

A GUIDE TO IMPACT ENERGIES

D3O® technologies stiffen to absorb and dissipate energy during an impact, significantly reducing the amount of force transmitted to your body or smartphone compared to standard materials.

D3O's team of expert engineers typically test D3O® technologies at a range of energies, from 5 to 50 J, to meet and exceed industry standard requirements and deliver fit-for-purpose materials.



A Joule (J) is a unit of energy. It is the amount of work or energy exerted when a force of one Newton causes a displacement of one meter.

We test D3O® materials at these levels, in a controlled environment, to simulate a real impact. We test the impact energy transmitted to the object to measure how much of the impact energy the D3O® material is dissipating.



UNPROTECTED

As this phone has no protective case the phone receives the full 5.12 J of impact energy and shatters.

WHAT IS AN IMPACT ENERGY?

The impact energy is the total (elastic + plastic) work done when two things collide. Energy absorption is the energy lost by a body as it compresses.

Force (F) is the result of an interaction between two objects. A body will remain at rest unless acted on by an external force. If a striker is falling, the force is the total mass of the striker and acceleration is due to gravity.



Force (F) = Mass x Acceleration (ma)

In the example below, the mass of the phone (iPhone mass = 170 g) x by the speed it's travelling (7.67m/s over a 3 metre drop) = would result in an impact energy of 5.12 J.



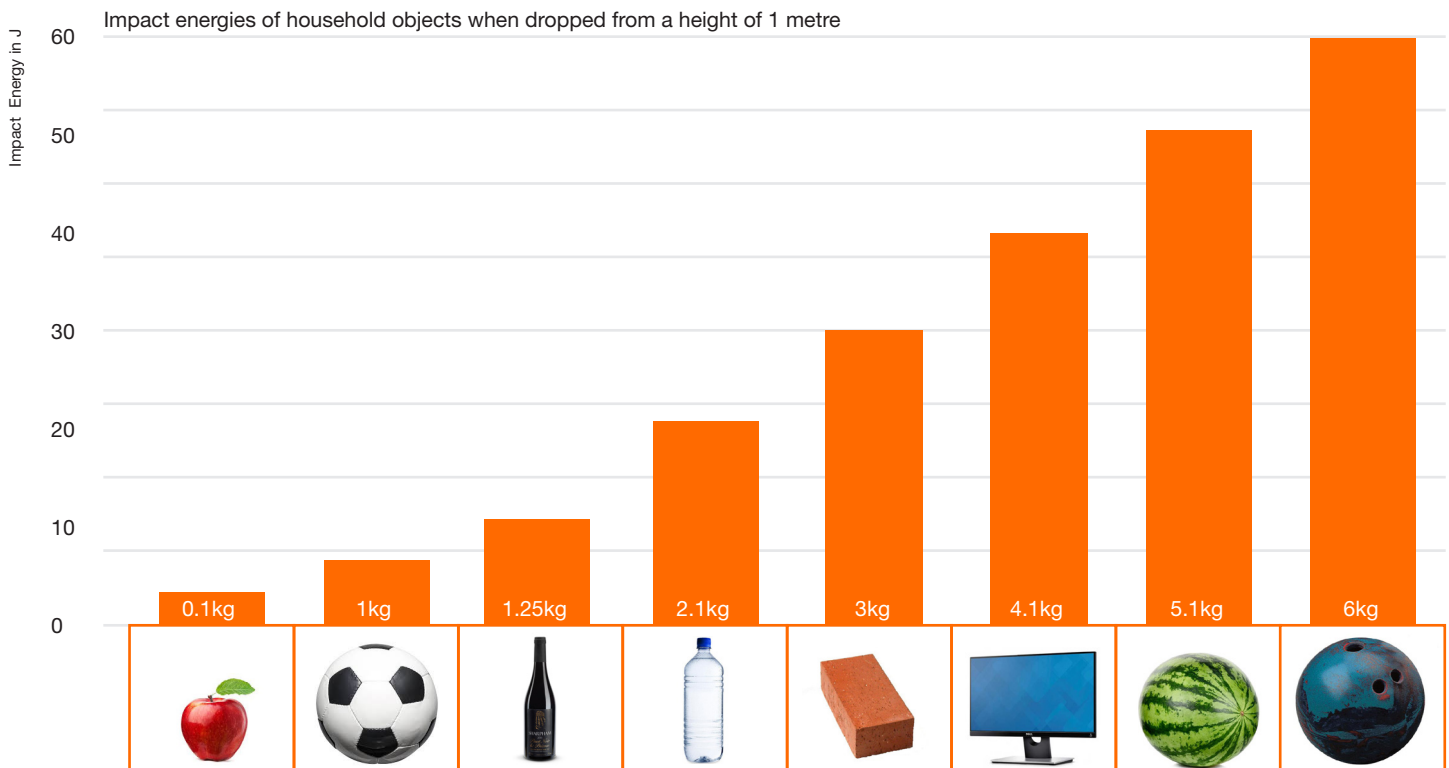
Force is often expressed in Kilonewtons. 1 kN = 1000 N.



PROTECTED BY D3O

In this example, your phone is in a protective case containing D3O®. D3O® stiffens on impact, dissipating the 5.12 J of impact energy and protecting the phone.





HOW DO WE TEST IMPACT ENERGY?

Our impact tests are designed to measure the resistance to failure of a material to a suddenly applied force. There are a host of different test methods for different certifications, different products and different impacts. For example, the way you test an ice hockey helmet is completely different to how you test a motorcycle back protector.

One frequently used test, for analysing back of hand glove protection, drops a weighted striker on to the sample, situated on top of the anvil. The Peak Transmitted Force (PTF) is recorded by a load cell beneath the anvil. A lower PTF indicates a product with better impact protection properties as less impact energy is being transferred to the anvil.

