
**Civil small and light unmanned
aircraft (UA) — Sharp injury to human
body by rotor blades — Evaluation and
test method**

*Aéronefs sans pilote (UA) civils petits et légers — Coupure sur le corps
humain par des pales de rotor — Évaluation et méthode d'essai*

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 16, *Unmanned aircraft systems*.

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Introduction

The global civil unmanned aircraft (UA) industry is developing rapidly and its application market is vast. In particular, the amount of low-altitude, slow-speed, small and light UA increases significantly, becoming the majority of civil UA. At present, the civil small and light UA include multicopter UA, fixed-wing UA and helicopter UA. The multicopter UA are widely used due to the simplicity, highly intelligent flight control system, and high stability. Considering uncontrollable factors, such as the reliability of UA and operational issues, collisions are inevitable in some circumstances. The safety of people in public place is critical.

Blunt and sharp injuries are caused by the collision between a UA and human body. The blunt injury is caused by the impact of a UA at a speed, while the sharp injury refers to the laceration and puncture to human body caused by high-speed rotating blades of a UA. Due to the lightweight and high-maneuvrability of the small and light UA, the sharp injury caused by the high-speed rotating blades can be more serious as a safety threat to human body comparing to the blunt injury.

Previous tests have shown that the sharp injury caused by the rotor blades of small and light UA is related to the rotational speed, blades size, blade material and impact speed. However, there is still no standard or guidance available to specify the key techniques, such as the selection of impact environment and equipment, the test method coupling the rotational speed of blades and flight speed of UA, the evaluation criteria for tests. Without an appropriate method to evaluate and verify the safety of UA rotor blades, it is not conducive to the safety management and safety assessment of small and light UA market. Therefore, it is of great significance to establish a standard to specify the test and evaluation methods for sharp injury to human body caused by UA rotor blades.

This document specifies requirements for the safety test method for the laceration and puncture caused by the civil small and light UA, including test principles, test methods, test equipment, test specimens, test items, test procedures, result evaluation, etc. In addition, the establishment of the standard supports the evaluation of the laceration and puncture caused by the civil small and light UA. The implementation of this document promotes the development of the test technology on the laceration and puncture caused by the civil small and light UA, thereby improving the safety of the product.

Currently, the test method of laceration and puncture caused by the civil small and light UA has not been standardized. The published International Standards for UA, such as ISO 21384-4, have not provided the expected guidance for the safety test of the laceration and puncture caused by multicopter UA at this stage.

The main technical contents of this document are the following:

- a) the test principles and method of the laceration and puncture caused by the rotor blades of civil small and light multicopter UA;
- b) the test equipment of the laceration and puncture caused by the rotor blades of civil small and light multicopter UA;
- c) the test items and procedures of the laceration and puncture caused by the rotor blades of civil small and light multicopter UA;
- d) the result evaluation method of the laceration and puncture caused by the rotor blades of civil small and light multicopter UA.

