



## Microwave Ovens and Health

**There is no established evidence that microwave ovens cause any health effects when used according to the manufacturer's instructions and maintained in good working order.**

### Introduction

Microwave ovens use microwave electromagnetic energy (EME) to cook food, either in the home or in commercial or other premises. Some features of microwave ovens and precautions in their use are described below. This fact sheet refers only to domestic-type microwave ovens intended for use in the home, in commercial kitchens or workplace staff rooms.

### How do microwave ovens work?

Microwave ovens generate intense microwaves within the cavity of the oven. The waves are reflected off the metal interior of the oven and readily absorbed by water molecules in food. Food is heated by absorbing the energy from the microwaves bouncing around inside the microwave oven. Simplistically, water molecules within the food are vibrated back and forth by the microwaves and the resulting friction causes the food to be heated up.

Cooking time is usually much shorter in a microwave oven compared to a conventional oven. The rate of heating depends on the moisture content, shape, volume and weight of food present. Uneven heating can occur in some foods where the outside may be only warm while the inside may be close to boiling (jam filled donuts or meat pies are examples). In other foods, some parts will be cooked, while others are not. Some parts of frozen food may remain frozen if insufficient time is allowed for the heating process.

The oven walls and most non-metallic cooking utensils are not directly heated by microwaves because they do not absorb microwave energy. However, the inside of the oven will feel warm due to the presence of the hot food and heat from the electrical circuits.



### How safe are microwave ovens?

Microwaves generated in microwave ovens cease to exist once the electrical power is turned off. They do not remain in the food when the power is turned off. They do not make the food or the oven radioactive. There is some evidence that nutritional content of some foods may be altered differently by cooking in a microwave oven, compared to conventional cooking, but there is no indication of detrimental health issues associated with microwaved food.

There is potential for foods to heat unevenly in a microwave oven. It is important to allow time for the heat to be distributed throughout the food prior to eating. Be careful when removing liquids from a microwave oven as they can become super-heated (heated beyond boiling point without actually boiling) and may suddenly erupt when stirred or knocked.

All microwave ovens have at least two safety interlock switches which stop the generation of microwaves immediately if the door is opened. It should not be possible to operate a microwave oven while the door is open. If the door does not fit squarely or shows signs of damage or corrosion then the oven should

either be taken to a qualified technician for repair or replaced. Routine testing of microwave oven leakage is not considered necessary.

## What containers can be used in a microwave oven?

Plastic containers considered suitable for holding foods at room temperature may not necessarily be suitable for use in a microwave oven. The high cooking temperatures may cause the plastic's chemistry to break down and thereby contaminate food in the container. Since it is difficult to determine the composition of plastic from its appearance, it is recommended that plastic containers or films not be used in a microwave oven unless specifically designated for such use. Any questions about such products should be directed to the manufacturer of the container.

Most ceramics, glass-ceramics, some plastics and papers are satisfactory for microwave oven use. Dishes with metallic glazes should not be used. If fast food foil containers and aluminium foil are used, the oven manufacturer's directions should be carefully followed. Do not let fast food foil containers or aluminium foil touch the sides of the oven as this may cause sparking.

## What inspection should be carried out by the user?

A microwave oven should only be used if an inspection confirms all of the following points:

- The surface of the door is not damaged.
- The door fits squarely and securely and opens and closes smoothly.

- The door hinges are in good condition.
- The oven is clean and in particular the door edges and interior surrounds are not covered with food or burnt material.
- No corrosion is evident on the door, the door hinges or the oven interior.

## What precautions should be taken when using microwave ovens?

- **Follow the oven manufacturer's instructions on recommended operating procedures and safety precautions.**
- Never tamper with or inactivate the interlocking devices.
- Never use the oven without the trays provided by the manufacturer unless specifically allowed in the manufacturer's instructions.
- Never operate the oven without a load (i.e. an absorbing material such as food or water) in the oven cavity unless specifically allowed in the manufacturer's instructions.
- Never rest heavy objects such as food containers on the door while it is open.
- Clean the oven cavity, the door and seals with water and a mild detergent at regular intervals (do not use abrasive cleaning pads).
- Supervise children using microwave ovens.

### Useful Links

ARPANSA fact sheet on RF EME  
[www.arpansa.gov.au/RadiationProtection/basics/rf.cfm](http://www.arpansa.gov.au/RadiationProtection/basics/rf.cfm)

US FDA fact sheet on microwave ovens  
[www.fda.gov/ForConsumers/ConsumerUpdates/ucm048953.htm](http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm048953.htm)

CSIRO fact sheet on microwave ovens and nutrition  
<http://www.csiro.au/en/Research/Health/Food-safety/Microwave-oven-safety>