



Testing of A-Safe Barrier products for compliance, and/or test until destruction of product for limitations.

Pedestrian Barrier

Flexible plastic barrier constructed from extruded profiles, designed for pedestrian segregation, used to direct or guide pedestrians in a required direction or to restrict pedestrian access.

Objective

Test barrier post for safe working loads and design limits. The output of this is to establish the safe working and maximum impact forces imposed upon the barrier under dynamic loading conditions. Test pedestrian barrier, simulating various sized vehicle impacts at 7 mph (11km/h), 90° to the barrier.

Test Specimen

1 x PB post (110 x 110 x 1160mm) having a steel base plate.

Test Equipment

Pendulum impact tester (PIT), having a 200 - 486 kg pendulum, set to 45° for 7mph (11 km/h).
 Measuring instrumentation for deflection and impact force.

Calculations

The impact force which the barrier must withstand is a combination of different variables. The formula used is that to calculate the impact force is the same as that used in BS3699 part 1 Loadings for buildings, see appendix B.

$$F = \frac{0.5mv^2}{\delta_c + \delta_b}$$

In vehicular impacts deflection is assumed to be 100mm, as the vehicle itself will deform or deflect the impact force energy. The deflection of the PIT is 15mm as the pendulum is a rigid structure.

Example of vehicle impacts

Examples of calculated impact force, for various vehicles is given in table below.

Vehicle	Mass	Load	Speed	Deflection	Impact force
Pallet truck	80 kg	1000 kg	5 km/h	100 mm	8.5 kN
Electric pallet truck	800 kg	1000 kg	8 km/h	100 mm	45 kN
Electric Order Picker	1200 kg	1000 kg	12 km/h	100 mm	122 kN
Counter balanced truck	2600 kg	1000 kg	8 km/h	100 mm	89 kN

Results

The PIT test results demonstrate that the pedestrian barrier achieved a Safe working impact load of 65.1 kN force.

Upon impact within the achieved safe working load, the barrier post may deform, which may result in the post deflecting up to 300mm, then return to its near true position/state

The pedestrian barrier achieved a maximum impact load of 158.4 kN force.

Upon impacts above the safe working limit of up to the maximum load, the barrier post may deform, which may result in the post lifting up from the base plate and deflecting up to 300mm, the deformation is likely to be permanent and severe damage may occur to the post such as splitting of the post in the region where contact is made with top and bottom of steel base plate. The steel base plate may also buckle.

Conclusion

The pedestrian barrier is capable of withstanding a safe working load of 65.1kN impact force and a maximum impact load of 158.4 kN.

This demonstrates the potential usage of the barrier in environments where manually operated pallet trucks, electric powered pallet trucks are. It may also be used in areas where larger vehicles are present in a controlled environment, for pedestrian segregation.

The actual impacts is a combination of vehicle speed, mass and deflection, therefore it may withstand light impacts from larger vehicles.

The test was carried out with impacts at 90° to the test specimen, this is the most severe type of impact.

Angular impacts do not impose such great impact forces, for example a 45° angular impact could reduce the impact force by up to 80%.