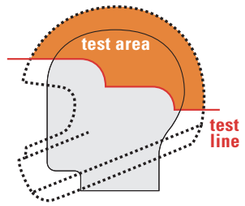
Helmet structure primarily for riders' protection

Arai maintains quality check according to self-established in-house standard for the products sold around the world in addition to mandatory national standards required by each different country. That is the so called as “Arai Standard”, and it is applied to the most Arai products to provide superior performance for motorcyclists.

Arai Standard

Impact management test

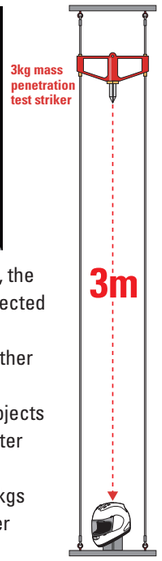
The Arai Standard does not specify fixed point, and requires any point above its test line needs to comply the requirements.



Test anvil may simulate impact objects in real accident scenario, and there are some different configurations. Flat anvil may simulate impact against flat road surface, kerbstone anvil may be simulate against level of curbstone, strike of guard rail and others. If anvil shape becomes more round, contact surface of the impact becomes less and that will give more stringent impact energy to the helmets.
The Arai Standard requires impact management test to be conducted with hemispherical anvil that has much less contact surface of the impact than flat or kerbstone anvils.

Arai Standard

Shell penetration test



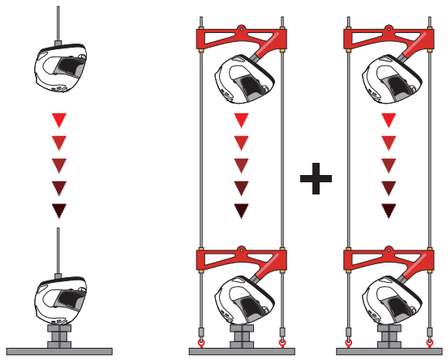
In the event of falling while riding motorcycles, the riders may hit against ground or slide in unexpected directions. The possibility that the helmets hit against guard rail, motorcycle foot pegs, any other object in the road shoulder is quite high, and performance evaluation against hard, sharp objects might be important for motorcycle helmets. Outer shell should have certain toughness, so Arai Standard defines shell penetration test with 3 kgs mass sharp tip metal striker falling from 3 meter height anywhere above its test line.

ECE R22-05 + SNELL 2010

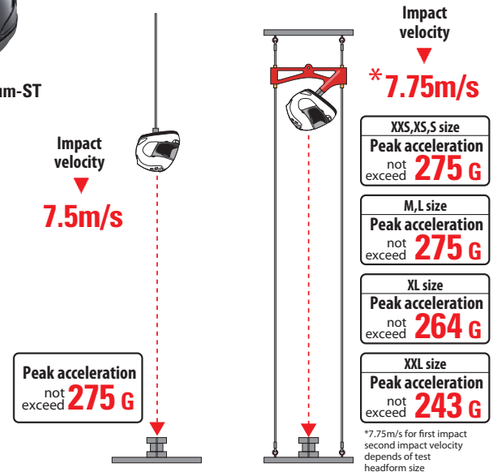
Satisfying both ECE R22-05 and Snell M2010 performance requirements

CERTIFIED BY SNELL MEMORIAL FOUNDATION

RX-7 RC　RX-7 GP　Quantum-ST



SNELL standard requires 2 time impact at the same spot while ECE R22-05 required a sigle impact.

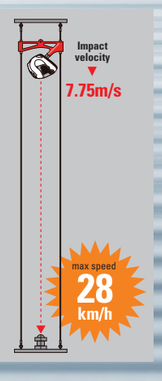


ECE R22-05 requires maximum peak acceleration should not exceeds 275G while SNELL standard requires lower maximum peak acceleration depending on size ranges.

For further information, please visit our website >>> **http://www.araihelmet-europe.com**

It is the shell that really works.

Impact absorption capacity is measured by dropping a helmet with a headform inside it on to a rigid anvil. The impact energy transmitted to the headform should stay below a specified level. When the helmet meets this requirement, consumers and the industry as well may assume that the helmet is therefore capable of protecting the wearer's head at real life impacts.



But there is a significant difference between test speeds and real life speeds. The velocity of a helmet at time of impact during tests is less than 28 km/h! This is true for even the most stringent standard in the world.

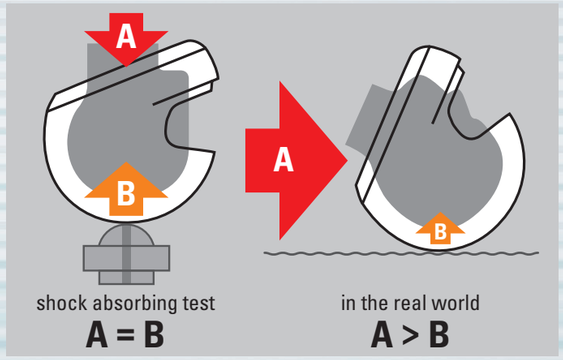
Kinetic energy goes up in proportion to square of velocity. Therefore the head of a rider at 100 km/h is carrying more than 10 times (!) the amount of energy than the head-form during a standard impact test. This kind of energy is far more than the impact absorption capacity of any helmet. Yet, in the real world there are helmets that have proven to protect riders' heads in actual accidents at even higher speeds. This fact alone tells that there is quite a difference in the nature of impacts under real world and test lab conditions.

$$\text{Kinetic energy} = \frac{1}{2} \times mass \times (Velocity)^2$$

shock absorbing test	at 100km/h speed
velocity at 28 km/h speed = 7.75	velocity at 100 km/h speed = 27.78
$\frac{1}{2} \times mass \times (7.75)^2$	$\frac{1}{2} \times mass \times (27.78)^2$
$\fallingdotseq 30.03 \times mass$	$\fallingdotseq 385.86 \times mass$

The difference **12.84** times

In the real world, it is seldom that an impact is aligned straight towards the center of the head, as is the case during impact tests. Instead, the impact can originate from any location, from any direction, at any speed, any angle and by any object.



Therefore only if the outer shell is constructed and functions properly, there may be the possibility that a decent portion of the impact energy is diverted by sliding over, or by dodging around, the object hitting it. This explains how some helmets do a good job even in accidents at racing speeds where huge energies are involved.

The following three topics are key in this respect:

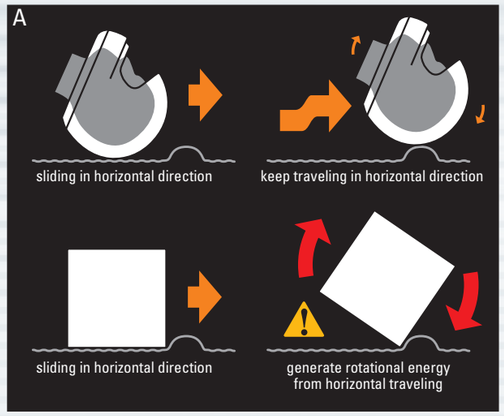
1 Shell Configuration

When a helmet is caught by an obstacle, this may cause harmful rotational and acceleration forces. When the helmet slides, energy is diverted. A

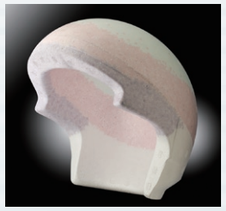
Round, smooth surfaces of outer shells offer the best chance to slide during or after impacts from any direction.

2 Shell Laminate

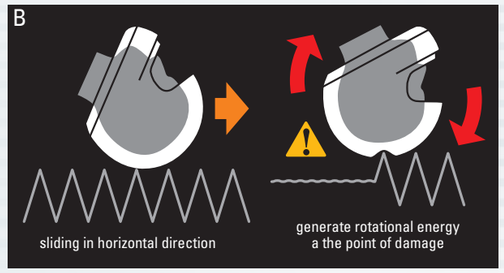
To divert the energy of an impact, a shell needs to serve as a "sled" to slide over or to dodge around obstacles hitting it. The strong laminate material of the outer shell needs to be able to sustain the impact load in order to perform this role. B



3 Shock Absorption



The true role of impact absorption in real world conditions is to work as a suspension at the time the energy is diverted. Good suspension eases the transmission of the impact to the rider's head.



There are ways to make a helmet shell that performs excellently under test lab conditions. C

Yet, when it comes to real world protection, what needed are solid basic properties that are less likely to fail you. And that is exactly what ARAI has been doing throughout its long history. The role of the outer shell in real world conditions is far more important than it is in a test lab.