CERAMITE GUIDELINES FOR USE

PROCEDURES FOR PREPARING, MIXING, CASTING AND FIRING CERAMITE CASTABLE REFRACTORIES

The following guidelines cover general use instructions for most Ceramite refractories. Special conditions or circumstances out of the ordinary may require modifications to these procedures.

Ceramite blends covered by these procedures are listed in the "mixing" section.

PREPARING

1. Refractory:
   Ensure the dry Ceramite castable refractory is at a room temperature of 20±5°C (68±9°F).
   NOTE: Depending on the bag size and storage conditions, it may take up to two days to stabilize the temperature of the material.
2. Fibres:
   If polypropylene fibres are being added to the refractory, they must be added to the dry castable prior to the addition of water. The recommended rate is 0.05 percent by weight. For example, 0.5 grams (0.0011 pounds) of fibre is added per 1 kilogram (2.2 pounds) of dry castable.
   NOTE: For all parts and plates cast with Ceramite SFR, fibres must be added. All other blends with thicknesses of more than 10 centimetres (4 inches) must have fibres added.
3. Water:
   The water being used must be potable and at a temperature not exceeding 25°C (77°F). With room temperatures below 15°C (60°F), use tempered water between 21–25°C (70–77°F).
4. Mixer:
   For effective mixing of the Ceramite castable a clean pan mixer in good operating condition is recommended.

MIXING

1. Add dry Ceramite to the mixer/hopper and record the weight.
2. Sprinkle any required polypropylene fibres into the dry refractory and mix thoroughly for at least one minute prior to the addition of water. Ensure there is no balling of the fibres.

3. Gradually add the total amount of water recommended. Refer to the following guidelines for the amount of water as a percentage by weight.

Water addition guidelines, as a percentage of weight:

- Ceramite BCA 4.5–6.0%
- Ceramite BCR 5.0–6.0%
- Ceramite BCR-S 5.5–6.2%
- Ceramite BKA 4.5–6.0%
- Ceramite BKR 4.7–6.0%
- Ceramite BKR-F 5.2–6.5%
- Ceramite BKR-S 5.5–6.2%
- Ceramite CSA 4.3–4.7%
- Ceramite CSR 4.7–6.0%
- Ceramite CSR-F 5.2–6.5%
- Ceramite CSR-S 5.5–6.2%
- Ceramite SFR-SB 6.0–7.3%
- Ceramite T 5.2–6.5%
- Ceramite T-D ..... water addition covered in the Ceramite T-D datasheet
- Ceramite T-W ..... water addition covered in the Ceramite T-W datasheet

4. Mix the refractory and water for a minimum of six minutes and until the mix is thoroughly blended.
   NOTE: If fibre-reinforcement is required, such as stainless steel needles, add them four minutes or later into the mixing cycle. A standard quantity of fibre-reinforcement is 3% by weight. Ensure there is no balling of fibres during the mixing process.

MOLDING

1. Transfer the refractory from the mixer to the mold or form.
   NOTE: A shovel or rake may be required if the mixer cannot be placed for direct pouring.
2. Vibration of the refractory is recommended during the casting process to raise any trapped air pockets to the surface. Externally mounted or pencil form vibrators can be used, depending on the casting.
   NOTE: Ceramite-S blends are self-flowing, meaning they can be successfully cast in most instances without the use of vibration. Mild vibration may be applied. However, excessive vibration of the refractory can cause particle settling and reduce the overall strength of the product.
3. Use finishing tools to smooth the refractory and provide an optimum surface finish.

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HARDENING

1. When the casting, trowelling or spraying process is complete, cover the exposed surfaces to minimize the evaporation of water and promote hardening of the Ceramite material.
2. Allow the Ceramite to set undisturbed for a minimum of 24 hours at a room temperature of approximately 20°C (68°F) before demolding or proceeding to the firing process. Increase the set time for lower temperatures and before demolding smaller castings which may generate little internal heat.

FIRING

After the Ceramite has set for a minimum of 24 hours it must be fired according to the following heating schedule. Items marked as "NOTE" in the following steps support material cast or are applied within a steel frame, such as material cast in a steel crucible shell.

1. Place any cast item in a heating oven. For other applications create a heating environment by incorporating a thermocouple or similar temperature monitoring device.
2. Raise the temperature from ambient to 150°C (302°F), increasing the temperature at a maximum rate of 25°C (45°F) per hour.
   NOTE: If heating a steel shell, increase at a maximum rate of 10°C (18°F) per hour.
3. Hold the temperature at 150°C (302°F) for one hour minimum for each 1 centimetre (0.4 inch) of refractory thickness.
4. Raise the temperature from 150°C (302°F) to 275°C (527°F), increasing the temperature at a maximum rate of 10°C (18°F) per hour.
5. Hold the temperature at 275°C (527°F) for one hour minimum for each 1 centimetre (0.4 inch) of refractory thickness.
   NOTE: If heating a steel shell, hold the temperature for two hours minimum.
6. Raise the temperature from 275°C (527°F) to 350°C (662°F), increasing the temperature at a maximum rate of 10°C (18°F) per hour.
7. Hold the temperature at 350°C (662°F) for one hour minimum for each 1 centimetre (0.4 inch) of refractory thickness.
   NOTE: If heating a steel shell, hold the temperature for two hours minimum.
8. Raise the temperature from 350°C (662°F) to the maximum fire temperature. The maximum fire temperature for each material type is in the following list. Raise the temperature at a maximum rate of 25°C (45°F) per hour.
   NOTE: If heating a steel shell, increase at a maximum rate of 18°F (10°C) per hour.

Maximum fire temperature:

- Ceramite BCA .....850°C (1562°F)
- Ceramite BCR .....600°C (1112°F)
- Ceramite BCR-S.....600°C (1112°F)
- Ceramite BKA .....850°C (1562°F)
- Ceramite BKR.....600°C (1112°F)
- Ceramite BKR-F.....600°C (1112°F)
- Ceramite BKR-S.....600°C (1112°F)
- Ceramite CSA .....850°C (1562°F)
- Ceramite CSR.....600°C (1112°F)
- Ceramite CSR-F.....600°C (1112°F)
- Ceramite CSR-S.....600°C (1112°F)
- Ceramite SFR-SB.....600°C (1112°F)
- Ceramite T .....600°C (1112°F)
- Ceramite T-D.....600°C (1112°F)
- Ceramite T-W.....600°C (1112°F)

9. Hold the maximum fire temperature for one hour minimum for each 1 centimetre (0.4 inch) of refractory thickness.
   NOTE: If heating a steel shell, hold the temperature for two hours minimum. The steel quality might limit the maximum temperature.
10. Lower the temperature slowly at a maximum rate of 25°C (45°F) per hour.
11. Upon reaching a temperature of 100°C (212°F) the cool down can continue in the ambient air.

DANGER!
Failure to follow the mixing, preheating or firing instructions associated with packaged Ceramite® product may cause an explosion resulting in death, injury or property damage.

NOTE: Pyrotek recommends purchasing Ceramite® in pre-fired cast shapes.

HEALTH AND SAFETY

Prior to use, refer to the product safety data sheet for proper handling and required personal protective equipment. Ceramite® Material Safety Data Sheets can be requested at sds@pyrotek-inc.com, or by contacting your local Pyrotek Sales Engineer.

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