

# PRODUCT USE INSTRUCTIONS

May 2005

Since 1886, UCAR Carbon Company has been supplying qualifying carbon and graphite products, skilled technical service, and experienced application assistance worldwide.

## UCAR GRADE C-34 CARBONACEOUS CEMENT

For Bonding and Sealing of **GRAFOAM**<sup>®</sup> Carbon Foam

### DESCRIPTION

UCAR<sup>®</sup> Grade C-34 Cement is an improved, carbonaceous heat setting bonding agent consisting of two components – a black powder and a molasses-like liquid – which are prepared for use as explained below. C-34 Cement is used principally for bonding carbon brick and large carbon and graphite shapes in thermic applications. It can be thermally cured to form a strong carbonaceous bond.

### PACKAGING

The ingredients for the preparation of C-34 Cement are supplied in individual containers labeled to show contents and assembled in standard 4.5 Kg (10 pound), 15.9 Kg (35-pound), and 79.4 Kg (175-pound) package units.

### STORAGE

The unmixed ingredients for UCAR Grade C-34 Cement will not deteriorate if kept covered and stored in a cool, dry place.

### PREPARATION FOR USE

For **GRAFOAM**<sup>®</sup> Grade FPA-15, 20 and 35, use the following proportions: 100 parts by weight of powder to 44 parts by weight of liquid. For **GRAFOAM**<sup>®</sup> Grade FPA-02, 5 and 15, use the following proportions: 100 parts by weight of powder to 47 parts by weight of liquid. The liquid should be thoroughly stirred before removing from the container.

Excessive thinning of the cement with the liquid component reduces the strength of the cemented joint. However, due to variations in temperatures, atmospheric conditions, and the sizing of the powder component, it may be necessary to increase or decrease the liquid component by up to 5% maximum to obtain the proper consistency. The standard recommended cement mixture should be thoroughly mixed before making any decision to change the liquid level.

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Cement should be mechanically mixed in a cold mixer. Mixing should continue until a uniform consistency is obtained. Because of the extreme fineness of the dry portion of the cement, agglomerates may be found occasionally in the containers of powder when stored under high humidity conditions or when containers have been punctured. In such cases, the powder should be sifted through a screen about the mesh size of the window screen prior to mixing. Once mixed, the cement should be used within a time period that will vary with the temperature as follows:

Temperature	Time Period
21°C (70°)	15 Days
38°C (100°)	3 Days

Guidelines for mixing one to two 175-pound units of cement are as follows (a total of 2 hours preparation time is required):

1. Completely empty one container of liquid component into paddle type mixer.
2. Add one box of powder component and mix for 15 minutes.
3. Add a second box of powder and mix for 30 minutes.
4. Shut off mixer and let sit for 45 minutes.
5. Mix for an additional 30 minutes prior to use. Cement is now ready to use.
6. If mixer is large enough for two 175-pound units then above quantities in steps one thru three can be doubled. Use the same mixing times.
7. A ¾" electric drill with paint type mixing paddle should be available at site when cement is being used if additional mixing of cement is needed.

Cover the cement and store in a cool place (21°C/70°F or less if possible) when not in use. Prior to using, warm the cement to room temperature; do not overheat.

## SURFACE PREPARATION

The surface to be bonded or sealed should be clean, dry, and dust free. For best bonding result, the carbon foam blocks need to be prepared and have adequate flatness and surface smoothness.

## METHOD OF APPLYING

### FOR BONDING:

Apply cement to the surface using a hard plastic trowel with a rounded edge free of burs to eliminate damage to the foam surface, in particular, of low-density foams. Spread C-34 Cement paste to about 2-3 mm thickness. Use the flat side of a flexible neoprene (or similar materials) applicator to work the cement paste in a circular motion and fill all open pores of the carbon foam surface with the cement paste. Remove all excess cement paste off the surface with a fixed-edge neoprene (or similar materials) scraping tool.

Apply additional approximately 1-2 mm of the cement paste to both mating surfaces and a rounded-edge flexible applicator. Join the two pieces together. If practically, slide the top piece slightly in all four directions against the bottom piece to insure an even bonding thickness and squeeze out excess cement paste. Scrape off any excess cement after joint is tightly closed. Place a weight of the top of the assembled blocks to prevent further movement of the cemented joint. Desirable joint thickness is generally less than 1 mm.

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### **FOR SEALING:**

Use the method of application described in the above Bonding Section. Desirable “sealant” thickness is generally less 0.5 mm.

After the curing step described below, a second sealer such as Chemlease MonoCoat E-308, MPP-117, and many other commercially available mold sealers can be used to seal off the surface and achieve vacuum tightness.

### **CURING THE CEMENTED JOINT**

Curing the cement paste to temperatures above the use temperature is required. A ramp-up rate of 20°C/hour is generally recommended. It is also recommended to hold the assembled blocks under a weight during curing. A final hold temperature at 150°C minimum is required to properly cure the resin. If the use temperature is above 150°C, it is necessary to cure to a temperature above the intended service temperature for the part. A hold time of 4 hours is generally adequate. However, the low thermal conductivity of the carbon foam should be taken into consideration when determining the total hold time because it is dependent upon the carbon foam grade and the thickness of the block. Too rapid heating can cause the cement paste to extrude from the joint before the cement paste sets up. The parts must not be moved after the curing operation is started.

### **REMOVING C-34 CEMENT**

The liquid component can be used to remove the fresh uncured cement from tools and equipment. Once the cement is cured, it is insoluble in the liquid component. **DO NOT** use liquid component to clean hands, clothes, or plastics.

<p style="text-align: center;"><b>CAUTION!</b></p> <p style="text-align: center;"><b>READ THIS BEFORE USING</b>  <b>UCAR® GRADE C-34 POWDER</b></p> <p><b>CAUTION! CONTAINS GRAPHITE (CAS #7782-42-5), CARBON BLACK (CAS #1333-86-4), AND PHENOLIC RESIN (CAS #9003-35-4). HARMFUL IF INHALED. MAY CAUSE PNEUMOCONIOSIS. CAUSES EYE AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE ASTHMATIC REACTION.</b></p> <p>Do not breathe dust. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling.</p> <p><b>FIRST AID</b> - For overexposure to fumes, vapors, and particulate matter, move the exposed person to fresh air. If breathing is difficult, oxygen may be administered. If breathing has stopped, artificial respiration should be started immediately. Seek medical attention.</p> <p>If the material enters the eyes, flush with water for at least 15 minutes. Seek medical attention if irritation develops or persists.</p> <p>If the material gets on the skin, wash thoroughly with mild soap and water. Seek medical attention if irritation develops or persists. Dermatitis should be treated symptomatically by a physician.</p> <p>If the powder is ingested, give two glasses of water and induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately.</p>	<p style="text-align: center;"><b>CAUTION!</b></p> <p style="text-align: center;"><b>READ THIS BEFORE USING</b>  <b>UCAR® GRADE C-34 LIQUID</b></p> <p><b>CAUTION! CONTAINS FURFURYL ALCOHOL (CAS #98-00-0). HARMFUL IF SWALLOWED OR INHALED. MAY BE ABSORBED THROUGH SKIN. CAUSES EYE AND SKIN IRRITATION. COMBUSTIBLE, REACTS VIOLENTLY WITH STRONG ACIDS. DO NOT BREATHE VAPOR. DO NOT SWALLOW.</b></p> <p>Do not get in eyes, on skin, on clothing. Wash thoroughly after handling. Keep container closed. Use adequate ventilation. Keep away from heat, flame, and acids.</p> <p><b>FIRST AID</b> - For overexposure to fumes, vapors, and particulate matter, move the exposed person to fresh air. If breathing is difficult, oxygen may be administered. If breathing has stopped, artificial respiration should be started immediately. Seek medical attention.</p> <p>If the material enters the eyes, flush with water for at least 15 minutes. Seek medical attention if irritation develops or persists.</p> <p>If the material gets on the skin, wash thoroughly with mild soap and water. Seek medical attention if irritation develops or persists. Dermatitis should be treated symptomatically by a physician.</p> <p>If the powder is ingested, give two glasses of water and induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately.</p> <p><b>IN CASE OF FIRE</b> - Use water, dry chemical, CO<sub>2</sub>, or foam.</p>
<p><b>MIXTURE WARNING!</b></p> <p><b>WARNING</b></p> <p>C-34 Cement must not be used in contact with hot surfaces in excess of 70°C (160°F). Furfuryl alcohol fumes will be generated which can flash if heated above 70°C (160°F). Do not heat in confined spaces; vapor pressure can cause pressure buildup. Potential for explosion if heated in confined space.</p> <p>When the solid and liquid components have been mixed, the same precautions and instructions that apply to the individual components apply to the mixture.</p> <p>Material Safety Data Sheet Number 4025 for this product should be reviewed for more safety information.</p>	