



Tundish Dry Ramming Material: Technical Specifications and Installation Guide

This briefing document provides a comprehensive overview of dry ramming materials used for tundish working layers, encompassing material characteristics, precise technical dimensions, and a detailed step-by-step installation protocol based on current industry standards and provided site specifications.

1. Material Overview and Characteristics

Tundish Dry ramming material—often referred to as Tundish ramming mass or "T-Cast Tundish Ramming Mix"—is an unshaped refractory material designed for the working layer of a tundish. Unlike traditional castables, it is formed via vibration methods without the addition of water or liquid binders.

Key Performance Advantages

- **Rapid Turnover:** Construction can be completed in minutes, and the material requires no long baking or maintenance periods, significantly increasing the turnover speed of intermediate packages.
- **Thermal Protection:** The material reduces the tundish steel shell temperature by 30–40°C compared to magnesia coating materials, preventing steel shell creep and improving the operating environment.
- **Metallurgical Purity:** Formulated with alkaline materials and organic binders (such as phenolic resin and industrial lubricants), it helps reduce inclusions and purifies molten steel.
- **Structural Integrity:** During use, the material forms a sintered working surface with high strength, while the non-working surface remains unsintered and dense.

This dual-layer structure absorbs expansion stress and hinders crack propagation.

- **Simplified Removal:** After use, a loose layer remains near the permanent lining of 70% Alumina bricks, making it easy to "knock the bag" and clean the tundish without damaging the permanent castable layer.
- **Cost Effective over the use of Tundish Boards:** The unit cost per liquid steel is lower than if Tundish Boards were used.

2. Technical Specifications (Tundish Data example)

The following tables outline the specific dimensions and lining requirements for the tundish construction.

Tundish Physical Dimensions

Feature	Top Dimension	Bottom Dimension
Length	66 inches	58 inches
Width	38 inches	29 inches
Wellblock Area	N/A	8 x 8 inches

Lining Thickness and Material Layers

Layer Type	Material Specification	Thickness (Bottom)	Thickness (Sides)
Permanent Layer	70% Alumina Bricks	5 inches	3 inches
Working Layer	T-Cast Ramming Mix	6 inches	5 inches
Sealing	White Heat K	Used for sealing wellblocks	N/A

3. Step-by-Step Installation Guide

Phase I: Preparation and Permanent Lining

1. **Clean the Tundish:** Ensure the tundish temperature is below 50°C. The permanent layer (70% Alumina Bricks) must be free of residual paint, dust, and water.
2. **Former Preparation:** Clean the mold (former) and apply a mixture of T-Cast and engine oil to facilitate demolding. Centering of the former is important to achieve even lining wear.

3. **Vibration Setup:** Install the vibration motor on the former mold and ensure all fasteners are secure to prevent loosening during operation.



Phase II: Bottom Construction

1. **Wellblock Placement:** Install the 8x8 inch wellblock and nozzle seat bricks. Ensure the upper surfaces are tube-level and on the same plane.
2. **Initial Pour:** Evenly pour the T-Cast dry ingredients into the bottom upto 6 inches in height.
3. **Compaction:**
 - Use a **poking tool** to remove air pockets and ensure deep penetration of the material around the wellblocks.
 - Use a **manual ramming tool** or plate vibrator to pound the material tightly layer by layer.
 - The final height of the bottom material should be slightly higher than the upper surface of the nozzle seat bricks to ensure full contact with the former and wellblock.



4. **Sealing:** Use **White Heat K** to seal the wellblocks with the T-Cast after placement.



Phase III: Side Wall Construction

1. **Mold Placement:** Lower the mold (former) into the tundish. Center it carefully using measured blocks to ensure the gap between the mold and the permanent brick layer (approx. 5 inches) is uniform on all sides.
2. **Filling:** Pour dry materials into different positions along the side walls.
3. **Vibration Cycle:**
 - Start the main vibration motor for 5–10 seconds.
 - Use an auxiliary manual vibration motor to travel around the tundish for one complete circle to ensure maximum density.
 - Use the sharp Poking tool and the blunt Ramming tool remove any airgaps and ram the material in place to maximum density.



4. **Topping Off:** Fill any gaps left by the vibration process and compact the top surface manually using sodium silicate slurry upto the height of 3inches from the top; similar to creating Spout&Top Mix such as in the case with NaliTop. Gas drainage holes to be made on top.

4. Sintering and Heating Protocols

The transition from a dry powder to a functional refractory lining requires a specific two-stage heating process to activate the thermosetting binders and sintering agents.

Stage 1: Initial Sintering and Demolding

- **Burner Method:** Ignite a burner within the former mold. Heat the mold to between **200–300°C** for **1–2 hours**. This provides the necessary demolding strength.
- **Firewood Method:** Fill the tundish with firewood to the brim. Light the fire and maintain it for **4–5 hours** (or until the firewood is exhausted). This should reach a temperature of approximately **400°C**.

Stage 2: Final Baking

- Once the mold is removed, bake the lining over high heat for approximately **1 hour**.
- The tundish is ready for the passage of liquid metal once the lining temperature reaches **above 1000°C**.

5. Summary of Safety and Efficiency

- **Safety:** Rapid construction methods reduce labor intensity and safety hazards.
- **Cost:** Improved service life and reduced consumption per ton of steel significantly lower production costs.
- **Efficiency:** The elimination of long baking cycles allows for immediate turnover, meeting the demands of continuous steel casting operations.



Refractory for Tundish T-CAST

Chemical Specifications of Rishi Minerals T-CAST:

Silica	SiO ₂	98% ± 0.5%
Alumina	Al ₂ O ₃	0.2% max
Others	Additive Mix	Total 2.2%

Physical Specifications of Rishi Minerals T-CAST:

Product Name	Grain Size	Temp. Limit	Yield or Bulk Density	Appearance
Tundish Ramming Mix – T-CAST	0 to 6mm	1700 °C	2.20 g/cm ³	Grey in color

Installation method:

Dry Ram (Use of Manual Ramming recommended) on Hot Face (red in picture)
Refer Installation Manual.

Standard Packing:

25Kg ± 0.1Kg in new PP bags with LDPE liner.

Shelf life:

6 months (store in cool and dry condition)



Signed by Management,
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