

Impact performance of building envelopes: guidance on specification

Facades may be subject to impact during normal use. They must be able to resist such impacts without causing safety hazards. Damage affecting serviceability should also be minimized but may be accepted where components are readily replaceable. This Technical Note provides guidance on specification of impact performance of walls for a range of conditions appropriate for the UK. Technical Note TN 76 describes a method of test for cladding panels.

Introduction

Materials such as masonry and concrete are robust and can generally be expected to resist normal impacts however many materials used in modern building envelopes are more susceptible to damage and require testing to assess their performance.

The CWCT Standard for systemized building envelopes states that 'the envelope shall withstand specified impact loads' but gives limited guidance on the severity of impact loads to be specified. BS 8200 which has formed the basis for specification of impact performance for many years has now been withdrawn.

This Technical Note reviews the need for impact testing of building envelopes under typical UK conditions and provides guidance on specification of impact performance. The impacts considered are generally horizontal and the guidance is considered applicable to surfaces within 15° of vertical. At greater slopes, performance requirements may be modified based on the perceived risk of impact. Additional considerations may apply in particular locations. Examples include resistance to wind blown debris in areas affected by hurricanes, resistance to sustained attack and vehicle impacts.

Technical Notes TN 66 and TN 67 give guidance on impact requirements for glass roofs resulting from maintenance activities at roof level but more severe impacts from objects dropped from greater heights are not included. Impacts considered in Technical Notes 66 and 67 are vertical arising from falling people and objects.

Types of impact

Hard and soft body impacts

The building envelope may be subject to impact from a variety of causes. Surfaces are required to be resistant to impact from soft bodies, principally people, which deform on impact to distribute the load, and from more rigid objects referred to as hard bodies. Hard body impacts are generally considered to have lower impact energy than soft body impacts but hard body impacts from access equipment, skateboards etc could be at higher levels of impact energy. Hard body impacts tend to cause failure by localised punching whereas soft body impacts tend to cause failure by generalised bending. For this reason hard impacts can be damaging even at low impact energy.

Serviceability impact

It has been UK practice to require serviceability under impact. Following a serviceability impact test, there should be no loss of performance. Damage of an aesthetic nature such as indentations on metal panels may be acceptable depending on the severity of the damage, the nature of the material and location of use.

Failure of components under serviceability impacts may be acceptable where the components are readily replaceable. Where materials may require replacement following impact, the acceptability depends both on the ease of replacement and the ease of obtaining replacement materials several years after construction.

Where it is impractical to use materials that can withstand serviceability impacts without damage, the loss of performance can be mitigated. For example brittle materials may be reinforced with a mesh backing to prevent cracks opening up so that they remain in place.