

Cold bump pull

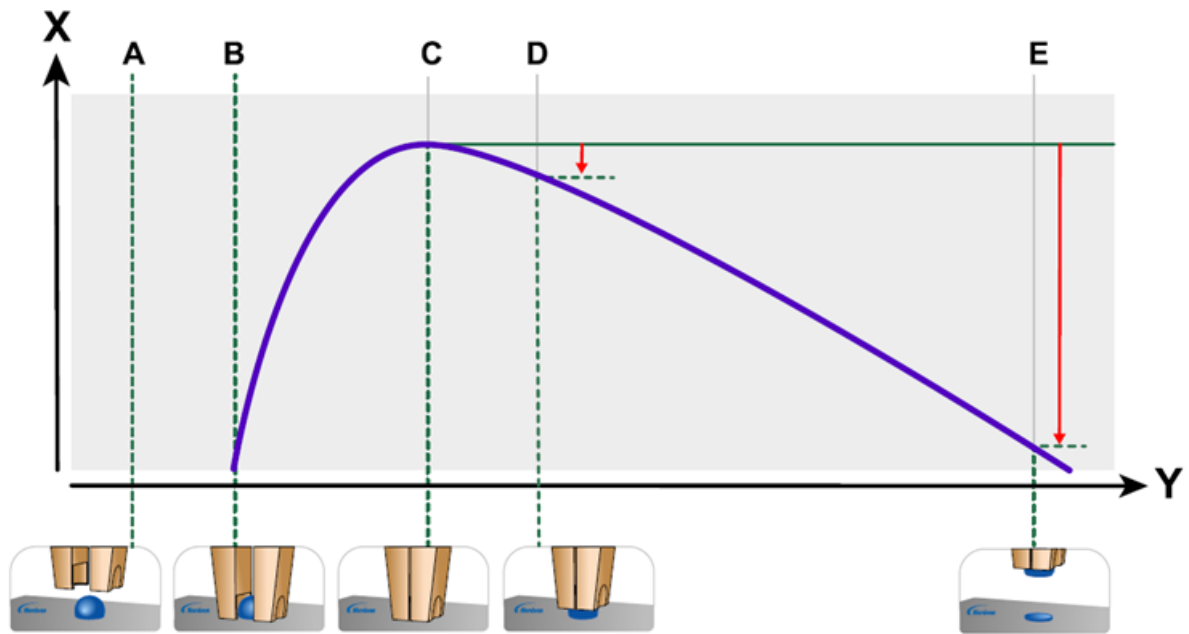
Nordson DAGE bondtesters provide cold bump pull tests to vertically remove the solder ball from a device or substrate by using patented tweezer jaws.

Tests are performed in accordance with:

- JEDEC JESD22-B115
- JEITA EIAJ ET-7407
- IPC-9708

The cold bump pull jaws have a cavity etched into it to match as closely as possible to the diameter of the solder ball being tested. The jaws grip the solder ball without damaging the bonding area and applies a load that is virtually symmetrical to the area of attach, therefore applies a more uniform stress field to the ball.

The cold bump pull test method is required as traditional shear testing tends to deform the solder ball during the test such that the area of attach can become damaged during the process. Also border line failures can under some circumstances gain support from the side wall of a cavity and traditional shear testing may miss this.

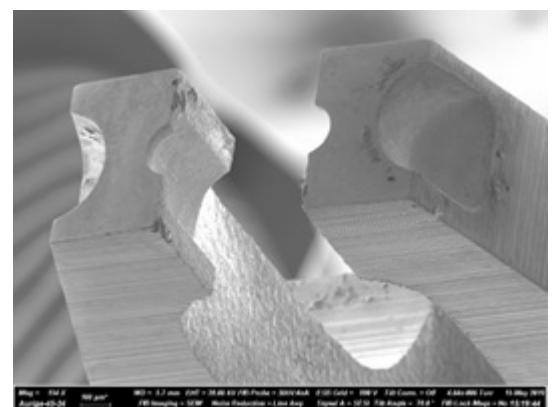


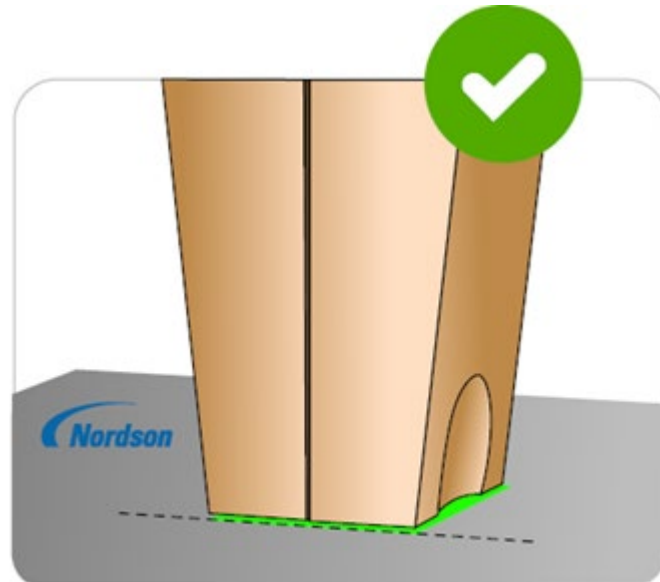
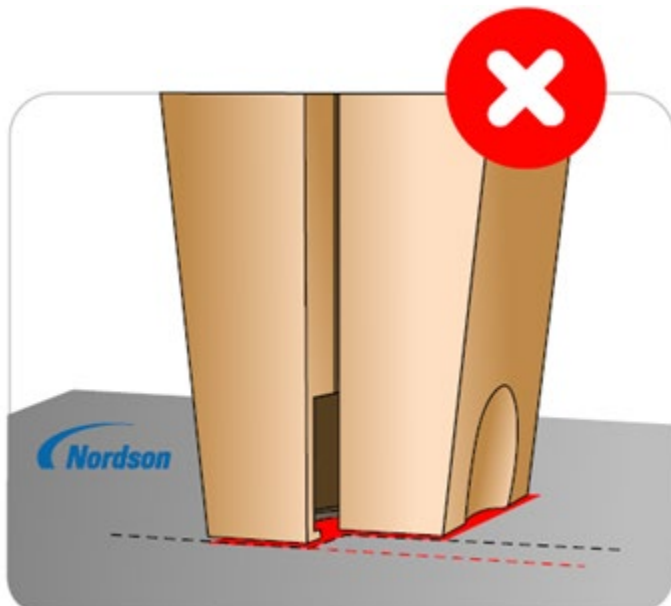
The right tools for the job

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.

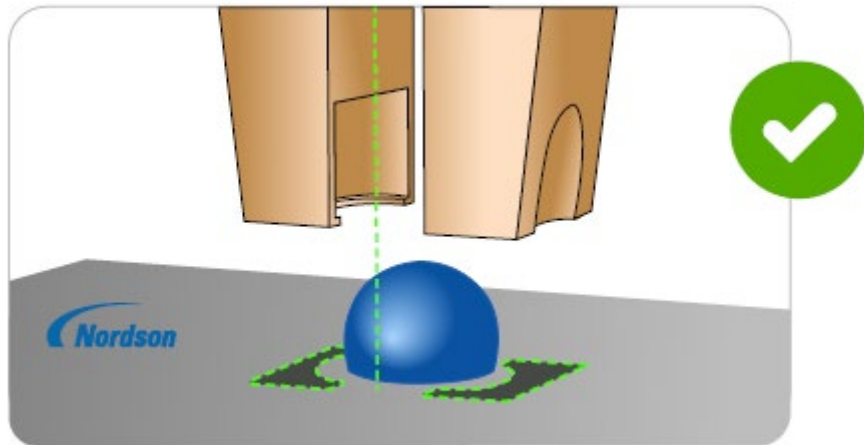
The size and shape of the tool is important.

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.









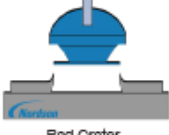
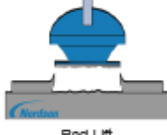
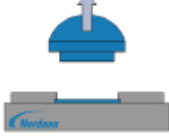




Automated CBP



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 Pull Testing

Failure Mode	Description	Illustration
Type A: Ductile	A – Ductile: Solder ball fracture at or above the surface of the solder mask within the bulk solder material.	 Ductile (pad fracture surface view) 
Type B: Quasi-Ductile	B – Quasi-Ductile: Mixed ductile/brittle fracture with the dominant failure mode (>60% area) being ductile.	 Quasi-Ductile (pad fracture surface view) 
Type A: Pad Lift Or Type B: Pad Crater	A – Pad Lift: Solder pad lifts with solder ball. B – Pad Crater: Lifted pad includes ruptured base material.	 Pad Crater  Pad Lift
Non-wet	Solder ball lifts from pad and any portion of the pad top-surface plating is exposed.	
Type A: Brittle	A – Brittle: The break is at the solder/intermetallic interface or intermetallic/base metal interface.	 Brittle (pad fracture surface view) 
Type B: Quasi-Brittle	B – Quasi-Brittle: Mixed brittle/ductile fracture with the dominant failure mode (>60% area) being brittle.	 Quasi-Brittle (pad fracture surface view) 
Ball Extrusion	Solder ball is stretched but not fractured. Invalid failure – repeat test with replacement solder ball samples after appropriate adjustments.	