

Microwave Leakage Detector ENHANCED INSTRUCTIONS



1. INTRODUCTION

This is a CE approved microwave leakage detector with LCD display, warning LED indicator and audible warning device.

The unit is designed to test for microwave leakage in accordance with the routine test defined within BS EN 60335-2-25:2002, Safety of household and similar electrical appliances - Domestic microwave ovens, and within BS EN 60335-2-90:2002, Safety of household and similar electrical appliances - Commercial microwave ovens.

Further guidance on recommended maximum exposure levels to microwave radiation is contained in NRPB Documents GS15_2 and GS15_3 published in 2004, and in the 1988 Recommendations of the International Non-Ionizing Radiation Committee.

The above standards and guidance documents recommend that microwave leakage (expressed as microwave power density in milli-Watts per square centimetre) from microwave ovens and similar appliances, should not exceed $5\text{mW}/\text{cm}^2$, (which can also be expressed as $50\text{W}/\text{m}^2$), when measured at a distance of 50mm or more from the exterior surface of the appliance under test.

The microwave detector indicates microwave power density as values on the LCD display.

The microwave detector **should be kept at a distance of 2 inches** (equivalent to 50mm or 5cm) while the instrument is moved over the exterior surfaces of the appliance under test although in practice it is easier to keep the tester near to the oven and only pull it away to 2 inches when you detect leakage and need to take a reading from the display.

FEATURES

3 Digit LCD Readout

Beeping and red flashing LED at $>5\text{mW}/\text{cm}^2$

Battery life approx 1 year

High reliability & precision with full SMT (Surface Mount Technology)

TECHNICAL SPECIFICATION

Supply: 9V alkaline battery, MN1604 or equivalent (not included)

Warning Value: $5\text{mW}/\text{cm}^2$

Frequency of Operation: Calibrated to 2450MHz

Accuracy: $\pm 1\text{dB}$

2. WARNINGS

2.1. UNDER NO CIRCUMSTANCES MUST THE MICROWAVE DETECTOR BE PLACED INSIDE A MICROWAVE OVEN.

2.2. UNDER NO CIRCUMSTANCES MUST ANY THERMOMETER BE PLACED INSIDE A MICROWAVE OVEN.

2.3. FOR COMBINATION OVENS, WITH RADIANT HEATERS FOR ROAST OR BAKE SETTINGS, DO NOT RUN THE OVEN AT RADIANT HEAT SETTINGS DURING THE TESTS DESCRIBED BELOW: USE MICROWAVE POWER ONLY.

2.4. MICROWAVES ARE POTENTIALLY DANGEROUS: MICROWAVE APPLIANCES SHOULD NOT BE ADJUSTED OR REPAIRED BY ANYONE EXCEPT PROPERLY QUALIFIED SERVICE PERSONNEL.

It is important not to defeat or tamper with safety interlock switches. Before carrying out the leakage test, check that the safety interlock switches on the oven operate effectively, such that the microwave power is cut OFF automatically before the oven door can be opened.

3. OPERATING INSTRUCTIONS

3.1. You should ZERO the unit before every use. To do this switch the unit on and then press and hold the Zero button until the unit BEEPS 3 times, the display flashes 3 times and display reads Zero. You can now carry out the tests as detailed below.

This unit also has a backlight which can be turned on/off by pressing and releasing the Zero button quickly.

An additional Max/Hold feature enables you to see the highest reading attained throughout the test procedure.

A battery warning indicator will also show on the LCD display when the battery is low.

The Basic Safety Test below in 4.1 is the most common safety test you will use when dealing with microwave ovens.

In addition there is an optional test explained in 4.2 to determine more accurately the power/efficiency of the microwave oven. This is an optional test and not a mandatory test.

4. BASIC MICROWAVE OVEN SAFETY TEST

4.1. The following routine safety test should be carried out on microwave ovens, to ensure that microwave leakage remains below the recommended safe maximum of $5\text{mW}/\text{cm}^2$.

This routine microwave leakage test should be carried out with the microwave oven connected to its rated power source.

IMPORTANT: Fill a 1 Litre jug or beaker with cold tap water and place it in the centre of the load-bearing surface of the oven.

OPERATING A MICROWAVE OVEN EMPTY WITHOUT THE JUG OF WATER WILL GIVE A FALSE POSITIVE READING AND COULD CAUSE DAMAGE TO THE OVEN . NEVER OPERATE A MICROWAVE OVEN EMPTY.

The oven should then be operated at its maximum microwave power setting.

FOR COMBINATION OVENS, WITH RADIANT HEATERS FOR ROAST OR BAKE SETTINGS, DO NOT RUN THE OVEN AT RADIANT HEAT SETTINGS: USE MICROWAVE POWER ONLY.

While the microwave oven is running, place the microwave detector 2 inches from the surface of the appliance (Fig. 1) and move the detector about slowly all over the exterior surface of the oven to locate points of microwave leakage, keeping it at right angles to any door seal as shown, and paying particular attention to the door seal, the edges of the door, the front window, any seams in the case construction and any visible ventilation slots. The microwave detector will show when microwave power is detected above $0.01\text{mW}/\text{cm}^2$, as indicated by the LCD display.

The microwave detector should be kept at a distance of 2 inches (equivalent to 50mm or 5cm) while the instrument is moved over the exterior surfaces of the appliance under test although in practice it is easier to keep the tester near to the oven and only pull it away to 2 inches when you detect leakage and need to take a reading from the display.

The red LED will light and an audible tone will sound as an additional warning if microwave leakage exceeds the $5\text{mW}/\text{cm}^2$ safety limit. In the event of extended or repeated tests, the water in the beaker should be changed as necessary to prevent boiling and evaporation.

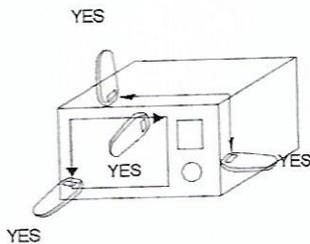


Fig. 1

An oven that exhibits microwave leakage in excess of $5\text{mW}/\text{cm}^2$ should be taken out of service and investigated for faults by a competent service engineer. It should not be put back into service until faults are cured and the oven can be shown to pass the microwave leakage test.

4.2. ONLY AFTER THE MICROWAVE LEAKAGE TEST ON PAGE 3 IS FOUND TO GIVE A SATISFACTORY result can the following OPTIONAL procedure be used as a simple functional test to assess the microwave heating power of the oven.

AGAIN, THIS IS AN OPTIONAL TEST

This functional test should be carried out with the microwave oven connected to its rated power source.

Fill the polypropylene beaker with 275ml ± 15mls of tap water at a known temperature and place it in the centre of the lowest shelf in the oven. Use a thermometer to measure the initial temperature accurately. Record the actual water volume and the Initial Temperature accurately.

DO NOT LEAVE THE THERMOMETER IN THE BEAKER.

The oven should then be operated at its maximum microwave power setting for 90 seconds. FOR COMBINATION OVENS, WITH RADIANT HEATERS FOR ROAST OR BAKE SETTINGS, DO NOT RUN THE OVEN AT RADIANT HEAT SETTINGS: USE MICROWAVE POWER ONLY. (Note, The heating time is not critical, but must be recorded accurately: for an oven with an imprecise clockwork timer, use a stopwatch or wristwatch with a second-hand to establish the duration of the test). Immediately after the 90 seconds microwave heating episode, open the door, give the contents of the beaker a very brief stir using the thermometer, then measure the final temperature of the water.

Determine the rise in temperature from:

$$\text{Temperature Rise} = (\text{Final Temperature}) - (\text{Initial Temperature})$$

The microwave heating power of the oven can be estimated from the following formula:

$$\text{Microwave Heating Power (Watts)} = \frac{4.19 \times (\text{Water Volume in ml}) \times (\text{Temperature Rise})}{\text{Heating Time (seconds)}}$$

(Note: This formula is simplified for convenience. Result should be rounded down to nearest 50W).

4.3. At the end of all testing, ensure that the microwave detector is stored safely.

5. EXTENSIVE MICROWAVE OVEN TESTS FOR TEST ENGINEERS

The **OPTIONAL** tests below are carried out with the microwave cooking appliance connected to its rated power source and operating at its maximum power setting. Fill the polypropylene beaker with 275ml ± 15mls of tap water at a known temperature and place it in the centre of the lowest shelf in the oven. Use a thermometer to measure the initial temperature accurately. Record the actual water volume and the Initial Temperature accurately. For each test the microwave leakage detector will be moved about the external surface of the oven (described below). A thermometer will be used to check the above mentioned temperatures. The following test procedures are specified to non-hazardous radiation at less than 5mW/cm².

Normal Operation Test
Thermal Test
Enclosure Test
Door Opening Sequence Test
Door Seal Continuity Test
Door Seal Foreign Matter Test

5.1. Normal Operation Test (Microwave)

This test will be carried as per the above specification. This is carried out with all shelves, fittings and accessories in place within the cooking cavity.

5.2. Thermal Test (Microwave)

This test will be carried as per the above specification. This is required to achieve maximum door seal temperature of combination appliances, e.g. thermal/browning ovens utilising sequential or simultaneous control programmes. With the beaker removed the oven is thermally heated to the maximum setting. The browning unit will be set to heat the oven to 240°C ± 5°C and then the test is repeated.

5.3. Enclosure Test (Microwave)

This test will be carried as per the above specification. This is carried out with all the shelves, fittings and accessories removed which are normally without the use of tools.

5.4. Door Opening Sequence Test (Microwave)

This test will be carried as per the above specification. This normal operation test is repeated with the door being opened in small increments through the normal door opening sequence and searching for the point at which the interlock switches the appliance off.

5.5. Door Seal Sequence Test (Microwave)

This test will be carried as per the above specification. This normal operation test is repeated with a minute gap created in the door closure. This is achieved by using a high quality bonded paper shim 0.05mm thick placed between the door and the cooking cavity. The test will be carried out ten times with the shim in ten different places equidistant around the door seal area.

5.6. Door Seal Foreign Matter Test (Microwave)

This test will be carried as per the above specification. The normal operation test is repeated with a light coating of common light cooking oil applied onto all door sealing surfaces.

5.7. At the end of all testing, ensure that the microwave detector is stored safely.

6. COMPLETION OF TESTING

6.1. Pass

Apply a Passed Microwave Test sticker. These labels must have the date of test, an individual asset number, the date the appliance is next due for testing and the signature of the electrical engineer who carried out the testing. The asset number will compile the buildings asset list along with the asset number and description being logged within the Pass log report.

6.2. Fail

Apply a Failed Microwave Test sticker depending on what testing has been carried out. These labels must have the date of test, an individual asset number, the signature of the electrical engineer who carried out the testing. The asset number will be logged along with the description into the Fail log report and then the appliance will be taken out of service.

6.3. Summary

On completion of the testing the passed appliance will be repositioned back into its original location, and you must ensure the cables are dressed safely down to their socket outlet. You should supply to your client a hard back folder containing an Appliance Register, Fail Report, Pass Report, Repair Log and Full Certification (with or without frame).