SECTION 1. Getting Started

1.1 Instrument description

MUST System 3 (also referred to as MUST 3) is a purpose-designed solderability test system.

MUST = Multicore Universal Solderability Tester. The system was originally designed as part of a BRITE research award partly funded by the then European Economic Community (EEC) now EU. This early development work was shared between Multicore Solders, the National Physical Laboratory (UK), Siemens and Philips.

MUST was acquired by Gen3 Systems Limited from Henkel (Multicore Solders) in 2002.

The MUST System Grandfathered all solderability testing with over 30 years experience (1975) and more than 2500 users around the world.

The system is based on the Wetting Balance principal, but has been designed to use the Microwetting Balance method for surface mounted components. This method also permits more accurate testing of circuit board samples by eliminating the ‘floating’ problem encountered in the bath method. With this method much greater resolution can be obtained by using a solder globule in place of the conventional solder bath.

The measuring head uses a standard LVDT (Linear Variable Differential Transformer) to measure the vertical forces of surface tension and buoyancy acting on the component termination. Contact between the solder and the termination is detected at slow dipping speeds by monitoring the force signal at a high frequency. This allows electrically insulated terminations to be dipped into the solder globule or bath. At high dipping speeds, using the solder bath, electrical contact through the termination to the specimen clip is used to detect contact with the solder.

The wetting force is sampled at 1KHz on tests between 0 and 5 seconds (s) duration. On tests over 5 s, the sampling rate is reduced to 0.4KHz after 5 s.

The globule blocks are mounted on a motorised, computer controlled X-Y table. This system is used to set the start position of the test, which is recorded to a disk file with the test conditions and can be recalled and loaded into the software before a batch of components is tested.

The motorised table is also used to automatically advance along the side of a multi-leaded component. This enables individual leads on a multi-leaded device to be easily tested.

The software supplied with the system leads the operator through the test procedure and pass/fail data can be easily obtained at the end of a test or at the end of a series of tests.
1.2 Main Features

- Wetting Balance, and Micro-Wetting Globule Testing
  - Electronically operated using vastly superior LVDT technology and latest Windows® XP and “Vista ready” software all providing
    - Superior Gauge R&R
  - Greater accuracy through a vastly improved sampling rate measuring to levels better than 0.1mN/BIT
    - Accuracy resolution >0.01mN force
    - Component 0201 result is ~0.2 mN force
  - Unique Auto-Tare before testing – this increases test accuracy and efficiency permitting more tests per hour. (Most other systems are mechanical balances and need the use of weights to re-balance between individual tests)
  - Software control of the motorized XYZ axis
  - Safer to use
    - Using unique automatic safety cover to prevent operator exposure to molten solder when changing components or clips
  - Multi-lead testing - Unique Step-and-Repeat function
  - Unique Force and Electrical Contact detection
  - Auto-range selection
  - Complex parameter setting
  - Fully SPC compliant – all tests fully recorded
  - The most comprehensive scope of supply:
    - Bath and 4 Globules: 4mm; 3.2mm; 2mm and 1mm
    - Solder pellets (Lead and Lead-Free) 200mg (4mm); 100mg (3.2mm); 25mg (2mm) and 5mg (1mm)
    - All Accessories to conduct solderability testing in full compliance with all standards
    - A set of clips to suit the majority of components (Customised clips also available)
  - Software controlled replacement of bath or globule
  - Smoother, Faster and Quieter in operation

Testing to all international standards including:

- JEDEC JEDS22-B102D
- IEC 60068-2-20 Revising 2007 (Dip & Look - Solder Bath)
- IEC 60068-2-54 Revised 2006 (Force Measurement - Leaded devices)
- IEC 60068-2-57 Revising 2007 (Dip & Look - Wetting Balance)
- IEC 60068-2-69 (Force Measurement - Surface Mount Devices)
- IPC-J-STD-002 – Components
- IPC-J-STD-003 – Boards
- MIL-STD-883 Method 2022
- EIA/JET-7401
- New Japanese Solder Paste Test
CAUTIONS:

- MAXIMUM component weight is 40g including clip. If more than this is used the calibration of the LVDT can be affected and result in poor system performance and inaccurate results
- ALWAYS keep the globule pins covered with a solder pellet to prevent oxidation of the iron pin
- DO NOT remove specimen clips from the instrument by pulling them straight down. The specimen clips should be removed by rotating them backwards to release the magnetic lock
- Locate the system on a solid worktop free from vibration and draughts
- Fume extraction should NOT be used on the machine as this will affect the system operation
- A Windows® compatible PC is required (not part of our scope of supply)
- Windows® XP or Vista operating software is required

1.3 Unpacking

Before unpacking the instrument check the outer case for damage and report any damage to the carrier.

To produce a stable instrument the construction is very solid, this produces an instrument that is relatively heavy (70Kg packed weight).

Remove the top of the crate by un-doing the 8 screws around the sides of the crate.

The flux and solder receptacle packs can now be removed in their packing. The accessory pack, specimen clips, and CD manual can now be removed and the two foam-inserts either side of the machine removed. The instrument can now be lifted off the foam base onto a firm stable bench. Lifting the instrument is a two person operation and the instrument should be lifted from underneath at both ends. Retain the crate & the packing for future use, ie when returning the unit for calibration etc.

Check the pack contents against the packing list and report any deficiencies to Gen3 Systems or your local representative immediately.

Note: Flux is NOT included when the MUST 3 is shipped by air as it is classed as dangerous goods.
1.4 Installation

1.4.1 Electrical Supply

The MUST System 3 can be connected to either 220V/240V or 110V single phase power supply.

IF THE VOLTAGE MARKED ON ANY COMPONENT DOES NOT CORRESPOND TO YOUR POWER SUPPLY DO NOT CONNECT THE INSTRUMENT TO THE MAINS.

1.4.2 Levelling

For the most accurate results the instrument should be levelled by adjusting the four large feet at the corners of the instrument until the spirit level, mounted in the head, is centred. Ensure that all four feet are in contact with the bench and that the instrument does not rock when any corner of the instrument is depressed.

Failure to correctly level and stabilize the instrument will result in inaccurate results and operational difficulties.

1.4.3 Operating Environment

MUST SYSTEM 3 is, of necessity, a very sensitive piece of equipment and must be treated like a sensitive balance. In some respects it is more sensitive than a balance, as it is measuring very small dynamic forces.

Whilst damping has been built into the system, to prevent the effects of external vibration, it is essential that the instrument be mounted on a solid, vibration-free bench in a vibration-and draft-free environment. Airflow across the instrument will disturb both the delicate force measurement sensor and the solder temperature control. The addition of further equipment must not affect the instrument balance performance and the level of measured noise, e.g. fume extraction equipment.

The operating temperature range of the instrument is 5 to 35 °C and although the operation will not be affected by high humidity, prolonged exposure to high humidity may cause some of the fixings to tarnish.

1.4.4 Hardware Installation

Once the instrument has been installed and levelled on a firm bench the computer can be connected. It is recommended that the computer, and more importantly the printer, be located on a separate work bench or surface. NEVER STAND THE MONITOR ON TOP OF THE INSTRUMENT. Connect the computer to the instrument using the USB Cable supplied.

Check the instrument voltage marked near the power inlet is the correct voltage for your power supply and connect the power supply to the connector at the rear left-hand side of the instrument below the ON/OFF switch.
1.5 Technical Assistant

1.5.1 Contact

If you encounter a problem, review all the system and software installation procedures and the troubleshooting information. If the problem persists, you can obtain technical support from your local representative or from Gen3 Systems direct (techsupport@gen3systems.com). Ensure that you have a full description of the problem, test conditions and operation sequence available before you call for assistance. ALWAYS give the machine Serial Number that can be found on the rear of the machine.

1.5.2 Limitation of Liability

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1.5.3 Copyright

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SECTION 2. Getting Started

*** IMPORTANT – READ ALL OF SECTION 2 BEFORE STARTING ***

2.1 Computer requirement

The Software requires a Windows® Vista/XP compatible PC, Pentium 4 or higher with minimum of 512 Mb RAM. The MUST System 3 connects directly to the PC USB port using the USB cable supplied.

It is assumed that you are familiar with the use of Window XP operating systems and thus understand how to use a mouse and select menu options, etc.

2.2 Software Installation

DO NOT switch on the MUST 3 or plug the USB cable into PC at this stage

Insert the MUST 3 software installation CD into the CD-ROM of the PC. The software should run automatically, if it does not, open the installation software in the CD-ROM driver and run the ‘Gen3_MustIII+2OB’ file manually.

Once the installation commences follow the on-screen instructions

If the following window is prompted, click “Cancel” and the software will continue to finish the installation.
Click “OK” to restart the computer when prompted.

After the PC has re-started the MUST 3 & ELF icons will be displayed on the desktop.

2.3 FTDI Driver Installation

Switch on the MUST 3 and connect the USB cable, the PC will detect new hardware and open the dialogue box ‘new hardware found’ click on this box and the following window will be displayed.

Choose “No, not this time” and then click “Next”.
The following window will open, tick “Install from a list or specific location (Advanced)”

Check “Include this location in the search” and click “Browse”, you will see a Browse for Folder, the folder you are looking for is:

C:\Program Files\Gen3 Must3\FTDI
The following window will appear, click “Continue Anyway” to continue to finish the installation.

This completes the MUST 3 software installation.

2.4 Initial Connection

With the computer switched ON connect the MUST 3 to the computer with the USB cable, switch on the MUST 3.

The display panel on the MUST 3 should read:

Gen 3 Systems Ltd
MUST III

Double click the ELF icon and the following process window pop up.
Once the process window has finished and closed, the front panel display on the MUST 3 will display software version and machine serial number:

MUST III V4.10
Serial Number xxxx

This proves initial communication has been established between the PC and the MUST 3.

Note: you have to run the ‘ELF’ programme each time you start up the MUST 3.

Click the MUST SYSTEM 3 shortcut on the Desktop to start the program. The MUST 3 software will open.

2.5 Log On

Click the “Log On” button. The initial password for access at Supervisor level is: sp. Type this when prompted for a password.

You are advised to establish new users, passwords and appropriate access levels (Supervisor, Engineer or Technician) as soon as possible – see section 2.8.

If you wish to enable Lead Free go to 2.6 if not go to 2.7.

2.6 Enable Lead-Free

Before clicking connect, check that “New Lead Free Block Configuration” and “Lead Free” options are selected.

Click Database – ensure that ‘New Lead Free Block Configuration’ has a bullet point to show it has been enabled, if not select it.

Click Tools – Choose ‘Lead Free Enable’ (if you look in Tools again you will see that a Bullet Point has been put in front of the Lead Free Enable).
2.7 Connection & Key Code Entry

Click - Connect, the MUST 3 will start initialization and you will be asked for The Key Code - enter this code. If you have enabled Lead Free you will be asked for the Lead Free Key Code, again enter this code and you will then have access to the MUST 3. The Key Codes are located on the front of the Software Installation CD.

Note: you only have to enter these codes once.

Once the key codes have been entered the initialisation will continue:

- Finding Communication port
- Initialize Stepper driver
- initialize MUST
- Homing XY axis
- Closing Cover
2.8 Setting up new users, password and access levels

The MUST System 3 has 3 levels of system access:

1. Supervisor  
   Full technical and administrative access

2. Engineer  
   Full technical access but no administrative access, i.e. cannot change user names and passwords.

3. Technician  
   Limited technical access, no administrative access – can perform tests and produce reports but cannot edit any test parameters or run calibration sequences.

These can be assigned when setting up a new user and new user password as follows:

After logging on as a supervisor, select the Tools menu and from the drop down box select “Password”. A “Manage User and Password” prompt screen will then appear (below). Type in a new user name and password of choice and then click the “Add” button on the right.
To then specify an access level for this new user, select the desired access level using the arrows next to the Access Level box and then click “Save”. You can then exit the screen or continue to add more new users, passwords and their associated access levels.

<table>
<thead>
<tr>
<th>Description</th>
<th>Supervisor</th>
<th>Engineer</th>
<th>Technician</th>
<th>No Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect with MUST System 3</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>Change Password Access</td>
<td>√</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Change languages</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>View System Constants</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Create/Edit Parameters</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Create/Edit Pass/Fail</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Create/Edit Components</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Machine Calibration</td>
<td>√</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Set Temperature</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>View Help Files</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Analyse Test Results</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>Perform Wetting Tests</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>Debug Access</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
</tbody>
</table>
SECTION 3. System Operation

3.1 Quick Start Notes

It is highly recommended that the operating personnel familiarise themselves with the pertinent solderability testing standard. A list of the applicable standards can be found on Page 3.

For convenience Gen3 has created a “Solderability Software Wizard” to assist new users in setting-up a test. Of course the “Wizard” may be used as convenient to the operator. Please appreciate that Windows’ software is open architecture, so all testing parameters may be open together and this may cause confusion to untrained personnel. To make full use of the system it is recommended that the manual be read carefully.

As a general guide only use the globule blocks with small immersion depths and slow dipping speeds. The system has been optimised at 1 mm/s with a depth of 0.10 to 0.25 mm.

High dipping speeds and immersion depths can be used with the solder bath, but ensure that you have electrical contact from the bottom of the termination to the specimen clip. The system has been optimised at 20 mm/s with an immersion depth of 2 to 5 mm.

When using the globule blocks set the preheat distance between 2 and 3 mm and set the distance between 10 and 15 mm with the solder bath. Remember that the system has a very sensitive force measurement head and so is highly susceptible to external vibration and draughts.

The Solderability Manual gives a full description of the Wetting Balance theory and the application of the Microwetting Balance method. An understanding of the theory of the method will enable you to gain the most from this system.

3.2 Main Menu

Once logged on and connected to the machine you are presented with the main menu (see below). Here you can begin to create and manage component parameters, create and manage test parameters, perform wetting test and export test result as data file etc EXCEL file.
3.3 Tool Menu

The main menu is easy to navigate with icons representing in the toolbar which is shown above. The “Tools” menu is where you can find some useful aids:

- **Set Temperature** - sets the temperature and turns the heater to the receptacle on.
- **Sliding Cover** - Opens and closes the sliding cover door.
- **Change Receptacle** - Changes the receptacle after test, will only allow the receptacle to be ejected after temperature has cooled to below 70°C.
- **Calibrate** - Calibrates the machines temperatures and forces.
- **Password** - Sets access levels, usernames and passwords.
- **System Constants** - View system constants, TKVALS.
- **Language** - Set's the software language.
- **Alignment** - Sets the alignment of the receptacle to the component.
- **Lead Free** - Check this to set the machine to run lead free receptacles and lead free test parameters. Firmware update required.

3.4 Test Parameters

Note: To create and manage test parameters (all sections of 3.4), you do not have to connect the MUST 3 instrument, you only need to be logged on with the appropriate Access Level.
3.4.1 Creating New Test Parameters

From the main menu click the Manage Test Parameters icon to open the Test Parameters sheet. Then select “New” from the File drop-down menu.

Click the Add New Test Parameter icon in the test parameter sheet window. Click “Yes” to save changes.

You will be shown the Test Parameter Database with some default test parameters. Give your test parameter and new name and click “Save”.

The window will change asking you to load the Test Parameter. Locate and highlight your saved parameter and click “Open”.

In the new window, fill in the field you require and click “Apply”.

Now you have successfully created a new Test Parameter and the Parameter will be shown in the Test parameter sheet.

You can edit the new test parameter sheet or continue to add more.

Click “Exit” icon when done and then click ‘yes’ to save & exit.

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter name or Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Time</td>
<td>The time in seconds the component is immersed in the solder during test.</td>
</tr>
<tr>
<td>Pre-Heat</td>
<td>The time in seconds the component will be heated before the test starts.</td>
</tr>
<tr>
<td>Immersion Speed</td>
<td>The speed which the component lead will be immersed into the solder.</td>
</tr>
<tr>
<td>Removal Speed</td>
<td>The speed which the component will be removed from the solder.</td>
</tr>
<tr>
<td>Temperature</td>
<td>The required temperature of the solder during test in °F or °C.</td>
</tr>
</tbody>
</table>
3.4.2 Managing Test Parameters

From the main menu, click the Manage Test Parameter icon to open the test parameter sheet.
From the test parameter sheet, click “open” icon

The load test parameter selection window will now be displayed. Highlight the saved parameter you would like to edit and click “open”. The parameter stored in the parameter file will be displayed in the parameter sheet.

In this window, highlight the parameter and select the “Edit Test Parameter” icon. Modify the field and when done click “Apply”. You will be directed back to the test parameter sheet.

When editing parameters is complete, click “Exit”.

You will be asked to save, click “Yes” and you will be directed back to the Main Menu.

3.4.3 Creating New Pass/Fail templates

Click the icon, highlight any template (it doesn’t matter which one at this stage) and click “Open”.

You will be shown with a Pass/Fail template. Edit as required, then select “File” and from the drop down menu click “Save as”, click “yes” to save changes and give the template a new name. Click “Save”.

<table>
<thead>
<tr>
<th>Pass/Fail Limits</th>
<th>The values that checked will determine if the test is a Pass or a Fail. Otherwise the values will be ignored and will neither affect the result, nor displayed on the Pass/Fail sheet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to Zero (Tb)</td>
<td>The time in seconds for the wetting curve to re-cross the zero line.</td>
</tr>
<tr>
<td>Time to Buoyancy (Ta)</td>
<td>The time in seconds for the wetting curve to re-cross the buoyancy line.</td>
</tr>
<tr>
<td>Time to 2/3 Fmax (T2/3)</td>
<td>The time in seconds it takes for the force to reach 2/3 maximum force.</td>
</tr>
<tr>
<td>Force at Time 1 (F1)</td>
<td>Measured force at Time 1.</td>
</tr>
<tr>
<td>Force at Time 2 (F2)</td>
<td>Measured force at Time 2.</td>
</tr>
<tr>
<td>Wetting Angle at Time 1 (WA1)</td>
<td>Measured, wetting angle at Time 1.</td>
</tr>
<tr>
<td>Wetting Angle at Time 2 (WA2)</td>
<td>Measured, wetting angle at Time 2.</td>
</tr>
<tr>
<td>General Status</td>
<td>The values that are checked will be displayed on the Pass/Fail sheet once the test has finished.</td>
</tr>
<tr>
<td><strong>T2/3 - Tb</strong></td>
<td>The time at 2/3 minus the time taken to re-cross the zero line.</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Area Under Curve (AUC)</strong></td>
<td>The area under the curve.</td>
</tr>
<tr>
<td><strong>Dewetting</strong></td>
<td>Value of de-wetting taken place during test.</td>
</tr>
<tr>
<td><strong>Maximum Force (Fmax)</strong></td>
<td>Maximum force measured during test.</td>
</tr>
<tr>
<td><strong>Time at Fmax</strong></td>
<td>The time at which maximum force is achieved.</td>
</tr>
</tbody>
</table>

### 3.4.4 Creating New Components

From the main menu, click the Manage Components icon to open the component sheet. From the component sheet, select “New” from the file dropdown menu.

An instruction window will appear, prompting for a file name, click “Ok”.

The component library window will be shown. Assign a new name to the component file then click “Save”.

From the saved component sheet, click “Add new component” icon. Select the General tab and enter the component description and the results filename.
Click “Select” button under test parameter section, then highlight a test parameter and click “Open”. The test parameter sheet will be opened. Highlight the test parameter to be used and click the select test parameter icon. The number on the left will changed to <-- to signify the parameter has been selected. Click “Exit” to be taken back to the component setup box.

<table>
<thead>
<tr>
<th>General Tab</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component Description</td>
<td><strong>Component Description</strong></td>
</tr>
<tr>
<td>Results Filename</td>
<td>The name the results will be saved under</td>
</tr>
<tr>
<td>Test Parameters (Select)</td>
<td>Open the required Parameter file</td>
</tr>
<tr>
<td>Pass/Fail Template (Select)</td>
<td>Open the required Pass/Fail Template</td>
</tr>
</tbody>
</table>

Click “select” button under Pass/Fail template section to open a pass/fail template. Highlight the desired Pass/Fail template and click “Open”.

Modify the fields if necessary, and then click “Yes” on the prompted window. Click “dimension” tab and fill in the fields.

Note: different setting required when using Bath with round leads, Bath with rectangular lead and Globule test method.

Bath test with round leads

Bath test with rectangular leads
### Globule test

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Select the appropriate Clip for the component under test.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clip type</td>
<td>Select the appropriate Globule/Bath for the test.</td>
</tr>
<tr>
<td>Receptacle</td>
<td>Select the required depth for the component to be immersed.</td>
</tr>
<tr>
<td>Immersion Depth</td>
<td>Select 1 for single leaded components e.g. Chip Capacitors. Select more than 1 for multi leaded components such as QFP or SOIC devices. The MUST SYSTEM can perform step and repeat tests.</td>
</tr>
<tr>
<td>Number of leads</td>
<td>When more than 1 lead is selected you have the option to enter the pitch between leads. You can bend in between leads out of the way to give more room under test.</td>
</tr>
<tr>
<td>Lead Spacing</td>
<td>Measure the diameter of the lead and enter the value here.</td>
</tr>
<tr>
<td>Round Leads</td>
<td>Measure the Width of the component and enter the value here.</td>
</tr>
<tr>
<td>Diameter</td>
<td>Measure the Thickness of the component and enter the value here.</td>
</tr>
<tr>
<td>Perimeter</td>
<td>This will change with the Width and Thickness entered.</td>
</tr>
<tr>
<td>Rectangular Leads</td>
<td>This will change with the diameter entered.</td>
</tr>
</tbody>
</table>
Receptacles and their sizes

<table>
<thead>
<tr>
<th>Receptacle</th>
<th>Pellet size</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>1Kg Bar</td>
<td>N/A</td>
</tr>
<tr>
<td>G1</td>
<td>25mg</td>
<td>2mm</td>
</tr>
<tr>
<td>G2</td>
<td>200mg</td>
<td>4mm</td>
</tr>
<tr>
<td>G3</td>
<td>5mg</td>
<td>1mm</td>
</tr>
<tr>
<td>G4</td>
<td>100mg</td>
<td>3.2mm</td>
</tr>
<tr>
<td>B1LF</td>
<td>1Kg Bar Lead Free</td>
<td>N/A</td>
</tr>
<tr>
<td>G1LF</td>
<td>25mg Lead Free</td>
<td>2mm</td>
</tr>
<tr>
<td>G2LF</td>
<td>200mg Lead Free</td>
<td>4mm</td>
</tr>
<tr>
<td>G3LF</td>
<td>5mg Lead Free</td>
<td>1mm</td>
</tr>
<tr>
<td>G4LF</td>
<td>100mg Lead Free</td>
<td>3.2mm</td>
</tr>
</tbody>
</table>

Click “Pass/Fail” tab

Fill the different options which are depending on the type of receptacle previously selected.
<table>
<thead>
<tr>
<th>Pass/Fail</th>
<th>Time to Zero (Tb)</th>
<th>The time in sec for the wetting curve to re-cross the zero line.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time to Buoyancy (Ta) (Bath only)</td>
<td>The time in sec for the wetting curve to re-cross the buoyancy line.</td>
</tr>
<tr>
<td></td>
<td>Time 2/3 of Max Force</td>
<td>The time in sec for the force to reach 2/3 maximum force.</td>
</tr>
<tr>
<td></td>
<td>Time 2/3 - Tb</td>
<td>The Time at 2/3 minus the time taken to re-cross the zero line.</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>Specifies the force in mN in which the results will be displayed.</td>
</tr>
<tr>
<td></td>
<td>Time 1</td>
<td>Specifies the time in sec when the first force value is taken.</td>
</tr>
<tr>
<td></td>
<td>Force</td>
<td>Specifies the minimum force in mN at time 1.</td>
</tr>
<tr>
<td></td>
<td>Wetting Angle (Bath only)</td>
<td>Specifies the angle the component is to be immersed.</td>
</tr>
<tr>
<td></td>
<td>Normalized (Bath only)</td>
<td>Changes with force change.</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>Specifies the time in sec when the second force value is taken.</td>
</tr>
<tr>
<td></td>
<td>Force</td>
<td>Specifies the minimum force in mN at time 2.</td>
</tr>
<tr>
<td></td>
<td>Wetting Angle (Bath only)</td>
<td>Specifies the angle the component is to be immersed.</td>
</tr>
<tr>
<td></td>
<td>Normalized (Bath only)</td>
<td>Changes with force change.</td>
</tr>
<tr>
<td></td>
<td>View Pass/Fail Template (Select)</td>
<td>View the Pass/Fail Template selected previously.</td>
</tr>
</tbody>
</table>

Click the conditions tab
Fill in the material that you will be using in test for that particular component. Ignore the position information which is aligned again.
Different options will be available depending on the type of receptacle that been selected. To calculate the surface tension, see the section titled how to calculate surface tension in the Solderability Manual.

When all fields have been entered, do click “update” icon to update the new component. Note: click that icon every time when you do some changes.
When done, click “Exit” icon and click “Yes” to save changes.

### 3.4.5 Editing Components

From the main menu, click “Manage Components” icon to open the component sheet.
In the component sheet window, from the file dropdown menu or the icon, select “Open”.
In the load component window, highlight the required file to edit and click “open”.
In the component sheet highlight the component parameter to edit and click the edit component icon.

Edit the component field and when done click “Update” icon, exit and save changes. You will be taken back to the main menu.
SECTION 4. Component Testing

4.1          Set-up

From the main menu click “General Test” icon to open the wetting test window.

From the wetting test window, either click “Select” icon to display the component sheet or select “select component” in the main bar to open component sheet.

Click “open” icon to display the component database. There are default component files stored already when you install our software. You can also find the components created by the operator. Highlight the desired component file and click “open”.

The component parameter sheet will be displayed. You can generally view all the parameters by using left/right direction buttons or edit it when you click “Edit component” icon. Highlight the required component and click the Select icon. You will notice the line number of the left change to <--> to show the component has been selected.

Click “Exit” icon to back to the wetting test window where all the information is now displayed.
Check the information is correct, if you need to re-select another component or edit, click “select” icon and locate the component as before.

You are now ready to start the test. Click “General Test” icon. The first time you start a test, you will be prompted to align the component. See section on alignment.

Align the component, click “save and continue”.

If you have a cold receptacle, the temperature graph will appear and the systems will proceed to heat the receptacle to the specified temperature set in the test parameters.

Once the temperature has been reached, follow the on screen instruction to guide you through the rest of the test.

Note: there is an “Abort” icon which when clicking will terminate the test at any point before contact is made.

The test will end after the specified test time and the test results will be displayed simultaneously.
When the test has finished, you will be asked to test another component. Choose “yes” to continue the testing or select “No” to go back to the results window where you can analyse the results and view graph. At the bottom of the result sheet, you will see various tabs that can be viewed and analysed.

Take a minute to look at these. See section of Analyzing results for more information.

To save the results, select “Save as” from the dropdown menu of File. You can save the results to anywhere you like.

### 4.2 Alignment

When you start a test for the first time, the software will automatically prompt you to align before the test commences and will display the alignment window.

To align a component and save the position, open the component sheet by selecting the Manage components icon. Click “Open” icon and load the component file desired into the sheet. Highlight the component to be aligned and click “Align component” icon. The machine will then proceed to align and display the alignment window.

![Alignment Window](image)

Note: you will need to install the correct receptacle, clip and component on the instrument. Using the arrow buttons bring the solder pellet/bath up towards the component until a gap of about 5mm is achieved and the component centered round the pellet. There are two speeds (high/low) to control the z-axis movement. You can also use the buttons from the front screen panel. When you are satisfied with the alignment, click “Save”. This saves the position information into the component parameter file. Click “continue” to take you back to the component sheet. You can check the information is correct by scrolling along the component sheet.
4.3 Analysing Results

From the main menu, select the “Analyse” icon and the pass/fail sheet will be displayed.

Select “Load result” icon to view single file or multiple files, and then click “open”.
From here, you have the choices to view a single graph or view multiple graphs.

View a single graph, highlight a line and click “display graph” icon.

View all the graphs loaded into the sheet, select the “multiple graphs” icon. A maximum of 15 results can be displayed at a time.

View all the graphs loaded into the sheet, also highlight a graph you choose, click “highlight a graph”.

Note: to load saved results from a specific location, instead of clicking the load results icon, select “open” icon and locate files. This way is used if you have saved files to somewhere other that the results folder in the default folder.

4.4 Set Temperature

This icon is used to turn the receptacle heater ON or OFF. If the heater is ON, you can enter the temperature you required. It is recommended that you enter the temperature to the same value, as that stored in the component parameter file. This will ensure that the solder temperature is at the required value, when you wish to perform a wetting test.

Even if you do not wish perform a wetting test immediately, then you should set the temperature to the value set in the parameters file. This will allow the solder receptacle to warm up and reduce the delay, when you wish to perform a wetting test.

When you perform a wetting test, the temperature will automatically be reset to the value stored in the component parameters file, before a test can be performed.

Note: the user is required to turn the heater off manually if it is not required, otherwise it will maintain the set temperature until the MUST is switched off.

4.5 View Temperature Profile

When you have turned the heater ON and entered the temperature you required, this icon can be clicked to view the temperature profile, and monitor how the temperature is going to change against time (second).

Note: when the temperature reaches as you require, please allow 10-15mins for the temperature to stabilize.
4.6 Saving Results

After a test has finished, the results are automatically saved into a folder called Result. This folder is located on the C:\program files\Gen3 Must3. You can also alternatively save the files to anywhere on your computer. You can also save a file in EXCEL format which you can access from the “Save as type” in dropdown menu.

4.7 Print

If you wish to print a list of the result sheet only, just simply click “Printer” icon in the result sheet window. Or if you wish to print the graph with data, after either clicking “display graph”, “multiple graphs” or “highlight a graph” icons, then you click “printer” icon in the graph window.