

**58th CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGIONS**

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AGENDA ITEM 3: AVIATION SAFETY

**THE APPLICATION OF SHIELDING PRINCIPLE IN THE
CIVIL AIRPORT CLEARANCE**

(Presented by the People's Republic of China)

INFORMATION PAPER

SUMMARY

The application of shielding principle regarding obstacle limitation surfaces is crucial for the safe and efficient operation of airports and the local economic development. Currently, there is a lack of standardized guidance for the application of the shielding principle. Although the ICAO Annex 14 *Aerodromes and Airport Services Manual - Control of Obstacles* provide the definition and application circumstances of the shielding principle, specific shielded areas and application methods of shielding principle are not specified. With the development of the global economy, the demand for shielding principle application to airport surrounding areas is increasing. Due to the lack of standardized guidance, the application of the shielding principle is limited in many countries, and its application may pose safety risks to operations. Another problem of shielding principle application lies in the inconsistency of definitions for concepts such as “shielding object” and application methods among different countries. The application of the shielding principle is closely related to flight safety and further influences economic development. Scientific and reasonable application of the shielding principle plays an important role in ensuring flight safety, efficient airport operations and airport clearance protection. Therefore, it is necessary to conduct research on rules and application methods related to the shielding principle and to establish uniform standards and guidelines. This will further regulate and guide the application of the shielding principle, preventing the construction of buildings exceeding height limitation, reducing safety risks and strengthening the protection of airport clearance.

THE APPLICATION OF SHIELDING PRINCIPLE IN THE CIVIL AIRPORT CLEARANCE

1. INTRODUCTION

1.1 The application of the shielding principle is closely related to flight safety and further influences economic development. Scientific and reasonable application of the shielding principle plays an important role in ensuring flight safety, efficient airport operations and airport clearance protection. The establishment of relevant rules and application methods of shielding principle regarding obstacle limitation surfaces will help states to understand and apply shielding principle and will further regulate and guide the application of the shielding principle, preventing the construction of buildings exceeding height limitation, reducing safety risks and strengthening the protection of airport clearance.

1.2 Currently, ICAO Annex 14 *Aerodromes and Airport Services Manual - Control of Obstacles* specify the definition and application circumstances of the shielding principle as follows:

- 1) Definition: “When the object is shielded by an existing immovable object, the formula for shielding should be based on horizontal plane projected from the top of each obstacle away from the runway and a plane with a negative slope of 10% towards the runway; any object which is below either of the two planes would be considered shielded.”
- 2) Application circumstances: “New objects or extensions of existing objects shall not be permitted above the approach or transitional surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object; New objects or extensions of existing objects should not be permitted above the conical surface or inner horizontal surface except when, in the opinion of the appropriate authority, the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.”

1.3 However, neither Annex 14 nor *Airport Services Manual* specifies the specific shielded areas and application methods. Due to the lack of standardized guidance, the application of the shielding principle is limited in many countries, and its application may pose safety risks to operations. Therefore, it is necessary to conduct research on rules and application methods related to the shielding principle and to establish uniform standards and guidelines. This will further regulate and guide the application of the shielding principle, preventing the construction of buildings exceeding height limitation, reducing safety risks and strengthening the protection of airport clearance.

2. DISCUSSION

Deficiencies in regulations and problems in the application of shielding principle

Deficiencies in regulations

2.1 Currently, neither Annex 14 nor *Airport Services Manual - Control of Obstacles* provides a clear definition of shielding object. While they present cross-section for shielding principle, specific shielded areas and application methods of shielding principle are not specified. As a result, a comprehensive and systematic set of rules for shielding principle application has not been developed, making it challenging to effectively guide and regulate the application of the shielding principle.

Problems in the application of shielding principle

2.2 The shielding principle applied by each country vary significantly. This includes inconsistency of definitions for shielding object, varying application methods of shielding principle,

different requirements on areas that shielding principle is restricted and whether aeronautical study is required. These differences not only pose safety risks to operations when applying shielding principle but also restrict the application of shielding principle among many countries.

Development of China's guideline for shielding principle and application of shielding principle based on the guideline

Development of China's guideline of shielding principle

2.3 In 2022, China developed a comprehensive and systematic guideline for shielding principle, which have been widely applied and yielded positive results domestically. The development process involved extensive research on the application status of shielding principle both domestically and internationally, collection of technical specifications and information from ICAO and major countries around the world and reference to the application methods of shielding principle in different countries. With all these efforts, the guidance was developed based on the domestic operational situation to ensure flight safety. Local urban planning and construction needs were fully considered to maximize the utilization of land resources. Considering the function, location, and topographical conditions (plain and mountainous areas) of different obstacle limitation surfaces and their impact on flight safety, a set of application methods of shielding principle are proposed after a comprehensive validation using collision risk models. After seeking extensive input and feedback from departments of the Administration and Regional Administrations, local government departments, airports, consulting & design institutions, research institutions and other entities, *The guideline for application of obstacle shielding principle in civil airport clearance*, undergoing multiple rounds of deliberation and expert review, was developed to guide the application of shielding principle.

Application of shielding principle based on the guidance material

2.4 *The guideline for application of obstacle shielding principle in civil airport clearance* includes 4 chapters and 1 appendix, respectively, the general terms, applicable areas of shielding principle, application methods of shielding principle and examples of shielding principle application. The guidelines have been widely promoted and applied nationwide. Promoting and training activities have been carried out to raise awareness and understanding of the shielding principle. Since the implementation of the guideline, they have been used multiple times in various regions throughout the country, receiving praise from both organizations and individuals using it. It is widely acknowledged that the guideline has provided specific provisions for different application circumstances, making it highly practical and instructive. As a result, the guideline has significantly improved the airport clearance protection system and enhanced governance capacity.

Shielded areas of transitional surface, take-off climb surface, approach surface, inner horizontal surface and conical surface, and application of shielding principle regarding these surfaces

Transitional surface

2.5 The transitional surface is along the side of the runway and relatively close to the runway. It is a critical area for ensuring flight safety, and thus, the application of shielding principle should be strictly controlled.

Take-off climb surface/approach surface

2.6 The take-off climb surface and the approach surface are obstacle limitation surfaces designed to ensure safe departure and landing of aircraft. In these areas, where aircraft take off and land frequently, there is a relatively higher level of safety risk. Therefore, it is essential to conduct thorough research on shielded areas and application rules and requirements of shielding principle.

Inner horizontal surface and conical surface

2.7 The inner horizontal surface and the conical surface are obstacle limitation surfaces primarily designed for aircraft operations within the airport and maneuvering flight around the airport.

The research on shielding principle for these areas should consider factors such as vertical height,

Future plan

2.8 The Conference is invited to discuss and determine the direction for researching shielding principles, make a plan for developing regulations on shielding principles, and actively promote the development and application of these regulations.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

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