TYPE 41900/42000
GENERAL PURPOSE INCUBATORS
OPERATION MANUAL
AND PARTS LIST
SERIES 700 & 701

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Voltage</th>
<th>Model No.</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I41920</td>
<td>240</td>
<td>I42040</td>
<td>240</td>
</tr>
<tr>
<td>I41920-26</td>
<td>220/240</td>
<td>I42040-26</td>
<td>220/240</td>
</tr>
<tr>
<td>I41924</td>
<td>100</td>
<td>I42044</td>
<td>100</td>
</tr>
<tr>
<td>I41925</td>
<td>120</td>
<td>I42045</td>
<td>120</td>
</tr>
</tbody>
</table>
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Safety Information
Your Thermolyne Incubator has been designed with function, reliability, and safety in mind. It is your responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert boxes throughout the manual.

Alert Boxes

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warnings alert you to a possibility of personal injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cautions alert you to a possibility of damage to the equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes alert you to pertinent facts and conditions.</td>
</tr>
</tbody>
</table>
Warnings

**WARNING**

To avoid electrical shock, always:
1. Use a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Disconnect from the power supply prior to maintenance and servicing.

To avoid personal injury:
1. Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such materials.
2. Refer servicing to qualified personnel.

Please note the following WARNING:

**WARNING**

THIS PRODUCT CONTAINS REFRUCTORY CERAMIC, REFRUCTORY CERAMIC FIBER OR FIBERGLASS (GLASS WOOL) INSULATION WHICH CAN PRODUCE RESPIRABLE FIBERS AND DUST WHEN HANDLED. THESE FIBERS OR DUSTS CAN CAUSE IRRITATION AND CAN AGGRAVATE PRE—EXISTING RESPIRATORY DISEASE. REFRUCTORY CERAMIC INSULATIONS MAY CONTAIN OR MAY FORM CRYSTALLINE SILICA (CRYSTOBALITE) WHICH MAY CAUSE LUNG DAMAGE (SILICOSIS).

THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CLASSIFIED REFRUCTORY CERAMIC FIBER AND FIBERGLASS AS (2B) POSSIBLY CARCINOGENIC. IARC HAS CLASSIFIED CRYSTALLINE SILICA AS (2A) PROBABLY CARCINOGENIC.

The insulating materials are located in the door, the hearth collar, in the chamber of the product or the top plate assembly. Tests performed by the manufacturer indicate that there is no significant risk of exposure to dust or respirable fibers resulting from operation of this equipment under normal conditions. However, there may be a risk of exposure to respirable dusts or fibers when repairing or maintaining the insulating materials, or when otherwise disturbing the materials in a manner which causes release of dust or fibers therfrom. Through the use of proper handling procedures you can work safely with these insulating materials and minimize any exposure. Accordingly, before you repair or replace any insulating materials, or perform any other servicing on this product which could disturb or cause exposure to dust from insulating materials, you should consult the appropriate Material Safety Data Sheets (MSDS's) for such products with respect to proper handling and appropriate protective equipment. For additional MSDS's, or additional information concerning the handling of refractory ceramic products, please contact the Customer Service Department of Barnstead|Thermolyne Corporation.

1-800-446-6060
1-800-553-0039
Introduction

Intended Use
The Type 41900 and Type 42000 General Purpose Incubators are designed for laboratory incubation procedures requiring a high level of temperature accuracy, control, and uniformity.

Principles of Operation
The Incubators are constructed with a fiberglass insulated outer case with a thermally isolated chamber which is surrounded by an air jacket to aid in temperature uniformity. The chamber wall material is chrome-plated brass which provides for ease of cleaning, chemical and moisture resistance, attractive appearance, and good heat conduction. Heat is supplied by resistive elements located under the floor of the chamber. Temperature is measured by a sensor whose resistance changes as the temperature changes. This electrical resistance is inputted to the digital set/display electronic controller that anticipates the heat from the elements to maintain a stable temperature. Chamber air flow is natural (gravity) convection, with venting out the top.
## Performance Specifications

<table>
<thead>
<tr>
<th></th>
<th>SMALL</th>
<th>LARGE</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Range (°C)</strong></td>
<td>Amb + 5 to 70</td>
<td>Amb + 5 to 70</td>
<td></td>
</tr>
<tr>
<td><strong>Uniformity (°C)</strong></td>
<td>0.5 @ 37°C, 0.9 @ 56°C</td>
<td>0.5 @ 37°C, 1.0 @ 56°C</td>
<td>The temperature difference of the corner (1) with the maximum gradient from the center for a 24-hour period</td>
</tr>
<tr>
<td><strong>Control (°C)</strong></td>
<td>±0.3 @ 37°C, ±0.3 @ 56°C</td>
<td>±0.3 @ 37°C, ±0.3 @ 56°C</td>
<td>Average temperature variation at the chamber center, for a 24-hour period</td>
</tr>
<tr>
<td><strong>Accuracy (°C)</strong></td>
<td>±0.5</td>
<td>±0.5</td>
<td>LCD display value calibrated to the chamber center, for the temperature range</td>
</tr>
<tr>
<td><strong>Recovery Time (min)</strong></td>
<td>16 @ 37°C, 50 @ 56°C</td>
<td>26 @ 37°C, 40 @ 56°C</td>
<td>Time required to regain a temperature at the chamber center to within 0.3 °C, both doors open for 30 seconds</td>
</tr>
<tr>
<td><strong>Heat-Up Time (min)</strong></td>
<td>90 ambient to 37°C, 95 ambient to 56°C, 120 ambient to 70°C</td>
<td>160 ambient to 37°C, 160 ambient to 56°C, 160 ambient to 70°C</td>
<td>Time required for chamber center to attain the given temperature within 0.3°C</td>
</tr>
</tbody>
</table>

Testing and calibration conditions: chamber empty, 2 shelves in place; ambient temperature, 24°C ±2°C incubators at a steady temperature; 120 volts, 60 Hz.

(1) Temperatures are measured at the eight corners 2 inches from each wall and at the chamber center with a NBS traceable Fluke 2452 Measurement Control System and special limits of error 30 gauge thermocouples.

## General Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Volume</th>
<th>Chamber Dimensions (in./cm)</th>
<th>Exterior Dimensions (in./cm)</th>
<th>Product Number</th>
<th>Electrical (50/60 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ft³</td>
<td>W</td>
<td>H</td>
<td>D</td>
<td>W</td>
</tr>
<tr>
<td>Small</td>
<td>1.5</td>
<td>12-3/4</td>
<td>16-7/8</td>
<td>11-7/8</td>
<td>16-3/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(32.4)</td>
<td>(42.9)</td>
<td>(30.2)</td>
<td>(42.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>5.0</td>
<td>18-1/2</td>
<td>25-7/8</td>
<td>17-7/8</td>
<td>22-1/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(47.0)</td>
<td>(65.7)</td>
<td>(45.4)</td>
<td>(57.2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*EUROPEAN LINE CORD  
U.S. Patent No. 4,054,733
Unpacking
Remove the packing material from the glass door.
An owner's manual, two shelves, and four shelf supports are provided with each Incubator.

Installation
Site Selection: Allow adequate space for ventilation; place on a sturdy surface; level with the adjustable feet. Do not place directly under a heating/cooling vent or in a location which is subject to significant temperature variations (greater than ±5°C).

The electrical requirements are listed on the specifications plate located on the rear of the unit. Consult Barnstead/Thermolyne if your electrical service is different than those listed on the specification plate.

Plug the power cord into the specified electrical source and push the circuit breaker, located on the top-rear of the incubator, to the “ON” position.

Operation
The incubator’s operating temperature range is ambient-plus 5°C to 70°C.

The Incubator is turned On or Off by depressing the "ON-OFF" button located on the top panel.

The chamber temperature is the default value displayed.

To review the setpoint temperature, depress the "SET" button. The setpoint temperature mode will be indicated by an arrow in display area.

To adjust the setpoint temperature, simultaneously depress the "SET" button and either the "UP" or "DOWN" button.

NOTE
Depressing the "UP" or "DOWN" button without depressing the "SET" button will have no effect.

The rate of temperature adjustment increases the longer the buttons are depressed.
While adjusting the setpoint temperature, the display will skip from 71 to 0 when scrolling upscale with the "UP" button or from 0 to 71 when scrolling downscale with the "DOWN" button.

The green "CYCLE LIGHT" is illuminated while the Incubator is heating. It is located on the "ON-OFF" button.

Two miniature pin-jacks (2.03 mm), located on the control panel, marked " + " and " - " supply an analog signal to drive a recorder, 1°C equals 1 millivolt (approximate).

Incubators may be stacked to a height of 2 units.

The shelf supports are removable.

The shelves are adjustable in 3/4 inch increments, down to 2 inches above the chamber bottom and up to 2 inches below the chamber top.

The door is reversal. Page 10 describes the procedure to reverse the doors.
A "+" in the display area indicates the "secondary output device is functioning. Refer to Maintenance and Servicing (page 9) for more details.

Please refer to Calibration (page 7) for information concerning temperature accuracy and calibration.

**Calibration**

The unit has been factory calibrated with precision test apparatus so its display and control point values match the temperature sensor and actual chamber center temperature. Field adjustment should, thus, not normally be necessary. Should adjustment become desirable for any reason, contact Barnstead/Thermolyne for assistance.

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**CAUTION**

The unit’s control accuracy is generally much better than that of many thermometers. If, for any reason, the displayed temperature does not match a thermometer indication, the accuracy of thermometer should be questioned first. If a certified thermometer is used, make sure the proper immersion depth corrections are used. Medium (air, water, etc.) can also affect the thermometer indication. DO NOT ATTEMPT TO RECALIBRATE THE UNIT UNLESS THE ABOVE CONCERNS ARE ADDRESSED. THIS CONTROL REQUIRES A HIGHLY ACCURATE REFERENCE STANDARD FOR PROPER CALIBRATION. If in doubt, we encourage you to call the factory.

If, after having carefully considered the above factors, you feel that the incubator requires recalibration, proceed as follows:

---

**NOTE**

Be sure to read this entire section before making any adjustments.

**A. Locate the calibration adjustments:**

Open the incubator door, examine the area at the bottom of the control section just above the door—the area normally hidden when the door is closed. Just to the left of the display you will see three small holes; each of these holes provides access to an adjustment screw of a trimpot. The complete adjustment range of these trimpots is 20 turns. If you continue turning after reaching the end of the adjustment, the trimpot screw will just continue to turn—no damage will be done. For brevity, let's call these L, M, and R—for left, middle and right.

**B. Purpose of each adjustment:**

L shifts the entire calibration curve up or down. Thus, if you correct calibration by 1 degree at 20 degrees C, you will also change the calibration by 1 degree at 60 degrees C. For a given incubator temperature, turning L counterclockwise will lower the display reading .8 degree per turn; clockwise will increase the display reading.

M affects the high end of the range more so than the low end of the temperature range. At approximately 21 degrees C, M has no effect at all on the calibration. M will change the calibration about .8 degrees per turn at 60 degrees C and progressively less at lower and lower temperatures until it has no effect at 21 degrees C. Turn M counterclockwise to lower the display reading. In other words, M changes the slope of the calibration curve.

R adjusts the calibration so that the stabilized temperature displayed will match the temperature setpoint. It does not affect the accuracy of the temperature displayed. Turn R clockwise if the displayed temperature is higher than the setpoint; counterclockwise if lower. R changes the setpoint about .7 degrees per turn.
NOTE

Unless otherwise specified, it is imperative that the temperature of the incubator be allowed to completely stabilize after each adjustment. Calibration is best done in an empty incubator — a loaded incubator will take much longer to stabilize. When possible, allow incubator to stabilize overnight.

C. To calibrate at a single temperature:
If you are interested in one temperature only, it is easiest to use L only. For example, if you are interested only in a 37 degree temperature, set the temperature to 37.0 and allow to stabilize. Note the temperature as read by your reference thermometer—let us say it reads 36.6 or .4 degrees low. The display must now be lowered by .4 degree to correspond with your reference thermometer; therefore, turn L counter-clockwise a half turn (change is .8 degrees per turn). The display will now read 36.6. The incubator control now senses this as a low temperature and the incubator heats until both the reference and display read 37.0.

D. To calibrate the complete range of the incubator:
Set the temperature to a point below room temperature (say 5.0) so that the incubator will not come ON. With the door closed, let stand overnight to stabilize at room temperature.

Turn L until the display reads the reference temperature.

Now set the temperature to 60.0 and allow to stabilize overnight.

Proceed as in (C) except use M instead of L. For example, if the reference thermometer reads 60.4, turn M clockwise a half turn. This will immediately increase the temperature indication of the display to 60.4; the incubator will then sense this as a high temperature and lower the temperature until both the reference and display read 60.0.

It is possible that this adjustment may reflect into the calibration at room temperature by a very slight amount. For most accurate results, recheck at room temperature as above and repeat the procedure if necessary.

E. To make setpoint and the stabilized display temperature coincide:
Turn R as described in (B). There will be no immediate change in any indication. Let the temperature restabilize. The incubator will shift temperature until the two readings are coincident.

If you are interested in a single temperature only, you may wish to make this coincidence adjustment at the temperature. If you are interested in several temperatures over a range, we suggest making this adjustment at the center of the range.
Maintenance and Servicing

**WARNING**
Disconnect from the power supply prior to maintenance and servicing.

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Refer servicing to qualified personnel.

This incubator is equipped with a patented electronic control containing a secondary control circuit designed to provide high temperature safety in the event of failure of the output switching device (triac) and other critical components of the primary control circuit.

If a component fails in the "ON" condition the secondary control relay will remove power from the elements, simultaneously flashing a warning indication of a "+" on the digital display area.

The secondary control relay will then control the unit at the previous setpoint value until the cause of the malfunction is corrected, at which time it will return control to the normal circuit.

Occasional single tripping of the secondary control may occur, however, it does not require any action on your part.

Repeated, habitual cycling of the secondary control indicates that the critical control components may have failed which does require action to be taken.

In the event the control ever needs to be removed, repaired, or replaced, access is given by:
- a. Removing four screws located at the rear of the control cabinet.
- b. Sliding back the top cover exposing the printed circuit board.
- c. Eight connections must be removed from the PC board to remove control assembly.
If the elements need replacement, access is gained by tipping the unit backwards and opening the hinged access door on the bottom of the unit.

a. Indication of a burned out element would be lack of heat when the "CYCLE" light is on and/or initial slow heat-up or a cold side in the chamber.

b. Confirmation can be made by disconnecting the heater leads from the control and measuring the resistance of the heater assembly.

c. Resistance values.
   • Small Models: 100 volts, 65 ohms; 120 volts, 85 ohms; 220/240 volts, 181 ohms.
   • Large Models: 100/120 volts, 46 ohms; 220/240 volts, 92 ohms.

**Door Reversal**

The inner and outer doors can be reversed to open from either the left or right by following procedures below:

a. Open outer door.

b. Open inner glass door.

c. Remove shelves and shelf guides (braces).

d. Remove the two (2) side panels either by removing the 6 screws per panel (Type 42000) or by popping them off their support pins (Type 41900).

e. Switch the two sides and screw or pop them into place.

f. Switch support braces so that magnet is on the same side as strikeplate on door.

g. Gently peel off strikeplate and place on the inside of the glass door.

h. Close the outer door.

i. After disconnecting electrical power to the unit, remove 4 screws at back top of unit and slide top cover back.

j. Remove top pivot pin bolt.

k. Remove 2 front screws and loosen 1 bottom screw holding lower door support bracket.

l. Remove bracket and door, replacing screws in holes, and re-attach on opposite side.

m. Change pivot pin mounted in bracket to remaining open hole in bracket.

n. Remove remaining pivot pin from door and insert in opposite door bushing.

o. Place door in position, inserting open bushing over lower pivot pin first.

p. Replace top pivot pin bolt through faceplate into top pivot pin.

q. Replace top cover and 4 screws.

r. Reconnect electrical power to the unit.
## Replacement Parts List
### For Series 700 & 701

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN419X1A*</td>
<td>Control Assembly, 100/120 Volt</td>
<td>1</td>
</tr>
<tr>
<td>CN419X2A*</td>
<td>Control Assembly, 220/240 Volt</td>
<td>1</td>
</tr>
<tr>
<td>PC419X2A</td>
<td>Power Supply Board</td>
<td>1</td>
</tr>
<tr>
<td>PC419X1A</td>
<td>Display Board</td>
<td>1</td>
</tr>
<tr>
<td>EL419X1</td>
<td>Heating element, 120V, I41925</td>
<td>1</td>
</tr>
<tr>
<td>EL419X2</td>
<td>Heating element, 220/240V, I41920 &amp; I41920-26</td>
<td>1</td>
</tr>
<tr>
<td>EL419X3</td>
<td>Heating element, 100V, I41924</td>
<td>1</td>
</tr>
<tr>
<td>EL420X1</td>
<td>Heating element, 100/120V, I42045 &amp; I42044</td>
<td>1</td>
</tr>
<tr>
<td>EL420X2</td>
<td>Heating element, 220/240V, I42040 &amp; I42040-26</td>
<td>1</td>
</tr>
<tr>
<td>RS419X1A</td>
<td>Temperature Sensor All units</td>
<td>1</td>
</tr>
<tr>
<td>SWX104</td>
<td>Circuit Breaker All units</td>
<td>1</td>
</tr>
<tr>
<td>SCX77</td>
<td>Diode (220/240V) not supplied w/control</td>
<td>1</td>
</tr>
<tr>
<td>DR700X1</td>
<td>Glass Door for type 41900</td>
<td>1</td>
</tr>
<tr>
<td>DR701X1</td>
<td>Glass Door for type 42000</td>
<td>1</td>
</tr>
<tr>
<td>HG700X1A</td>
<td>Glass Door Hinge (Small)</td>
<td>1</td>
</tr>
<tr>
<td>HG701X1A</td>
<td>Glass Door Hinge (Large)</td>
<td>1</td>
</tr>
<tr>
<td>BC700X1</td>
<td>Shelf Bracket for type 41900</td>
<td>4</td>
</tr>
<tr>
<td>BC701X1</td>
<td>Shelf Bracket for type 42000</td>
<td>4</td>
</tr>
<tr>
<td>SH419X1</td>
<td>Shelf for type 41900</td>
<td>2</td>
</tr>
<tr>
<td>SH420X1</td>
<td>Shelf for type 42000</td>
<td>2</td>
</tr>
<tr>
<td>FTX25</td>
<td>Feet</td>
<td>4</td>
</tr>
</tbody>
</table>

*Control assembly consists of power and display printed circuit boards plus mounting bracket.

## Ordering Procedures

Please refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the Barnstead | Thermolyne dealer from whom you purchased this unit or can be obtained promptly from the factory. When service or replacement parts are needed we ask that you check first with your dealer. If the dealer cannot handle your request, then contact our Customer Service Department at 319-556-2241 or 800-553-0039.

Prior to returning any materials to Barnstead | Thermolyne Corp., please contact our Customer Service Department for a “Return Goods Authorization” number (RGA). Material returned without a RGA number will be refused.
## Wiring Diagram

**Type 41900/42000 Incubators**

<table>
<thead>
<tr>
<th>Designated No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Heater, Element</td>
</tr>
<tr>
<td>R1</td>
<td>Sensor</td>
</tr>
<tr>
<td>S1</td>
<td>Switch, Circuit Breaker</td>
</tr>
<tr>
<td>D1</td>
<td>Diode</td>
</tr>
</tbody>
</table>
**Thermal Ceramics**

**Material Safety Data Sheet**

**Date Revised:** 7/2/91

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**PRODUCT IDENTIFICATION**

**Trade Name(s):** CERAFIBER

**Generic Name:** REFRACTORY CERAMIC FIBER INSULATION

**Chemical Name:** ALUMINA SILICA

**Manufacturer:** Thermal Ceramics

**Address:** P.O. BOX 923, 2102 Old Savannah Road

**City:** Augusta

**State:** Georgia

**Zip:** 30903

**Telephone:** (404) 796-4200

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**PRODUCT INGREDIENTS**

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>CAS NUMBER</th>
<th>%</th>
<th>PEL and TLV (except as noted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFRACTORY CERAMIC FIBER</td>
<td>65997-17-3</td>
<td>100</td>
<td>1 FIBER/CC EXPOSURE GUIDELINE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5mg/M³ - NUISANCE RESPIRABLE - OSHA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10mg/M³ - NUISANCE TOTAL - ACGIH</td>
</tr>
<tr>
<td>CRYSTALLINE SILICA (CRISTOBALITE) WILL FORM “AFTER SERVICE” AT TEMPERATURES &gt;1000°C.</td>
<td>14464-46-1</td>
<td>&gt;20</td>
<td>0.05 mg/M³ - OSHA Respirable Dust</td>
</tr>
</tbody>
</table>

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**PHYSICAL DATA**

**Appearance and Odor:** WHITE FIBER-NO ODOR.

**Boiling Point:** NA

**Vapor Pressure:** NA

**Water Solubility (%):** NIL

**Vapor Density (Air=1):** NA

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**FIRE AND EXPLOSION DATA**

**Flash Point (Method):** NONFLAMMABLE

**NFPA Flammable/Combustible Liquid Classification:** NA

**Flammable Limits:** LEL: NA %

**Auto-Ignition Temperature:** NA

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**HEALTH HAZARDS**

**Summary/Risks:** EXPOSURE TO DUST FROM THIS PRODUCT SHOULD BE MINIMIZED. ANIMAL INHALATION AND ARTIFICIAL IMPLANTATION STUDIES HAVE REPORTED THE DEVELOPMENT OF TUMORS. BASED ON PRELIMINARY RESULTS, A NOTICE OF SUBSTANTIAL RISK HAS BEEN FILED WITH THE EPA ACCORDING TO SECTION 8(e) OF THE TOXIC SUBSTANCES CONTROL ACT. BASED ON ANIMAL STUDIES, IARC HAS CLASSIFIED RCF AS POSSIBLY CARCINOGENIC FOR HUMANS (2B). DATA FROM HUMAN EPIDEMIOLOGICAL STUDIES IS INSUFFICIENT. THIS SUBSTANCE OR MIXTURE HAS NOT BEEN CLASSIFIED A CARCINOGEN BY NTP OR OSHA.

**Medical conditions which may be aggravated:** AS WITH ANY DUST, PRE-EXISTING UPPER RESPIRATORY AND LUNG DISEASES MAY BE AGGRAVATED.

**Target Organ(s):** LUNGS, SKIN AND EYES.

**Acute Health Effects:** PRODUCT IS A MECHANICAL IRRITANT TO SKIN, EYES AND UPPER RESPIRATORY SYSTEM.

**Chronic Health Effects:** EXCESSIVE EXPOSURE TO RCF DUSTS AND AFTER SERVICE FIBERS MAY CAUSE LUNG DAMAGE (FIBROSIS). IARC STATES THERE IS SUFFICIENT EVIDENCE IN ANIMALS AND LIMITED EVIDENCE IN HUMANS TO CLASSIFY CRYSTALLINE SILICA AS A PROBABLE CARCINOGEN (2A) AND RCF AS A POSSIBLE CARCINOGEN (2B).

**Primary Entry Route(s):** INHALATION, SKIN AND EYE CONTACT.

**Signs/Symptoms of Overexposure**

**Inhalation:** IRRITATION OR SORENESS IN THROAT & NOSE. IN EXTREME EXPOSURES SOME CONGESTION MAY OCCUR.

**Skin Contact:** TEMPORARY IRRITATION OR RASH.

**Skin Absorption:** NA

**Ingestion:** NOT HAZARDOUS WHEN INGESTED. MAY CAUSE TEMPORARY IRRITATION TO GI TRACT.

**Eyes:** TEMPORARY IRRITATION OR INFLAMMATION

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**First Aid/Emergency Procedures**

**Inhalation:** REMOVE TO FRESH AIR. DRINK WATER TO CLEAR THROAT AND BLOW NOSE TO EVACUATE FIBERS.
Skin Contact: WASH AFFECTED AREAS GENTLY WITH SOAP AND WARM WATER.

Skin Absorption: NA

Ingestion: NA

Eyes: FLUSH EYES WITH COPIOUS QUANTITIES OF WATER. IF IRRITATION PERSISTS CONSULT A PHYSICIAN.

REACTIVITY DATA

MATERIAL IS STABLE. HAZARDOUS POLYMERIZATION CANNOT OCCUR.

Chemical Incompatibilities: HYDROFLUORIC ACID

Conditions to Avoid: NONE IN DESIGNED USE.

Hazardous Decomposition Products: NONE

SPILL OR LEAK PROCEDURES

Procedures for Spill/Leak: VACUUM CLEAN DUST WITH EQUIPMENT FITTED WITH HEPA FILTER. IF SWEEPING IS NECESSARY USE A DUST SUPPRESSANT.

Waste Management: WASTES ARE NOT HAZARDOUS AS DEFINED BY RCRA (40 CFR PART 261). COMPLY WITH FEDERAL, STATE & LOCAL REGULATIONS. METHOD OF DISPOSAL - LANDFILL. RQ - N/A.

SPECIAL PROTECTION INFORMATION

Goggles: GOGGLES OR SAFETY GLASSES WITH SIDE SHIELDS ARE RECOMMENDED.

Gloves: GLOVES ARE RECOMMENDED.

Respirator: <1 F/CC, USE 3M 9900; <10 F/CC, USE MSA COMFO II WITH H FILTER; <50 F/CC, USE MSA ULTRA-TWIN H FILTER; OR EQUIVALENTS. SEE SECTION IX-OTHER.

Ventilation: USE SUFFICIENT NATURAL OR MECHANICAL VENTILATION TO KEEP DUST LEVEL TO BELOW PEL/TLV/WEG (WORKPLACE EXPOSURE GUIDELINE) USE DUST COLLECTION WHEN TEARING OUT.

Other: WEAR LOOSE FITTING, LONG SLEEVED CLOTHING. WASH EXPOSED AREAS WITH SOAP & WARM WATER AFTER HANDLING. WASH WORK CLOTHES SEPARATELY FROM OTHER CLOTHING; RINSE WASHER THOROUGHLY.

Special Considerations for repair/maintenance of contaminated equipment: CRISTOBALITE RESPIRATOR: <10X PEL, USE 3M 9900; <100X PEL, USE MSA ULTRA-TWIN H FILTER; OR EQUIV. SEE SEC IX-OTHER.

SPECIAL PRECAUTIONS

*** ALWAYS SEGREGATE MATERIALS BY MAJOR HAZARD CLASS ***

THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Storage Segregation Hazard Classes: IRRITANT

Special Handling/Storage: KEEP MATERIAL DRY.

Special Workplace Engineering Controls: ADEQUATE VENTILATION TO KEEP DUST LEVEL TO BELOW PEL/TLV/WEG (WORKPLACE EXPOSURE GUIDELINE).

Other: ADDITIONAL INFORMATION ON THE HEALTH AND SAFETY ASPECTS OF REFRACTORY CERAMIC FIBERS IS AVAILABLE.

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As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

MSDS/MSD3 FORM REV. 7/2/91
Owens/Corning Fiberglas
Material Safety Data Sheet

Manufacturer: Owens-Corning Fiberglas Corp.
Fiberglas Tower
Toledo, Ohio 43659

Health Information Phone and Emergency Phone:
8:00 AM - 5:00 PM (EST): (419) 248-8234
Emergencies only, after 5:00 PM (EST):
(419) 248-5330

Product Division: Insulation Operating Division (INSOD)

Date Prepared: June 1, 1991
Supersedes MSDS Dated: July 20, 1987


Section 1 - Component Data

Hazardous Ingredients:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>% Composition</th>
<th>OSHA-PEL</th>
<th>ACGIH-TLV</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiberglass Wool</td>
<td>Fibrous Glass</td>
<td>65997-17-3</td>
<td>85-96</td>
<td>a.</td>
<td>10mg/M³ 8-hr TWA</td>
<td>3 x 10⁶ fiber/M³ 10-hr TWA (NIOSH-REL)</td>
</tr>
</tbody>
</table>

Nonhazardous Ingredients:

| Cured Phenol/formaldehyde binder solids | 25104-55-6 | 4-15 | ........None Established........ |

a. OSHA has not yet established a PEL for fibrous glass. OSHA considers it to be a "particulate not otherwise regulated" (PNOR) with a PEL of 5 mg/M³ for the respirable dust fraction, and 15 mg/M³ for the total dust fraction, both as an 8-hr TWA.
Section 2 - Emergency and First-Aid Procedures

Inhalation: Move individual to fresh air. Seek medical attention if irritation persists.

Skin Contact: Wash with mild soap and running water. Use a washcloth to help remove fibers. To avoid further irritation, do not rub or scratch irritated areas. Rubbing or scratching may force fibers into the skin. Seek medical attention if irritation persists.

Eye Contact: Flush with flowing water for at least 15 minutes. Seek medical attention if irritation persists.

Ingestion: N.A. (Not Applicable)

Section 3 - Fire and Explosion Data

Flash Point (°F): N.A. (Not Applicable)  Method Used: N.A.

Auto Ignition Temperature (°F): N.A.  Flammability Limits (%):

Extinguishing Media: Water, Foam, Dry Chemical

Special Fire-Fighting Instructions: In a sustained fire, self-contained breathing apparatus should be worn.

Unusual Fire and Explosion Hazards: The facing on kraft paper and foil faced products will burn and should not be left exposed. Special care should be taken when working close to the facing with an open flame. Vinyl faced products in fire conditions may give off hydrogen chloride, a highly irritating and toxic gas. Evacuate the building immediately.

Section 4 - Health Hazard Data

Primary Routes of Exposure: Inhalation and skin contact.

Acute: Inhalation: Inhalation of dusts and fibers may result in irritation of the upper respiratory tract (mouth, nose, and throat).

Skin Contact: Skin contact with dusts and fibers may product itching and temporary mechanical irritation.

Eye Contact: Eye contact with dusts and fibers may produce temporary mechanical irritation.

Ingestion: Temporary mechanical irritation of the digestive tract. Observe individual. If symptoms develop, consult a physician.

Chronic: See carcinogenicity section below. There are no other known health effects associated with chronic exposure to this product.

Carcinogenicity:

<table>
<thead>
<tr>
<th>Hazardous Ingredients</th>
<th>Listed By:</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiberglass Wool</td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

IARC: The International Agency for Research on Cancer (IARC) in June, 1987, classified fiberglass wool as a possible cancer causing agent to humans (Group 2B). This classification was based on a combined evaluation of published human and animal studies. The human data included large scale mortality studies of U.S. and European fiberglass wool factory workers. IARC concluded that the human studies did not provide sufficient evidence that fiberglass wool caused cancer in human. The classification of fiberglass wool as a possible carcinogen to humans was substantially based on experimental animal studies in which they were exposed to wool glass fibers through non-natural routes, such as injection or implantation. IARC regards it as prudent to treat a material
for which there is sufficient evidence of carcinogenicity to animals as if it is a possible carcinogen in humans.

Additional Information: Animal inhalation experiments in which laboratory animals were exposed to large quantities of glass fiber have not resulted in a positive association between glass fibers and lung cancer. A small study of Canadian glass wool workers reported a statistically significant increase in lung cancer mortality.

Large scale studies published in 1987 which examined the mortality rates of U.S. and European fiberglass wool factory workers found no statistically significant difference in lung cancer rates between those workers and the populations in their local or regional communities. A 1990 update of the U.S. cohort reported a small statistically significant excess for respiratory cancer in workers when compared with populations in their local communities. While the overall mortality rates in these mortality studies were slightly raised and did increase with time since the first exposure, the increases were not related to duration of exposure or to an estimated time weighted measure of exposure. An expanded study is investigating other possible factors.

California Prop 65 Statement: Warning: Contains fiberglass wool. Possible cancer hazard. To avoid this possible cancer hazard, minimize breathing fiberglass wool dust.

Medical Conditions Aggravated by Exposure: Persons with a history of chronic respiratory or skin conditions that are aggravated by mechanical irritants may be at increased risk for worsening their condition from exposure to this product.

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**Section 5 — Employee Protection**

Ventilation: General dilution ventilation and/or local exhaust ventilation should be provided, as necessary, to maintain exposures below PEL's or TLV's. Dust collection systems should be utilized in operations involving high speed cutting/machining, such as routing, and may be required in other operations involving power tools.

Respiratory Protection: Appropriate respiratory protection should be used in accordance with your company's respiratory protection program and OSHA regulations under 29 CFR 1910.134. A properly fitted NIOSH or MSHA approved air purifying respirator such as the 3M Model 8710 or Model 9900 (in high humidity environments) or equivalent should be used when working with fiberglass wool products under the following conditions:

1. installing loosefill;
2. in any confined or poorly ventilated space;
3. fabrication involving power tools;
4. any installation operation or fabrication operation which creates a dusty working environment.

Eye Protection: Safety glasses, goggles or face shields should be worn whenever fiberglass materials are handled.

Protective Clothing: Wear loose fitting, long sleeved shirt that covers to the base of the neck, and long pants. Skin irritation from exposure to fiberglass is known to occur chiefly at pressure points such as around the neck, wrist, and waist. Wear gloves when handling product.

Work/Hygienic Practices: Handle in accordance with good industrial hygiene and safety practices:

- Avoid unnecessary exposures to dusts and fibers
- Remove fibers from the skin after exposure
- Be careful not to rub or scratch irritated areas. Rubbing or scratching may force the fibers into the skin. The fibers should be washed off. Use of barrier creams can, in some instances, be helpful.
- Use vacuum equipment to remove fibers and dusts from clothing. Compressed should never be used. Always wash work clothes separately and wipe out the washer/sink in order to prevent loose glass fibers from getting on other clothes.
— Keep the work area clean of dusts and fibers generated during fabrication. Use vacuum equipment to clean up dusts and fibers. Avoid sweeping or using compressed air as the techniques resuspend dusts and fibers into the air.
— Have access to safety showers and eye wash fountains.

Section 6 — Reactivity Data

Stability (Conditions to Avoid): Stable (None)
Incompatibility (Materials to Avoid): None

Hazardous Decomposition Products: Facing and binder burns or decomposes in a fire. Primary combustion products are carbon monoxide, carbon dioxide and water. Vinyl faced products will emit hydrogen chloride in a fire. Emission of hydrogen chloride begins at 525°F with faster emission as the temperature rises.

Hazardous Polymerization: Will not occur.

Section 7 — Storage Precautions

Precautions to be Taken in Handling and Storage: Insulation should be stored in a dry place. Faced material should be stored well away from sources of ignition.

Section 8 — Physical Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Point</td>
<td>NA (Not applicable)</td>
</tr>
<tr>
<td>Specific Gravity (H₂O=1)</td>
<td>ND (Not determined)</td>
</tr>
<tr>
<td>Vapor Pressure (mmHg @ 20°C)</td>
<td>NA</td>
</tr>
<tr>
<td>Evaporative Rate (Ethyl Ether=1):</td>
<td>NA</td>
</tr>
<tr>
<td>Boiling Point (°F)</td>
<td>NA</td>
</tr>
<tr>
<td>Percent Volatile by Volume</td>
<td>NA</td>
</tr>
<tr>
<td>Vapor Density (Air=1)</td>
<td>NA</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Insoluble</td>
</tr>
<tr>
<td>ph</td>
<td>NA</td>
</tr>
</tbody>
</table>

Appearance and Odor: Pink, yellow or tan insulation which may have faint resin odor. Some products have a vinyl, kraft paper, foil or polypropylene facing.

Section 9 — Environmental Protection

Action to Take for Spills (Use Appropriate Safety Equipment): NA

Waste Disposal Method: Dispose in accordance with federal, state and local regulations. The primary method of disposal is in a municipal or industrial landfill.

EPA Hazardous Waste Number: This material is not regulated under the "RCRA" hazardous waste regulations.
Section 10 — Shipping Information

DOT Shipping Description: NA (Not applicable)
Hazard Classification: (Primary) Nonhazardous (Secondary) NA
ID Number: None IMO Class Number: NA
STCC Number: NA
Label(s) Required (if not excepted): NA
EPA Hazardous Substance: NA RQ Value: NA
Packaging Requirements (49CFR): (Specific) NA (Exceptions) None
Maximum Net Quantity in One Package: (Cargo only aircraft) NA (Passenger aircraft) NA
IATA Packaging Group: NA Freight Description: NA
Additional Information: None

Section 11 — Additional Information

SARA Title III Hazard Categories and Lists:

<table>
<thead>
<tr>
<th>Categories</th>
<th>NPCA - HMIS Rating:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Health: Yes</td>
<td>Health (acute): 1</td>
</tr>
<tr>
<td>Chronic Health: Yes</td>
<td>Flammability: 0</td>
</tr>
<tr>
<td>Fire Hazard: No</td>
<td>Reactivity: 0</td>
</tr>
<tr>
<td>Pressure Hazard: No</td>
<td>Personal Protection: Must be supplied by user depending on use conditions.</td>
</tr>
<tr>
<td>Reactivity Hazard: No</td>
<td></td>
</tr>
</tbody>
</table>

SARA III Listings:
Sec. 302 (Sec. 304 reportable), Extremely Hazardous Substances: None
CERCLA Hazardous Substances (Sec. 304 reportable): None
Sec. 313, Toxic Chemicals: None

NFPA Rating:
Health: 2
Flammability: 2 (facing, packaging)
Reactivity: 0
Unusual Hazards: None
Barnstead|Thermolyne
One Year Limited Warranty

Barnstead|Thermolyne Corporation warrants that if a product manufactured by
Barnstead|Thermolyne and sold within the continental United States or Canada proves to be
defective in material or construction, Barnstead|Thermolyne will provide you, without charge, for a
period of ninety (90) days, the labor, and a period of one (1) year, the parts, necessary to remedy any
such defect. Outside the continental United States and Canada, the warranty provides, for one (1) year,
the parts necessary to remedy any such defect. The warranty period shall commence either six (6)
months following the date the product is sold by Barnstead|Thermolyne or on the date it is
purchased by the original retail consumer, whichever date occurs first.

All warranty inspections and repairs must be performed by and parts obtained from an authorized
Barnstead|Thermolyne dealer or Barnstead|Thermolyne. Heating elements, however, because
of their susceptibility to overheating and contamination, must be returned to our factory, and if, upon
inspection, it is concluded that failure is not due to excessive high temperature or contamination,
warranty replacement will be provided by Barnstead|Thermolyne. The name of the authorized
Barnstead|Thermolyne dealer nearest you may be obtained by calling 1-800-446-6060 or writing to:

Barnstead|Thermolyne
P.O. Box 797
2555 Kerper Boulevard
Dubuque, IA 52004-0797
USA
FAX: (319) 556-0695

Barnstead|Thermolyne’s sole obligation with respect to its product shall be to repair or replace the
product. Under no circumstances shall it be liable for incidental or consequential damage.

THE WARRANTY STATED HEREIN IS THE SOLE WARRANTY APPLICABLE TO
BARNSTEAD|THERMOLYNE PRODUCTS. BARNSTEAD|THERMOLYNE EXPRESSLY
DISCLAIMS ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING
WARRANTIES OF MERCHANTABILITY OR FITNESS FOR USE.