

<b>SPECS. TOTAL BALL SHEAR</b>	<b>XYZTEC CONDOR 100-3-20Y</b>
<b>SPECS. SHOCK TEST</b>	<b>XYZTEC CONDOR 100-3-20Y</b>
<b>Rev. A – 2006-03-01</b>	

## 1. GENERAL

Ball Shear system able to perform BGA balls single ball shear and BGA packages total Ball shear  
From 0.5 to 20mm/sec shearing speed for BGA balls soldering control.  
Force and displacement to be monitored during shear test in order to plot the shear curve and calculate shear data.  
Load capability: 400 N minimum.  
System able to perform wire pull/ and wedge shear with proper tool adaptation.

## 2. DEFINITIONS

Machine Utilization Terms – Machine States

These terms and formulas are intended to be identical to, or compatible with SEMI standard E10 Standard for Definition and Measurement of Equipment Reliability, Availability, and Maintainability (RAM), 2001 release.

## 3. OPERATIONS

- a) Substrate or package manually placed on fitting plate/ support by the operator
- b) Vacuum / window clamp holding
- c) Loading of shear program
- d) Adjustment by operator of tool in place for shearing
- e) Program launch for automatic shear: with specified and programmable shear speed and shear height.
- f) Shear operation
- g) Shear tool move-up (0.15 mm min) then back to initial position.

## 4. SAMPLES TO BE PROCESSED

### 4.1 Matrix BGA molded boards

Substrate holder to have a specific cavity to cope with molded body and maintain them both with vacuum and with a window clamp.  
The supplier has to propose a work holder based on drawing in annex.

### 4.2 Singulated devices

System to be able to perform total Ball shear on singulated BGA devices  
Specific tool for Total Ball shear of singulated devices with balls down, keeping the tool /substrate distance at 20µm.

## 5. QUALITY OF HANDLING

Ball Shear test is destructive but when performed on molded and ball attached substrates it must be done without damaging more than the tested devices, especially with no damage on the substrates rails .  
Thus allowing the completion of the assembly process steps without loss of devices.

## 6. SHEAR TOOL DESIGN

The Shear tool shape is vertical but modified tool must be adaptable.  
The shear tool and holder has to be stiff enough to ensure no noticeable deformation during shear operation.  
The supplier has to recommend minimum shear tool section to be used and to provide such tool.

Shear tool: 6mm and 10mm width for total ball shear.  
Shear tool: 0.4mm for single ball shear

Shear tool for single package and balls down.

## 7. EQUIPMENT CAPABILITY:

Shear speed accuracy and repeatability: +/- 5% from 0.3 to 20 mm/ sec  
The shear speed variation when the tool is shearing balls: 5% maximum  
The distance necessary for the tool to reach the set speed (ramp up distance): 300 micron maximum  
The distance for the tool to slow down & stop (ramp down distance): 300 micron maximum.  
Shear height positioning accuracy: +/- 5% from 5 to 3000 µm  
Force and displacement data measurements: 500 Hz.  
Shear displacement: adjustable from 1 to 50,000 micron.  
Table displacement length: 100mm in X & Y directions

Shock test: in order to perform shock test ( with impact on ball but not a complete shear)

At a speed 20mm/sec the machine has to be programmable in order to stop tool inside the ball position

## 8. DIE SHEAR CAPABILITY

1000 N maximum load capability

## 9. TOOLING CHANGE

The system tool change over to set up single ball shear or total ball shear or die shear has to be feasible in less than 10 minutes.

The shear tool for single ball shear has to be able to move between 2 balls;

## 10. MICROSCOPE FOR TOOL PLACEMENT

Binocular microscope allowing accurate alignment of tool in back side of a ball or row of balls or die.

Magnification X20 times minimum

## 11. MACHINE REQUIREMENTS

### 11.1 Software

- The machine must be able to be programmed
- Test programs recording (name of 60 digits)
- Section for operators (no password) for using programs
- Section for engineering and maintenance under password protection
- Data record of test values : Maximum force and force and displacement curve on a specific file with
- Indication of date and operator performing test, devices and packages names and reference of program used (9x name of 80 digits each).
- Capability to display and save shear curves
- Data file able to be read using excel software.
- Relevant datas collection .
- Data collection and statistics to be stored into equipment.
- Software and program controlled by PC
- The equipment to be delivered with fully licensed software required for the application
- Original software to be provided on CD to allow complete re-installation of the programs required to run the equipment
- Shear speed to be displayed on table results as a control.
- Shear data : shear force in kgf or in Newton
- Shear curve, displacement before maximum shear force
- Machine data and measurements file data can be downloaded on floppy disk or CD/RW or USB key.