

TG-SECURE™ EN356 (Resistance Against Manual Attack)

EN356: P1A-P5A (Drop Ball Test)

Test Procedure

The test sample 1100 X 900 is placed in the test frame and three steel balls each weighing 4.11kg is dropped one at a time in a triangular pattern 130cm apart from varying heights depending upon the security level being sought. For P1A three steel balls are dropped from a height of 1.5 metres where for P4A three steel balls are dropped from 9 metres. For P5A, nine steel balls are dropped from 9 metres, three on each triangular point. A pass occurs where a steel ball fails to penetrate the glazing after a period of 5 seconds from impact. To achieve a security level the test must be repeated three times successfully. TG-Secure™ P1A-P5A security glazing is all glass laminates available in float or toughened options. Fire resistant options are available for P4A (12.3mm thick and 26Kg/m²), and P5A (14.3mm thick and 31Kg/m²) to E30 in timber and steel, and are CAMBRIDGE FIRE RESEARCH tested Report No. CFR1510151.



EN 356 – RESISTANCE AGAINST MANUAL ATTACK (DROP BALL TEST)

| Test Details | | | Drop Ball | | Glazing Strength | TG-SECURE™ PRODUCTS | |
|----------------|-----------------|-------------------|---------------|-----------|-----------------------|---------------------|----------------------------------|
| Security Level | Drop Height (m) | Total No. Strikes | Diameter (mm) | Mass (Kg) | Total Energy (Joules) | Min. Thickness (mm) | Min. Weight (Kg/m ²) |
| P1A | 1.5 | 3 | 100 | 4.11 | 181 | 6.8 | 16 |
| P2A | 3 | 3 | 100 | 4.11 | 363 | 6.8 | 16 |
| P3A | 6 | 3 | 100 | 4.11 | 724 | 9.2 | 21 |
| P4A | 9 | 3 | 100 | 4.11 | 1087 | 9.5 | 21 |
| P5A | 9 | 9 | 100 | 4.11 | 3262 | 10.3 | 15.8 |

*ToughGlaze also produces a P5A 7.5mm thick at 23Kg/m² which incorporates special interlayer technology.

EN356: P6B-P8B (Hammer & Axe Test – Higher Level of Security)

Test Procedure

The aim of this test is to cut out a 400 X 400 square within an 1100 X 900 test sample. The glazing is placed in a vertical frame and is impacted by way of a hammer head and axe head fitted to a mechanical arm. Firstly the hammer head is used to break the glass around the square and in generally takes 16-20 strikes to achieve this. The axe head is then fitted and its purpose is to cut through the glazing completely in order to make the 400 X 400 hole. New axe heads are fitted after every 10 strikes. The amount of hammer and axe strikes it took to create this hole are combined to give a total number of strikes which depicts the security level achieved, e.g. 30-50 strikes will achieve a P6B rating, whereas a glazing that took more than 71 combined strikes would achieve the highest rating P8B. There are no levels beyond P8B in this standard. TG-Secure™ P6B-P8B security products are glass to polycarbonate laminates and far exceed the security performance levels of all glass constructions to the same standard. They are available in float, toughened, and fire resistant options to E30 in timber and steel and are CAMBRIDGE FIRE RESEARCH tested (see above).



EN 356 – RESISTANCE AGAINST MANUAL ATTACK (HAMMER & AXE TEST)

| Level | Hammer Strikes | | Cutting Strikes | | Total No. Strikes | TG-Secure™ Standard Products | | TG-Secure™ Fire Resistant Products | |
|-------|-----------------------|--------------------|-----------------------|--------------------|-------------------|------------------------------|----------------------------------|------------------------------------|-----------------------------|
| | Impact Velocity (m/s) | Impact Energy (Nm) | Impact Velocity (m/s) | Impact Energy (Nm) | | Min. Thickness (mm) | Min. Weight (Kg/m ²) | Thickness (mm) | Weight (Kg/m ²) |
| P6B | 12.5 | 350 | 11 | 300 | 30 - 50 | 16.5 | 23 | 16.5 | 34 |
| P7B | 12.5 | 350 | 11 | 300 | 51 - 70 | 16.5 | 23 | 16.5 | 34 |
| P8B | 12.5 | 350 | 11 | 300 | 71 + | 18.5 | 25 | 18.5 | 37 |

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| Reference: | EN356 | Title: | EN356 TG-Secure™ | Version: | 1 |