

Glass and Manual Attack

We categorise glass into safety and security. Safety is where protection is needed from accidental damage and security for wilful damage. Glass used for security reasons can be further broken down into the types of threat:

- Manual attack
- Ballistic attack
- Explosion resistance

(There may be security concerns about [electronic eavesdropping](#) but in this passage we are primarily concerned with the mechanical properties of the glass and not acoustic, thermal or other aspects)

For manual attack we would generally suggest laminated glass. Whilst toughened glass is strong it can be broken by the knowledgeable with some ease. Witness the state of bus shelters around the country. The other problem with toughened glass is that once broken it collapses leaving an unprotected hole. Laminated glass can be designed to withstand a varied level of abuse by mixing the glass thickness for strength and the amount of interlayer that binds the glass together to improve penetration resistance. Even when broken laminated glass can still provide protection and slow the "would be assailant" down. The combination of toughened and laminated glass is often suggested to get the best of both worlds. The reality can be a glass that rapidly loses its integrity when both panes are broken. The lack of support offered by broken toughened can allow the glass to fold and be removed from the frame.

The range of manual attack applications is quite broad. Jewellers' windows and screens in vulnerable reception areas are often locations requiring protection above and beyond that offered by impact resistant glass classified by BS6206 or BS EN 12600. The British Standard BS5544 provided an anti-bandit solution where glass combined with suitable framing could be said to meet the classification. Note that the glass cannot meet this alone and glass supplied for glazing into these situations is stamped to the BS6206 category and not BS5544.

The new European standard gives a broader range of categories but like the BS5544 it does not relate the category to the type of attack. When asked to provide glass that may be subject to a manual attack it is almost impossible to judge the ferocity, determination, energy and range of implements an unpremeditated attacker might use. The hard body drop tests would cover most applications. The axe test uses glass intended for extreme situations.



European Standards

EN 356: 1999: 'Glass in building - Security glazing - Testing and classification of resistance against manual attack'

1. Hard body drop test
2. Axe test

EN 356: 1999 Classifications

1. Hard body drop test
- 4.11 kg steel sphere (100mm diameter)

- P1A 3 times from 1.5m
P2A 3 times from 3m
P3A 3 times from 6m
P4A 3 times from 9m
P5A 9 times from 9m



2. Axe test
- Impact from hammer followed by axe
Minimum no. of strikes to create opening

- P6B 30 - 50 strikes
P7B 51 - 70 strikes
P8B over 70 strikes

