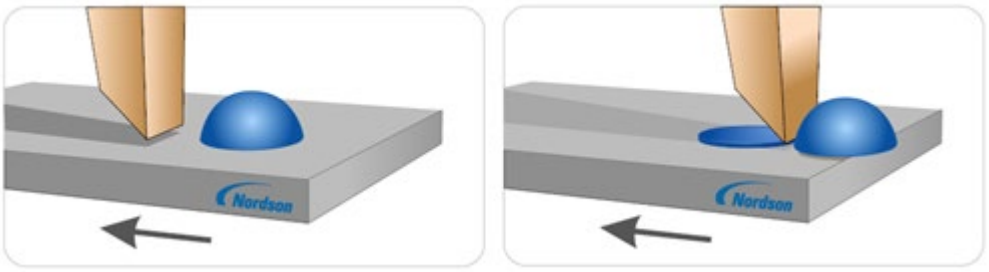
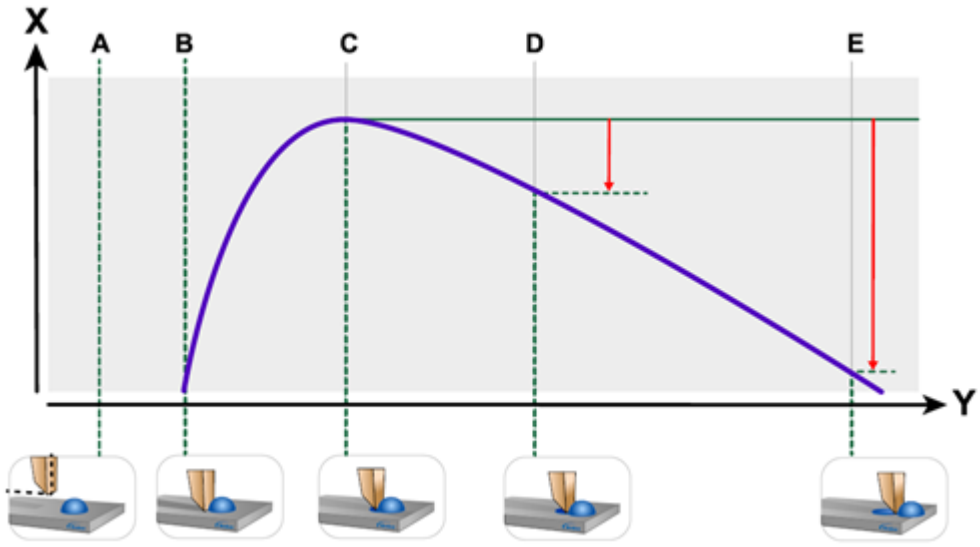
Ball shear

The ball shear test is one of the most common quality control tests undertaken Electronic interconnects such as solder balls and wire bonds can be sheared individually using a tool accurately positioned above the device's surface. Force and displacement are measured throughout the test.





The shear tool position during testing is critical for accurate and repeatable test results. Nordson DAGE cartridges find the device surface using an sensitive touchdown feature. High precision positioning provides shear height accuracies of +/- 0.25 microns. Touchdown is achieved using a patented load cartridge clamping system which ensures every bond is sheared at the same height relative to the surface that it is bonded on.

US Patent 6,078,387 (07-019), US Patents 8,424,390 and 8,607,641 and European Patent 2,363,701 (08-062)
The typical ball shear standards are:

- JEDEC JESD22-B116 - Au Ball Shear
- JEDEC JESD22-B117 – Solder Ball Shear
- ASTM F1269 - Ball Bond Shear

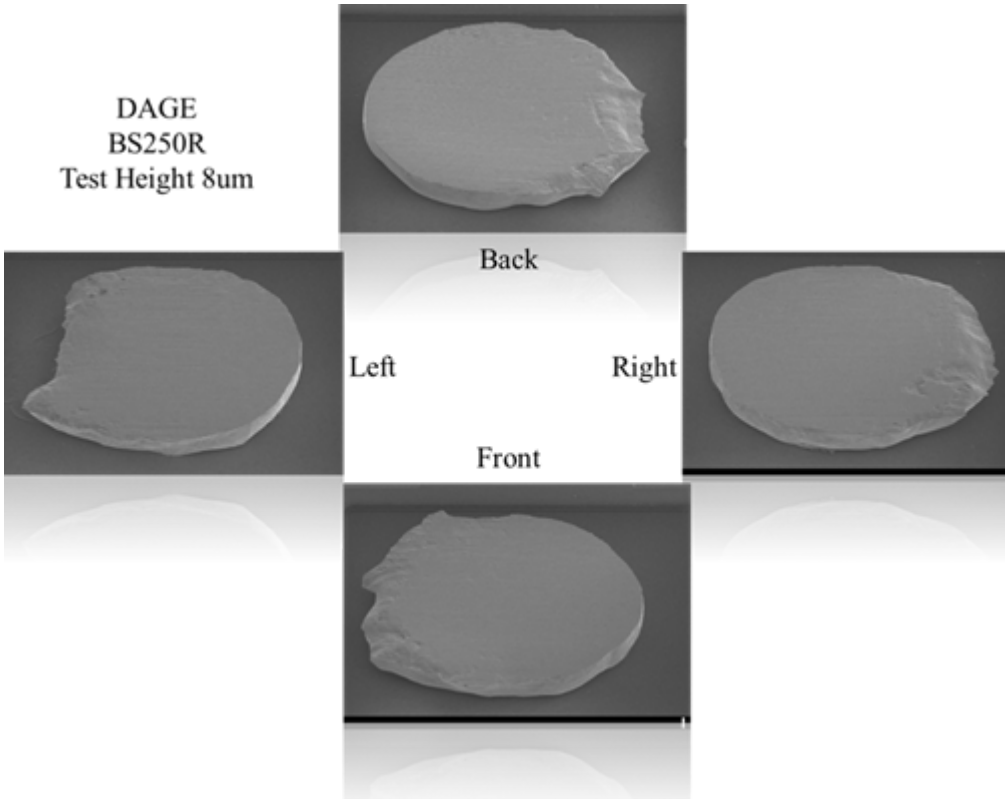
Accurate shear testing requires:

- Precise multi-axis control
- Repeatable shear height and test speed
- Low landing forces (soft landing)
- Firm clamping of the tool
- Zero hysteresis

Exceptional Repeatability

The accuracy of the Dage shear test has independently verified using an optical profilometer.

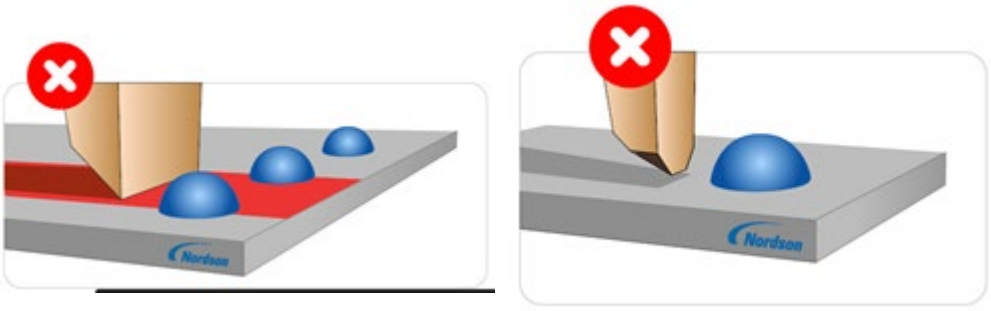
This shear height accuracy is also achieved on our rotational cartridges. Consistent height achieved regardless of direction of shear.



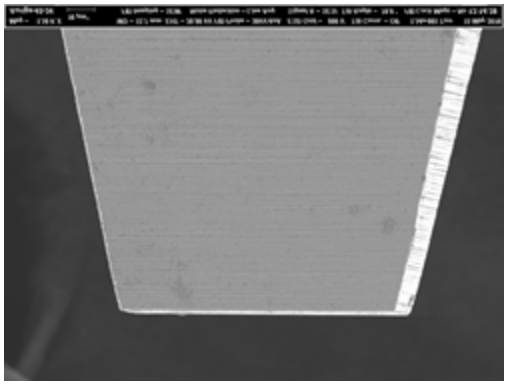
The Right Tools for the Job

Using the correct tool during testing is crucial for achieving consistency. If the tool is too wide you may hit neighbouring bumps, and if the tool is too thin it may cut a channel directly through the bump.

The size and shape of the tool is important:



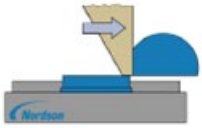
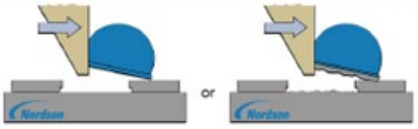
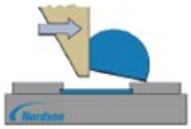
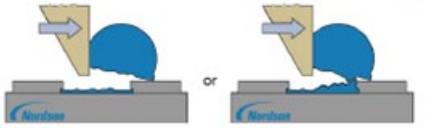
DAGE make a wide range of standard and custom tools to cover every application. Based on our years of experience we can advise which type of material to use for your test, and which size tool to employ. Dage only use the highest quality and purity materials to construct each tool.



Failure Mode Characterization

Characterizing the failure mode is just as important as measuring the failure force. For example, brittle failures could record high forces, similar to ductile failures. Therefore, recording the failure mode is key to understanding the quality of the joint.

Solder Ball Shear Testing

Failure Mode	Decoription	Illustration
Ductile	Solder ball fracture at or above the surface of the solder mask within the bulk solder material.	
Pad Lift	Solder pad lifts with solder ball; lifted pad may include ruptured base material.	 Pad separation at base material or Lifted pad inoludes ruptured base material
Ball Lift	Solder ball lifts from pad; pad is not completely covered by solder/intermetallic and the top surface of the pad plating is exposed.	
Interfacial Break	The break is at the solder/intermetallic interface or intermetallic/base metal interface. The interfacial fracture may extend across the entire pad or be the dominant failure mode at the tool contact region.	 100% interfacial fracture or Dominant failure mode at tool contact is interfacial fracture

Paragon software has a unique interface to allow fast and custom operator grading. Unique images (either graphics or real photos) can be uploaded to the software and the grade can be selected via touch screen or key pads.