

Graphical Tester for Otoplastics

With Bluetooth® Control

**Additional information for
use on Android platforms**

2018

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1 INTRODUCTION

1.1 Purpose

This additional manual walks you through the process of using a Bluetooth® leakage tester from an Android platform (smartphone or tablet). It describes how to sign up the tester and how to use the controlling app. It is generally assumed that the user is sufficient familiar with the Android OS (Operating System). The app can be downloaded and installed via Google Play (Deutsch) by searching for OtoBLT or directly via this link:

- Google Play: <https://play.google.com/store/apps/details?id=com.paad.bluetoothtesting&hl=de>

On our site you can find other methods to get hold of the OtoBLT app:

- URL: <https://www.cursorengineering.nl/de/?Otoplastik+Tester:Für+Bluetooth:App+Android+BLT>

For general use of the leakage tester itself, read the general manual.

2 SIGN UP

2.1 General

The leakage tester needs a one-time sign-up with the Android platform (§2.2).

Almost every Android platform features Bluetooth® connectivity, for completeness we mention the minimum system requirements:

- Smartphones and tablets: Android 4.1.x (Jelly Bean, API level 16)

To determine your Android version, select "Settings>About tablet>Android-version".

The user set timeout for the display to enter *Sleep (lock screen)* will be temporarily overruled.

2.2 Procedure

Start the Android machine and switch on the tester.

In general the procedure runs as follows:

- go to **Settings > Bluetooth** (turn on Bluetooth, if necessary)
- tap **search for devices** and the Bluetooth *wizard* will search for available devices
- after some time the *name* of your tester appears in the **'devices available'** list
- tap the *name* from this list to start the pairing procedure
- *the system may confront you with a pairing request: enter code 1234 and touch 'ok' **
- the *name* of the tester will appear in the **'paired devices'** list

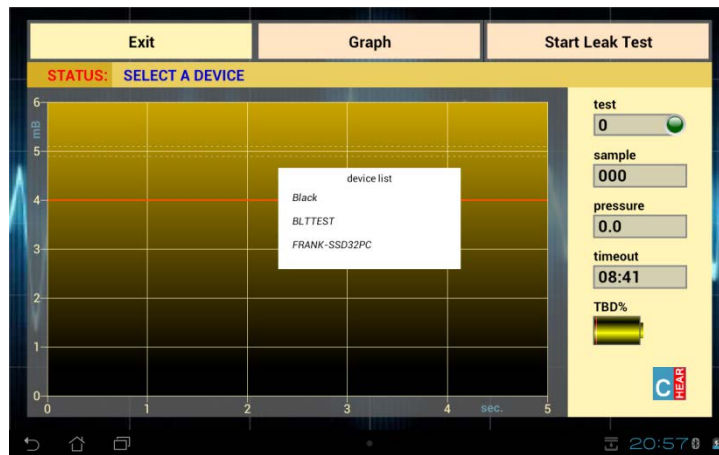
This completes the sign-up process

(*) with the introduction of the Secure Simple Pairing (SSP) mechanism, for testers delivered from 2014, there is no need to enter a pairing code anymore: the tester will directly be added to the *paired devices* list

3 MEASUREMENT

3.1 Selecting device

Switch on the tester and activate the app. A pop-up window will appear listing all Bluetooth®-devices, *paired and powered-on*, in the direct neighbourhood and might look like the one below:



Picture 3.1.1: device selection window

Select your leakage tester (here: BLTTEST) from the list. Subsequently the program will try to establish a connection with the device.

3.1 Standard measurement

When a connection has been established the screen will look like the picture below. From this screen all measurements will be performed. With testers (since 2017) the battery indicator displays the voltage (V)



Picture 3.2.1: measurement screen with battery indicator

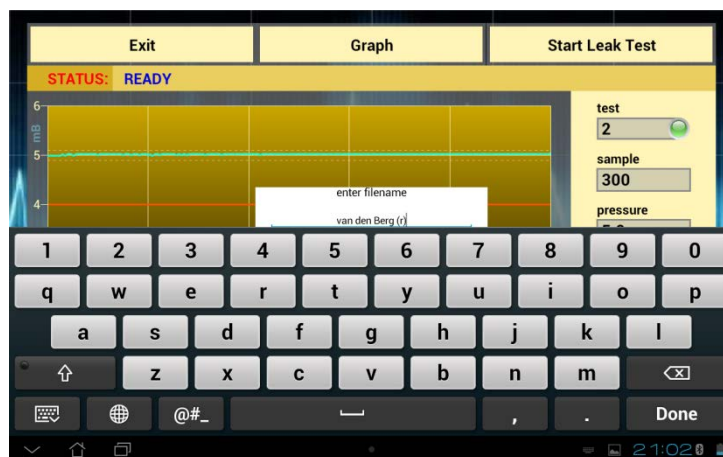
To start a test touch the **Start Leak Test** button, the air pump in the tester will increase the pressure in the tester in a few seconds to 5mB. The actual leakage measurement will take five seconds. In this period, ideally the pressure must remain at 5mB; a margin of 4mB is adhered to indicate that a lower value is to be interpreted as insufficient fitting of the earpiece. The picture below shows a possible result of a measurement.



Picture 3.2.2: a measurement result

3.3 Filing

After each test the user has the opportunity to save the resulting graph (colour or b/w) to a file for later handling. Touching the **Save Graph** button pops up a window allowing you to enter a filename as shown below.



Picture 3.3.1: saving a graph

The graph will be filed in the so-called 'Portable Network Graphics' file format, therefore the *extension* name reads: **.png**. One should not enter this extension name, the extension will be automatically added.

To prevent *file pollution* one can enter a valid filename only once.

Touching the screen outside this pop-up window terminates the filing process, but it can be restarted again until the next measurement.

All graphs will be stored in the directory `.../LeakageTest`, on the internal SD-card. From this directory one can prepare the graphs for further processing e.g. e-mailing, transferring, embedding in forms etc. For convenient handling files on your Android it might be handy to download a free *file manager* app from the Google Play Store.

When the measurements are completed the program can be terminated by tapping the **EXIT** button.

3.4 Screen legend

3.4.1 control

Three buttons are visible at the top of the screen:

- **EXIT**: if no measurement is being taken the program will be terminated and the leakage tester will be put in low power stand-by mode; if needed, multi tapping this button will abort the program if stuck for any reason
- **Save Graph**: the graph will be filed to: `.../LeakageTest/filename.png`, the maximum *filename* length is 32 characters
- **Start Leak Test**: a new measurement will start, the button name changes to **Wait...** and for the **EXIT** button to **Stop this Test**: one can terminate the running test

3.4.2 graph

The graph shows a unit on each axis:

- **mB**: the y-axis shows the relative pressure in millibar [mB] with respect to the ambient air pressure, the measurement will be made at a pressure of 5mB; the orange line indicates the (4mB) lowest limit that still meets the specification. SI unit for pressure: Pascal [Pa] (5mB \equiv 500Pa).
- **Sec.**: the x-axis shows the total measurement time in seconds; the measurement time can only start when the initial pressure (5mB) is reached

3.4.3 information panel

Details are displayed to the right of the graph that provides information about the progress of a measurement:

- **led lamp**: [green]: last measurement completed, result within specs
[orange]: last measurement completed, but result does not meet specs (< 4mB)
[red]: measurement started, but terminated or ended erroneously
- **test**: the number of tests done during the current session after program start
- **sample**: the number of measurement moments (= samples) during the running test
- **pressure**: the instantaneous measured pressure, or the last measured pressure (in mB)
- **timeout**: the time (m:ss) remaining until the automatic stand-by mode will be entered (10 minutes)
- **battery**: the charge condition, in percentages or voltage (V), of the batteries *in* the leak tester

3.4.4 status

The status of the leak tester is shown at the right of '**STATUS:**' on the status line (which is displayed immediately above the graph). The leak tester has a number of states; the most important of these are discussed in the next chapter.

4 STATUS MESSAGES

4.1 Permissions

With the introduction of Android Nougat (version 7, API level24) due to stricter privacy rules the user is able to grant permissions (or not) to privacy sensitive information or hardware (e.g. Contacts, Microphone etc.). These permissions are granted during installation or afterwards. Our app needs two so-called dangerous permissions:

- **Location:** is part of the Bluetooth® protocol and can reveal (coarse) information about your current location to malicious people in your direct neighbourhood; without this permission the app cannot run, because Bluetooth® is simply necessary for the communication with your device
- **Storage:** this permission is needed to obtain access to your memory to save test results (graphics); without permission the app will work fine, but it is impossible to save results

On occurrences in the app where permission is necessary, but not (yet) granted, the app will ask for permission in a pop-up window. A once given permission remains granted.

4.3 Device connection

Immediately after activating the app, the platform tries to establish a Bluetooth® connection with the tester. Problems that occur during this phase are also shown on the status line. An overview of important messages:

- **DETECTING DEVICES...:** busy composing a list of paired and active devices
- **SELECT A DEVICE:** the list is complete, choose your device
- **SELECTION TERMINATED:** by means of tapping outside the *Device List* window the selection procedure has been terminated
- **NO DEVICE SELECTED OR FOUND:** within the time span (approx 12s) no paired and switched-on device could be detected*
- **DEVICE '*devicename*' SELECTED:** the *device* has been selected; status should change to **OK** soon and the charge percentage of the battery should be determined, otherwise the Bluetooth® connection could not be established and the status changes to:
- **NO PROPER RESPONSE FROM '*devicename*' :** the Bluetooth® - device did not recognize the communication protocol, a new selection can be made**
- **CHECKSUM ERROR (RETRY *xx*):** the operating settings in the tester have not been correctly received or processed correctly; a maximum of ten attempts will be made

* leads to **EXIT (ONLY):** terminate app, restart it and switch tester (off and) on again

** after having selected devices other than leak testers, e.g. those needing permission, may take more time

4.2 Measurement

Normal messages while a test is running:

- **OK:** the leak tester is ready for the first test
- **AIR IN:** the air pump will try to pressurise the system
- **STABILIZING PRESSURE:** the target pressure has been reached and the system will check for a short time whether it is stable enough; after this phase, when the leakage is relatively high, the pressure line might enter the graph lower than 5mB
- **MEASURING:** the actual measurement runs, the graph will be drawn real time
- **DONE:** the last sample has been delivered
- **FINISHED:** the test has been completed and the system will be depressurized, while the system is depressurizing one can already start filing the graph, saves some time
- **TERMINATED:** tapping "**Stop this Test**" causes this message, thereupon:
- **READY:** the test has been completed, the leak tester is ready to take a new measurement

Error messages while a test is running:

- **TARGET PRESSURE (5mB) NOT REACHED:** the system loses so much air that the pressure cannot be increased sufficiently. Before drawing any conclusions, the system should always be checked for leaks without an otoplastic. Also check whether the air pump operates and if the otoplastic is placed correctly.
- **PRESSURE UNSTABLE OR OBSTRUCTION:** a stable test-pressure cannot be obtained, or air cannot or only difficult leave the system; check tubes etc., if this message remains service is required
- **CONNECTION WITH '*devicename*' LOST:** the existing Bluetooth®-connection went down*
- **OK, BUT VERY LOW BATTERY POWER:** the batteries in the tester are exhausted, replace batteries**
- **UNKNOWN ERROR:** the program halts for an unknown reason*

* leads to **EXIT (ONLY):** terminate app, restart it and switch tester (off and) on again

** this is an indicator only: think that a transitional situation can occur where the tester will start normally, but will not have sufficient power to operate the pump

4.3 Filing

Attention: please read §4.1, because of stricter privacy rules concerning archiving.

Common messages during archiving:

- **FILE '*filename.png*' ALREADY EXISTS:** the *filename* already exists, (re-)enter a different name
- **ENTER A VALID FILENAME:** the *filename* may not be empty
- **'*filename*' IS NOT A VALID NAME:** the *filename* contains characters in the range ["\\", "/", "*", "?", ":", "<", ">", "\"", "|"] that Android does not allow
- **SAVE DONE:** the file '*filename.png*' has been filed with time/date stamp