Mixing and Installation Guide

Pourable Backup Insulation

Pyrotek®

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INTRODUCTION

Our Mission Statement

Pyrotek is a leading international company supplying customers with performance improving technical products, integrated systems and consulting services worldwide. Our mission is to provide innovative solutions to customer needs utilizing our global resources. We are committed to:

- Customer satisfaction.
- Employee development.
- Profitable growth.
- Integrity.
- Reliability, quality and service.
- Environmental awareness.
- Partnerships with customers and suppliers.

Our Dedication to You

Our commitment to customer service began with the company's inception in 1956. Today you can depend on Pyrotek for innovative solutions to your high-temperature material requirements.

Safety Datasheets

Current material safety datasheets are available from your Pyrotek technical specialist, or by email at SDS@pyrotek.com.

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Safety Designations

In this manual the following marking conventions are used to focus on certain subjects or actions.

NOTE:
Highlights important or special information.

CAUTION: Possible Equipment Damage—
Provides information to avoid harm to the equipment.

WARNING: Personnel Hazard—
Alerts to avoid a situation that has a potential to cause serious bodily injury or death.

Preface

This manual describes the operation of specific equipment or materials. The information in this manual is important for proper and safe operations. Also, ensure the workplace is adequately illuminated, clean and safe.

Document Revisions

Please provide Pyrotek Corporate Marketing with any suggestions or changes you may have for improvement to the contents of this document.

Revision	Date	Reason
A	September 6, 2016	Initial publication.
B	March 2019	Content update

INTRODUCTION

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Introduction

This guide provides information on pourable backup insulation and how to install the insulation.

Pyrotek technical specialists can assist with application issues, insulation calculations, and general product questions.

Backup Insulation Applications

Backup insulation is generally placed between precast refractory liners and the outer equipment shell in the following applications.

- Tabletop refractory insulation.
- Trough insulation.
- Filter box insulation.
- Crucible, ladle and small furnace insulation.

Pourable Backup Insulation Types

POURABLE SLURRY BACKUP INSULATION

Pourable slurry backup insulation is a two-part water-based slurry that when mixed and dried creates a low-density, high strength, high insulating castable.

Two liquid components, referred to as “Part A” and “Part B,” are mixed to create a bonded castable. Mixing the components creates an exothermic reaction that causes the liquid to foam. The foam expands and fills voids as it transforms into a solid material. The solid castable material will have greater volume than the combined liquid material volumes.

All pourable slurry backup insulation contains water that must be removed before operation.

Wollite Formulations

The following are the available Wollite formulations. The formulations vary in properties like density and thermal conductivity, but are all two-part portable slurries.

- Wollite 30.
- Wollite 37.
- Wollite 45.
- Wollite 30ST-1.
- Wollite 56.

Contact your Pyrotek customer service representative to choose the best formulation for your application.

Pouring Wollite 30ST-1

Pyrocast 450

Pyrocast 450 is a light-density, highly insulating foaming two-part material that is similar to Wollite. It is blended in Europe and available regionally.

PACKAGING

Materials are packaged in two containers (Part A and Part B). Part A and Part B are mixed together to create the final product.

Wollite 30ST-1 and Pyrocast 450 are shipped in premeasured containers ready for mixing, blending and pouring single batches.

See "Mixing and Pouring Wollite 30ST-1 or Pyrocast 450" on page 2-2 and "Mixing and Pouring Wollite 30, Wollite 37, Wollite 45, Wollite 56" on page 2-2 for batch mixing instructions.

The following formulations do not have a prepackaged batch containers, and must be mixed in specific ratios from bulk containers.

- Wollite 30 bulk.
- Wollite 37 bulk.
- Wollite 45 bulk.
- Wollite 56 bulk.

Contact your Pyrotek technical specialist for help calculating the material amount required for your specific project.

Pyrotek recommends ordering an additional 10 percent of the material to account for any waste during installation.

DRY POWDER BACKUP INSULATION

Dry powder backup insulations do not require any added water and will sinter at specified temperatures to form hard, insulating refractory backup layers.

Pyroflow (L&D)

Pyroflow (L&D) is a free-flowing, dry backup insulating material which contains no water. It sinters into a solid block when heated to approximately 300°C (572°F). Pyroflow (L&D) also contains a non-wetting agent that repels molten aluminium.

Pouring Pyroflow (L&D)

Packaging

Materials are typically packaged in 7.5 kilogram (16.5 pound) pails. 90 kilogram (198 pound) drums are also available, along with other packaged sizes.

Safety

SAFETY DATASHEETS

Prior to mixing and installation procedures, read and become familiar with the Part A and Part B material safety datasheets.

PERSONAL PROTECTION EQUIPMENT

When mixing and installing materials wear the proper personal protection equipment referenced in the material's safety datasheet.

- Skin protection: Wear rubber or polyethylene gloves.
- Eye protection: Wear chemical safety goggles.
- Other protective clothing or equipment: Wear a protective overcoat when mixing material. An eye bath and safety shower nearby are recommended.
- Clean up: Maintain good personal and industrial hygiene. Wash thoroughly after handling the product.

Process Considerations

Read and understand the mixing procedures prior to beginning the mixing process.

It is recommended to first seal all small openings in the equipment shell to prevent the liquid from leaking prior to solidification.

Prior to mixing, it is recommended the liquid ingredients be between 15–18°C (59–64°F). Cool the ingredients if necessary. If the liquid is too warm it will prematurely setup in the pail and cannot be poured.

NOTES:
Allow any mastic applied to the equipment to fully solidify before pouring backup insulation.

MIXING

Mix the components carefully. Once the exothermic foaming reaction begins it cannot be stopped. As the material solidifies, it will warm and can reach a temperature of 70°C (158°F).

The mixed material goes through the following stages:

1. The mixed liquid's temperature increases.
2. The poured material expands as it hardens and sets.

WORKING TIME

Typical working time for the mixed liquid product before hardening is between 3–5 minutes, and personnel must be prepared to pour the mixture within the allotted time. Do not mix more than 19 litres (5 gallons) to allow for adequate placement time.

EXCESS MATERIAL REMOVAL

When setting the material can froth and expand outside the mould. See "Material Expansion" on page 2-1.

Material Expansion

After the material sets (3–5 minutes), use a trowel to cut away any excess material and level the surface.

Trimming Excess Material

Mixing and Pouring Wollite 30ST-1 or Pyrocast 450

BEFORE MIXING

Mix Part A separately to ensure it is thoroughly blended. Part A contains materials that can settle to the bottom of the container. Part B does not require mixing.

- Part A: Contains wollastonite and water, plus a sedimentation slowing polymer.
- Part B: Mildly acidic aqueous solution.

WARNING: Personnel Hazard—
Part B is considered a dangerous product and should be handled carefully.

BATCH MIXING

Complete the following to mix the entire material batch.

1. Use a paint impeller to stir Part A until it is homogeneous.
2. Add all of Part B to Part A.
3. Use a paint impeller to stir the combined mixture for 20 seconds.
4. The liquid is ready to pour. See "Liquid Pouring" on page 2-2 for more information.

SMALL BATCH MIXING

1. Use a paint impeller to stir Part A until it is homogeneous.
2. Combine Part A and Part B at a 4:1 weight ratio.
3. Use a paint impeller to stir the combined mixture for 20 seconds.
4. The liquid is ready to pour. See "Liquid Pouring" on page 2-2 for more information.

LIQUID POURING

Immediately after mixing pour the liquid mixture into the mould or cavity. Wollite will flow freely into all the cracks and crevices until it begins to harden.

The typical working time after blending is between 3–5 minutes. Leave additional space when pouring to compensate for material expansion.

Mixing and Pouring Wollite 30, Wollite 37, Wollite 45, Wollite 56

BEFORE MIXING

Mix Part A separately to ensure it is thoroughly blended. Part A contains materials that can settle to the bottom of the container. Part B does not require mixing and is directly added to Part A.

- Part A: Contains wollastonite and water.
- Part B: Mildly acidic aqueous solution.

WARNING: Personnel Hazard—
Part B is considered a dangerous product and should be handled carefully.

BATCH MIXING

The following materials are shipped in bulk containers. Blend the parts together based on the following weight ratios.

- Wollite 30 weight ratio 4:1 Part A to Part B.
- Wollite 37 weight ratio 4:1 Part A to Part B.
- Wollite 45 weight ratio 4:1 Part A to Part B.
- Wollite 56 weight ratio 5.25:1 Part A to Part B.

1. Open the Part A container.
2. Slowly blend the Part A liquid with a mixer or paint impeller to break up any sediment.
3. Continue blending until the material is homogeneous.

Mixing Part A

4. Add the required amount of Part A to a container capable of holding it and the corresponding Part B amount.
5. Measure the required amount of Part B and add to Part A.

Combining Part B with Part A

6. Add Part B and mix for approximately 20 seconds using a paint impeller.
7. The liquid is now ready to pour. See "Liquid Pouring" on page 2-3 for more information.

LIQUID POURING

Immediately after mixing pour the liquid mixture into the mould or cavity. Wollite will flow freely into all the cracks and crevices until it begins to harden.

The typical working time after blending is between 3–5 minutes. Leave additional space when pouring to compensate for material expansion.

Bake-out Overview

Pourable slurries contain water that needs to be removed prior to molten metal introduction.

Regardless of the bake-out technique, any newly installed backup insulation should be heated to 110°C (230°F) at all locations prior to use.

Contact your Pyrotek Technical Specialist for any information regarding bake-out techniques or procedures.

WARNING: Personnel Hazard—
If Wollite or Pyrocast 450 are not completely dried prior to use they may cause explosions. Follow the safe firing instructions to completely dry the material prior to metal contact!

CAUTION: Possible Equipment Damage—
Ensure any weep holes in the equipment shell's cold face are open and clear to allow for trapped moisture release.
A gas flame or direct heat should not impinge on the refractory surface, and the refractory should not be heated to excessive temperatures.

Bake-out Schedule

IN-FURNACE BAKE-OUT

If it is possible, place the entire equipment assembly (including backup insulation) in a furnace for bake-out prior to use. Use the furnace temperature schedule in the following table.

Step	Process	Process Duration	Furnace Temperature
1	Ramp	1:00 hour	20–110°C (68–230°F)
2	Soak	4:00 hours	110°C (230°F)
3	Ramp	0:30 minutes	110–180°C (230–355°F)
4	Soak	4:00 hours	180°C (355°F)
5	Ramp	0:30 minutes	180–230°C (355–445°F)
6	Soak	4:00 hours	230°C (445°F)
7	Ramp	0:30 minutes	230–375°C (445–710°F)
8	Soak	5:00 hours	375°C (710°F)
9	Cool slowly.		

Bake-out Schedule Table

Use thermocouples and monitoring devices to control the furnace ramp and soak periods.

To guarantee dryness, monitor all of the pourable backup insulation zones to ensure they have reached 110°C (230°F).

IN-SITU BAKE-OUT

For in-situ bake outs, use gas-fired or electric burners to heat the system's pourable backup insulation. A Pyrotek ZEN Hot Air Preheater is recommended.

Thermocouples and monitoring devices should be used to control the ambient temperature above any heated zone. The ambient temperature schedule should mimic

Pyrotek ZEN Hot Air Preheater

the in-furnace bake-out temperatures in "Bake-out Schedule Table" on page 2-3, but can be adjusted to meet equipment or process specifications. If the schedule needs to be adjusted for any reason, all the pourable backup insulation should be heated to at least 110°C (230°F) to ensure dryness.

A temporary cover, like a large ceramic blanket, can be placed over the equipment's top surface to help reduce thermal losses and assist in achieving bake-out temperatures. Place the cover to allow continuous airflow and moisture release from backup insulation areas.

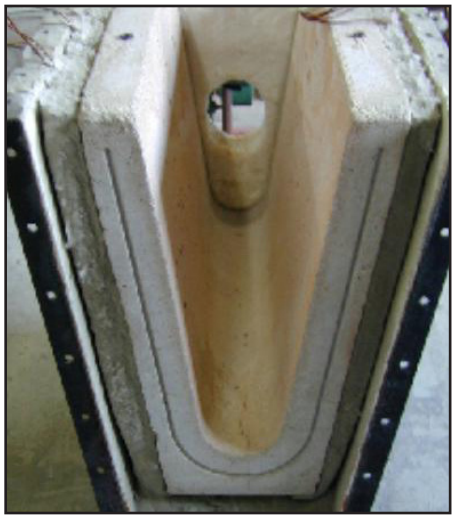
Do not install any permanent lids or plates over the pourable insulation areas until the bakeout process is complete to allow the release of moisture.

Pouring Pyroflow (L&D)

Pour Pyroflow (L&D) directly from the container into the open cavity being filled. Pouring between the insulating board and the precast refractory working liner is recommended.

Pouring Pyroflow (L&D)

"Pyroflow (L&D) Sintered Layer" on page 3-1 shows a sintered Pyroflow (L&D) layer which is now a solid backup insulation block. Pyroflow (L&D)'s recommended maximum thickness is approximately 37 millimetres (1.5 inches).



Pyroflow (L&D) Sintered Layer

Sintering Pyroflow (L&D)

Pyroflow (L&D) cannot support mechanical loads until it is sintered. Use refractory blocks to support the launder prior to the sintering process. After sintering the launder becomes rigid and strong and provides thermal insulation and mechanical support.

The recommended minimum sintering temperature is 300°C (572°F), and the equipment should be fired (if needed) prior to use to reach the proper setting temperature.

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