



## Investigation Guideline

# Portable Electric Space Heaters

## Appendix 63

Revised December 1998

### Background Information

Portable electric heaters are usually small, lightweight appliances equipped with cords and plugs for connection to a general-purpose electrical receptacle. These heaters are intended to be used to warm a room or part of a room allowing the central heating system's thermostat to be at a lower temperature. There are numerous variations of design concepts that have been, are, or could be produced in conformance with the voluntary standards for such heaters. The voluntary standards for portable electric heaters are based on the expectation that the heaters are used for short-time supplemental heating purposes. However, consumers often use these heaters for extended time periods to save money on central heating costs.

In 1996, the latest year for which data are available, portable electric heaters were associated with about 2,500 fires, 130 deaths, 200 injuries, and about \$45 million dollars in property loss. Between 1992 and 1996, the estimated number of fires, deaths, and injuries have remained fairly constant. In 1996, an estimated 25 percent of all U.S. households had at least one portable electric heater. The estimated life expectancy of these heaters ranged from 5 to 12 years with an average of about 8 years of useful life.

Portable electric heaters were a major focus of CPSC in the late 1980s and new safety requirements in the voluntary standard went into effect in 1991. Since that time, data do not appear to indicate a trend in either a downward or upward direction. During FY99, data collection is planned for this product. Following the collection of data, an analysis of the data will be done. The analysis will help assess the adequacy of the current edition of the voluntary standard and help in making further recommendations for change in the standard.

### Types of Portable Electric Space Heaters

Portable electric heaters are currently permitted by the voluntary standards to be rated as much as 1500 watts. In the past, the standards permitted such heaters to be rated as much as 1800 watts. Portable electric heaters consume electric energy at the highest rates of any consumer electrical products which are portable, require no installation for use, operate for long time periods, and

operate in an unattended-mode. There are two basic kinds of portable electric heaters: radiant and convection.

Radiant heaters, by use of glowing coils and reflectors, direct energy into the room. This type of heat is absorbed primarily by objects in the room; the surrounding air is not directly heated. They work well for "spot" heating, but may not be satisfactory if a consumer moves around a room. Parabolic heaters are a type of radiant heater. The heat is produced by a coiled wire element wrapped around a ceramic cone. This heat is directed in a concentrated beam by a parabolic reflector which results in most of the heat being directed at a target area. Parabolic heaters cost approximately \$70-\$100 and typically use about 1,000 watts, producing 3,413 BTU's per hour. Quartz heaters are another type of radiant heater. They are slender, stand either in an upright or horizontal position, and use quartz tubes instead of open coils/ribbons/wires or sheathed element. The heater should have a grill that does not allow children to poke fingers or objects into the tube area. Quartz heaters cost approximately \$40-\$70 and have an average size of 750-1,500 watts, which is equivalent to 2,560-5,120 BTU's per hour output. These heaters are also available in dual wattages which allow you to have a low and high heat setting.

Convection heaters warm air by moving it across a heating element or heat exchanger and blowing the warmed air by means of a fan into the surrounding room. They include ceramic or nichrome resistive wire heaters. The approximate cost for a convection-type electric heater is \$20-\$50, with a range from 750-1,500 watts, or equivalent to 2,560-5,120 BTU's per hour output. Many of these heaters are also available in dual wattages, which gives you the option of a low or high setting. There are also forced-air convection heaters which use electric coils to produce the heat and a fan to distribute the heat throughout the room. The ceramic disc heater is a type of forced-air convection heater. Prices for this type of heater range from \$40-\$150 and have a range in size of 350-1,500 watts, which is equivalent to 1,195-5,120 BTU's per hour output. Radiator-type heaters which may be either water or oil-filled are also classified as convection heaters. They usually do not include a fan but employ large heat exchanger surfaces to warm the surrounding air.

The following chart may help in identifying the type of portable electric heater.

Heater Type	Element Type	Element Surface Temperature	Hot Element Surface Color
Radiant	Quartz Tube	High	Very Bright, Almost White
Radiant	Open Ribbon	Moderate to High	Bright Cherry Red
Radiant	Open Coil	Moderate to High	Bright Cherry Red
Radiant	Sheathed Element	Low to Moderate	Dull Red
Fan-Forced Radiant	Any of the Above	Any of the Above	No Change
Fan-Forced Convection	Open Wire	Low	No Change
Natural Convection	Any-heater surface defines	Very Low	No Change

## **Investigation Instructions**

The attached data record sheet will ensure a uniform approach for gathering data about incidents associated with portable electric heaters. Every completed field investigation should contain a completed data record sheet, in addition to the CPSC standard 182 form and standard narrative description of the incident. Photographs of the product and any other products involved in the incidents should be included in the investigation. If applicable, a copy of the attending fire department's report of the incident or any other official report of the incident should be included.

### Free Text Summary

- Describe the sequence of events that led to the incident. If a fire incident occurred, determine what material ignited first and estimate any property damage including both flame spread damage (e.g., heater, small area surrounding heater, room, floor, entire structure, etc.) and property dollar loss.
- Describe incident, including component failure or multiple failures (if known) and subsequent events.
- For data retrieval from the computer, please use the following key words in the free text summary as appropriate: **portable electric space heater, fire, shock.**

### Description of Victim/User Contact With Product

- Describe accident scenario, including any deaths or injuries sustained.
- Indicate experience or knowledge the victim/user had of the product, (e.g. whether instructions or operating manual had been read, understood, kept).
- Determine the specific purpose for use, how often used, for what length of time heater was in use prior to the accident, and the heat setting at time of incident.

### Description of Product

- Describe the product characteristics (e.g. type, size, dimensions, BTU rating, volts, amps, watts).
- List manufacturer name, brand, model and serial number.
- Describe any safety certification labels, such as UL, CSA, ETL or other certification, or conformance with specific standards. Describe any safety features the product has (e.g. automatic tipover cutoff, indicator light, etc.) The tipover cutoff may not be visible on the outside of the heater. **All heaters manufactured after 1991 should have an**

**indicator light present. Some heaters manufactured prior to 1991 may also have an indicator light.**

- Provide wording of any warning labels or other information on rating plate.
- Describe type of heater (e.g., forced air, radiant, quartz, etc.)
- Specify age of product, date of purchase, whether the heater was purchased new, used or reconditioned.
- Indicate product history (e.g., previous problems, defects, malfunctions, maintenance repairs, etc.) If repaired, include dates and by whom repaired (factory serviceman, handyman, owner, etc.).
- Determine whether an extension cord was used. If so, indicate whether other appliances were plugged in on the same cord, including amperage requirements. Indicate age, wire size, type, condition and all markings on the extension cord. Determine whether the cord or extension cord was under furniture or carpet. Collect as a subsample, if possible.
- For heater cord, provide length, conditions, wire size, number of conductors, and position. Indicate if the cord was bundled up, bunched, under furniture or carpet, and whether it had a 2 prong or 3 prong plug. Specify all markings on cord and plug.
- Describe the types of controls on the unit and switch settings.
- Specify whether the power switch has an “off” position and whether there is a noticeable “click” when the switch is turned to the “off” position.
- Determine the stability of the heater (if it might have been a factor in the incident).
- Indicate any excessive heater surface temperature observed by user prior to incident.
- Specify how often the appliance was cleaned and what the cleaning procedure was.
- Determine whether the unit was repaired or replaced after the accident. Talk to repairman to determine the cause of failure.

#### Description of Victim/User

- Indicate the victim's/user's age, sex, height, weight, body measurements where appropriate, competence reducing factors (e.g., impaired vision, physical handicaps, medication, etc.), experience and knowledge of product and perception of hazards.

#### Description of Environment

- Describe the place of storage of the unit during the non-heating season, and the area surrounding it (cleanliness, neatness of use area, wet or dry location).

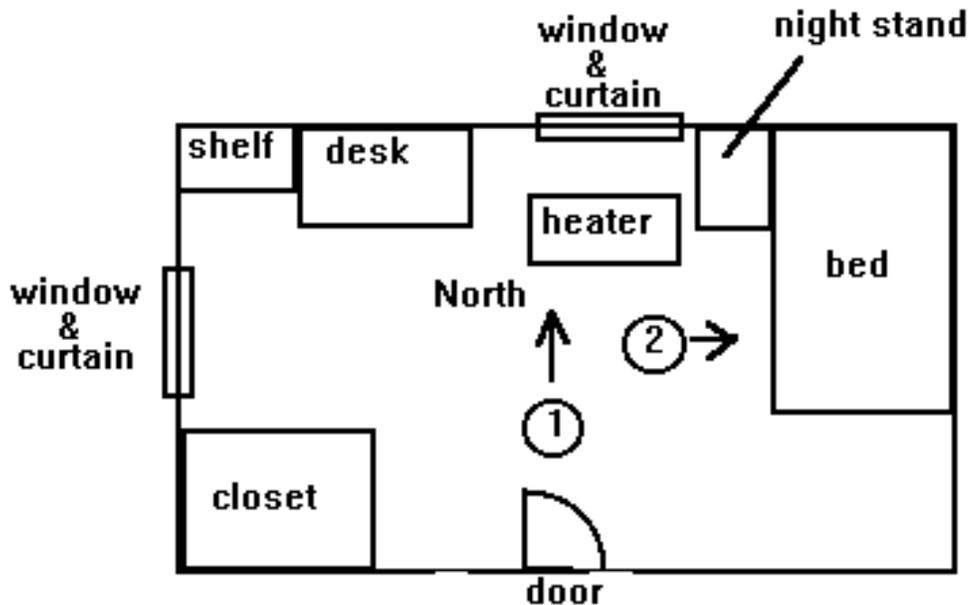
- Indicate if the unit is used near combustible materials. Indicate the distance from and type of these materials at the time of accident.
- Indicate the type and location of the electrical outlet in relation to the heater. Determine whether GFCI (ground fault circuit interrupter) was present on the outlet or whether the branch circuit was GFCI protected (GFCI breaker) and whether the GFCI operated to turn off the current during the incident.
- Describe the location of the product at the time of the incident (e.g., on the floor, top of chair or table, level or uneven surface etc.) and whether the heater was in operation at the time of the incident.
- Describe the overcurrent protection device (e.g. ampere rating, fuse, circuit breaker). Determine whether this device turned off the current during the incident.
- Specify wire size and material (copper or aluminum) of branch circuit to which appliance was connected.

### Photographs of Incident Scene

Photos of the products involved and diagrams describing the location of the incident should be included in the investigation report. **If possible**, please include photographs of the fire scene on-site, and perform the following steps to thoroughly diagram and photograph the incident scene and factors related to incident sequence:

- If fire escaped the heater and propagated to the surroundings, describe point of origin and path of propagation.
- Take a sequence of photographs where the portable heater was found starting from the area of no fire-related damage, progressing towards the area of the most damage. Number them in sequence. Clearly mark point of origin on photo with an "X". Mark a reference direction for description of locations in this report.
- Photograph close-up views of the heater involved in incident, and fire damaged components mentioned in the report. Do not disassemble the sample.
- Photograph location of the heater to illustrate the surrounding area, and proximity to any combustible materials.
- Draw a sketch of the shape of the room where the portable heater was located. Indicate the place you were standing (with a circle) and the direction you were facing (with an arrow) when you took the photograph. The numbered photographs (in sequence) should correspond to the numbered circles in the sketch. See example in Fig. 1.
- Use the sketch of the room to show location of furniture, curtains, combustible materials, and any other appliances within same room at the time of incident.

- Indicate whether more than one room or the entire building suffered fire-related damage.



**Figure 1: Sketch of bed room**

Sample Collection Instructions

- Collect all samples where the heater is still identifiable, i.e. do not collect samples where the entire heater is burned beyond recognition.
- Do not collect samples of water-filled or oil-filled radiator-type heaters.
- **Send all samples to the sample custodian at CSPC warehouse and notify Mai Ngo in Engineering Sciences at 301- 504-0508 x1310.**

Instruction for Obtaining Official Documents

- Determine whether the fire department attended the incident and obtain copy of fire incident, casualty, and investigation reports.
- Obtain copies of any official report if fire department did not attend (e.g. police report, emergency response report, service/repair report, insurance report, etc.)

The following pages are examples of portable electric heaters.

## RADIANT HEATERS



## FAN-FORCED RADIANT HEATERS



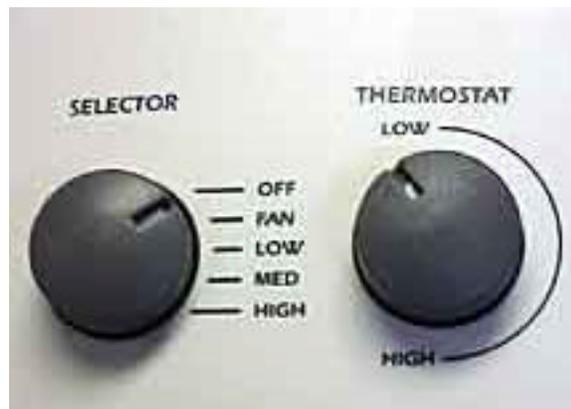
# FAN-FORCED CONVECTION HEATERS



## FAN-FORCED CONVECTION HEATERS (CERAMIC HEATERS)



# SAMPLE CONTROLS



# Investigation Guideline

## Data Record Sheet for Portable Electric Space Heaters

<b>Task Number</b>	
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<b>Description of Heater</b>	<b>Mark "Y" to one choice</b>
Visibly Glowing Glass-Like Tube (Quartz)	
Visibly Glowing Element with Fan	
Visibly Glowing Element without Fan	
Non-glowing or Hidden Element with Fan	
Non-glowing or Hidden Element without Fan	
Oil-filled	
Water Filled	
Other	
Unknown	

<b>Age of Heater</b>	<b>Enter number of years, months, or days</b>
Years	
Months	
Days	
Unknown	

<b>Date Purchased</b>	
<b>Date Manufactured</b>	

<b>Condition at Time of Purchase</b>	<b>Mark "Y" to one choice</b>
New	
Used	
Rebuilt	
Damaged	
Unknown	

<b>Electrical Characteristics</b>	<b>Enter volts, amps, or watts</b>
Volts	
Amps	
Watts	
Unknown	

<b>Dimensions</b>	<b>Enter dimension in inches</b>
Height	
Width	
Depth	
Leg Height	
Unknown	

<b>Enclosure Material</b>	<b>Mark "Y" to one choice</b>
Metal	
Plastic	
Combination Metal/Plastic	
Other	
Unknown	

<b>Heater Cord Characteristics</b>	<b>Circle / Specify</b>		
Length (Enter length in inches)			
Round or Flat	Round	Flat	Unknown
Condition Before Incident	Damaged	Good	Unknown
Cord Bundled Up?	Yes	No	Unknown
Number of Plug Prongs	2	3	Unknown
Can plug be plugged into standard duplex outlet?	Yes	No	Unknown
Extension Cord Used at Time of Incident?	Yes	No	Unknown
Heater Unplugged Between Uses	Yes	No	Unknown

<b>Heater Controls</b>	<b>Circle / Specify</b>		
Separate On/Off Switch	Yes	No	Unknown
On/Off Switch Part of Another Control	Yes	No	Unknown
Power Indicator Light Present <i>(All heaters manufactured after 1991 have an indicator light). (Some heater manufactured prior to 1991 may have an indicator light.)</i>	Yes	No	Unknown
Adjustable Thermostat	Yes	No	Unknown
Thermostat Settings (List all settings)			
Thermostat Setting at Time of Incident			
Multiple Wattage Settings	Yes	No	Unknown
Wattage Setting at Time of Incident			
Fan Speed Control Present	Yes	No	Unknown
Fan Speed at Time of Incident			
Timer Present	Yes	No	Unknown
Maximum Setting of Timer in Minutes / Hours			
Clock Present on Heater	Yes	No	Unknown
Safety Tipover Switch Present	Yes	No	Unknown

<b>Specific Purpose of Heater</b>	<b>(Mark "Y" for one choice)</b>
Supplemental Heat, Temporary	
Supplemental Heat, Prolonged	
Sole Source of Heat, Temporary	
Sole Source of Heat, Prolonged	
Other	
Unknown	

<b>Reason for Using Portable Heater</b>	<b>(Mark "Y" for one choice)</b>
Provided Cheaper Heat	
Other Fuel Source Not Available	
Wanted to Heat Only Certain Area	
Wanted to Heat Area Quickly	
Other	
Unknown	

<b>Frequency of Usage</b>	<b>Circle / Specify</b>
Number of Months per Year	
During Months Used, What Frequency of Usage:	
Daily	Yes      No      Unknown
If Daily, Specify Hours Per Day	
Occasionally	Yes      No      Unknown
If Occasionally, Specify Usage	
Storage Location of Heater in Off Season	

<b>Length of Time Heater Used Before Incident</b>	<b>(Mark "Y" for one choice)</b>
Less Than 1 Hour	
1 Hour	
2 Hours	
3 Hours	
Other (Specify time length)	
Unknown	

<b>Status of Heater When Consumer Away From Home</b>	<b>(Mark "Y" for one choice)</b>
Thermostat Turned Down	
Thermostat Turned to Freeze Position	
Turned to the Off Position	
Unplugged	
No Adjustments Made to Controls	
Other, Specify	
Unknown	

<b>Prior Problems With Heater</b>	<b>Mark "Y" for all that apply</b>
Overheating	
Causing Nearby Object or Wall to Overheat	
Cord or Plug Overheating	
Heat Blow Fuse or Trip Circuit Breaker	
Other, Describe	
None	

<b>Heater Ever Repaired</b>	<b>Yes</b>	<b>No</b>	<b>Unknown</b>
If Repaired, Describe Repair			

<b>Victim Info</b>	<b>Specify</b>				
	<b>Victim1</b>	<b>Victim2</b>	<b>Victim3</b>	<b>Victim4</b>	<b>Victim5</b>
Age					
Sex					
Nature of Injury					
Victim Asleep at Time of Incident					

<b>Incident Location</b>	<b>Circle / Specify</b>		
Area Messy/Unclean	Yes	No	Unknown
Area Neat/ Clean	Yes	No	Unknown
Indicate Room of Home			
Combustibles Nearby	Yes	No	Unknown
If Combustibles Nearby, Describe Combustible Item			
If Combustibles Nearby, Estimate Location of Item From Heater ( In Inches)			
Unknown			

<b>Type of Outlet Heater Plugged Into at Time of Incident</b>	<b>Mark "Y" for one choice</b>
Wall Outlet	
Light Fixture Outlet	
Outlet Built Into an Appliance	
Other, Specify	
Unknown	

<b>Location of Product at Time of Incident</b>	<b>Mark "Y" for one choice</b>
Floor	
Chair	
Table	
Other, Specify	
Unknown	

<b>Material on Which Heater was Placed</b>	<b>Mark "Y" for one choice</b>
High Pile Carpeting	
Low Pile Carpeting	
Vinyl, Linoleum Flooring	
Wood Flooring	
Upholstered Furniture	
Other Furniture, Specify	
Other Material, Specify	
Unknown	

<b>Type of Dwelling</b>	<b>Mark "Y" for one choice</b>
Single Family, Detached	
Single Family, Attached	
Apartment	
Mobile Home	
Other	
Unknown	

<b>Age of Dwelling (In Years)</b>	
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<b>Estimated Property Damage (In Dollars)</b>	
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<b>First Item to Ignite Other Than Heater</b>	<b>Mark "Y" for one choice</b>
Bedding	
Carpet	
Drapes	
Clothing	
Furniture	
Other, Specify	
Unknown	