the areas A and B the necessity to coordinate the town and territorial planning instruments with the plan of development of the airport. This can cause situations of disagreement among various instruments and the decree itself, in such a case, imposes a conference of services.

Moreover It will be task of the society of management of the airport to characterise and to propose to the interested Commune a plan of acoustic reorganisation and control of the produced noise, while it will be obligation of the Commune to include it in the plan of communal acoustic reclamation that it has to predispose in compliance with art.7 of the framework law n. 477/95.

Last extremely important action in the regulation of the airport noise is the limitation of the air traffic during the night period (hours 23.00 – 6.00) imposed with a specific decree; for obvious reasons, the sanitary flights, emergency and State ones or those with specific authorisation of the Ministry remain excluded from such limitation, for every single airport; however, such flights will have to be carried out with the less "noisy" aircraft and the competent bodies for the control will have to check that is not exceeded the limit of 60 dBA for A zone around airport.

4 - CONCLUSIONS

It is possible to make an example of the consequences deriving from the application of such normative: the case of Malpensa 2000. The obligation to define the airport zones and, therefore, the whole airport area in a situation that is remarkably changed, because of the sudden development of the airport structure which has consequently generated a meaningful impact on the territorial planning of the neighbouring Communes, involves the necessity to adopt important reclamation measures in wide zones of the communal territories interested in order to guarantee the protection of the exposed population. In some cases, it has been considered the necessity of moving entire villages as this represents the only possible action due to the characteristics of the air noise and its propagation.