

# KEYCOTE® SYSTEM



## The Key To Long Slurry Life

- Exceptional slurry life, reducing raw material, labor and disposal costs associated with scrapping and rebuilding gelled slurries.
- Cost and time savings resulting from reduced slurry testing, adjustment and maintenance requirements.
- Excellent wax adhesion characteristics, reducing surface defects and costs associated with scrap and rework.
- Excellent wetting ability and microbial defense characteristics.

The Keycote system is stable over a wide pH range. A newly built slurry has a pH of approximately 4.5. Over time, acidic slurry components like zircon and cobalt aluminate may cause a slight decrease in pH. However, the Keycote system's slurry integrity is not compromised with this pH shift. The Keycote system is designed to perform despite pH change. By design, no pH testing is necessary with a Keycote system slurry. Slurry maintenance typically requires only periodic water addition to compensate for evaporation.

Because the first coats of any shell are integral to a successful casting, the adhesion properties of the Keycote system are an improvement over other long-life binders. In fact, tested under adverse conditions, the Keycote system adhered to wax patterns that were still coated with silicone mold release agent.

The Keycote system is a two-part primary binder system comprised of Keycote® concentrate and Keycote® binder; blended together at a 1:4 ratio when building a slurry.

## Typical Material Properties\*

	Keycote binder	Keycote concentrate	1:4 Blended Keycote system
Base Composition	Colloidal Silica	Vinyl acrylics	
Other Composition	Proprietary	Proprietary	
Total Solids Content (Including SiO <sub>2</sub> )	31.0%	18.5%	27.5%
Particle Size (Approximate)	14 nm		
pH at 77°F (25°C)	7.0	4.0	4.5
Specific Gravity	1.203	1.025	1.167
Weight/Volume	9.9 lbs/gal (1.2 kg/l)	8.50 lbs/gal (1.03 kg/l)	
Viscosity at 77°F (25°C)	<10 cps	<10 cps	
Na <sub>2</sub> O Content (Weight)	<0.1%		
Particle Charge	Negative		

\*These results are based on the testing methods, frequency and procedures of Ransom & Randolph or its approved suppliers. The levels referenced herein are only for general guidance and do not constitute a firm specification.



## RANSOM & RANDOLPH

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## Formulations

If you currently have a primary slurry formulation, use the same percentages and loadings of your current refractories. The following formulations are for casters just starting out.

Intended Slurry Use	Target Slurry Density (g/ml)	Target Viscosity (sec)**	Formula for 10 Gallons (lbs)			Formula for 10 Liters (kgs)		
			Keycote binder	Keycote concentrate	Zircon (-200 mesh)	Keycote binder	Keycote concentrate	Zircon (-200 mesh)
Ferrous	2.99-3.03	11.4-13.5	35.2	8.8	206.7	4.22	1.06	24.85

\*\*Viscosity measured using through the hole method with a #5 Signature Zahn cup.

## Application Recommendations

1. Remix the Keycote binder prior to use to ensure a homogeneous blend of material.
2. For best results, weigh all ingredients when making up a new slurry or making additions to an existing slurry.
3. When building the slurry, add the refractory last. If more than one refractory is used, add the lowest density refractory first: fused silicas (2.2 g/cc), aluminosilicates (2.7 g/cc), zircon (4.5 g/cc). Add refractory slowly for best results.
4. New and makeup slurries must be prepared with a propeller mixer, not in a rotating tank. This ensures proper dispersion of the refractory particles. The propeller mixer must be of adequate HP and RPM. Excessive mixing action can introduce air into the slurry and cause erratic viscosity and/or bubbles in the slurry coat.
5. As with any slurry, the viscosity of the slurry must be stable before use. A stable viscosity is one that does not change by more than 1 second when checked at 1 hour intervals. Viscosity can be increased by adding more refractory and decreased by adding more binder.
6. It is required to replace water lost to evaporation. When water is needed (based on test results for viscosity and/or binder solids), use distilled or deionized water as opposed to tap water, which can contain contaminants that can negatively affect slurry life.
7. Antifoam, wetting and bactericide agents are already formulated into Keycote binder and other additions may not be compatible. Contact R&R's technical team before making these additions to the slurry.
8. Patterns must be clean and free from silicones or other contaminants before dipping.
9. It is not usually necessary to use a prewet before applying the first primary coat to the wax pattern. If a prewet is needed, use Keycote binder only.
10. If a prewet is needed between coats, the Keycote binder should be diluted to 27% binder solids (binder to water ratio of 5.8:1 by volume, 6.9:1 by weight). Drain the prewet well so that no pockets of liquid are left on the pattern.

## Slurry Control Procedures

Slurry Control Worksheets are available for download at [www.ransom-randolph.com](http://www.ransom-randolph.com). Slurry Control Worksheets allow you to input data directly and help you calculate values.

## Slurry Testing Frequency

R&R recommends running the following tests accordingly.

Slurry Test	Recommended Testing Frequency
Slurry Viscosity	Two Times Per Shift
Binder Solids	Two Times Per Week
Binder pH	Weekly



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## Target Binder Solids Range

The target binder solids range for Keycote binder is 26.5-28.5% by weight.

Specific Gravity	Binder Solids	Specific Gravity	Binder Solids	Specific Gravity	Binder Solids
1.146	24.3	<b>1.160</b>	<b>26.5</b>	1.174	28.6
1.147	24.4	<b>1.161</b>	<b>26.6</b>	1.175	28.8
1.148	24.6	<b>1.162</b>	<b>26.8</b>	1.176	28.9
1.149	24.7	<b>1.163</b>	<b>26.9</b>	1.177	29.1
1.150	24.9	<b>1.164</b>	<b>27.1</b>	1.178	29.3
1.151	25.1	<b>1.165</b>	<b>27.2</b>	1.179	29.4
1.152	25.2	<b>1.166</b>	<b>27.4</b>	1.180	29.6
1.153	25.4	<b>1.167</b>	<b>27.5</b>	1.181	29.7
1.154	25.5	<b>1.168</b>	<b>27.7</b>	1.182	29.9
1.155	25.7	<b>1.169</b>	<b>27.9</b>	1.183	30.0
1.156	25.8	<b>1.170</b>	<b>28.0</b>	1.184	30.2
1.157	26.0	<b>1.171</b>	<b>28.2</b>	1.185	30.3
1.158	26.1	<b>1.172</b>	<b>28.3</b>	1.186	30.5
1.159	26.3	<b>1.173</b>	<b>28.5</b>	1.187	30.7

## Storage & Handling

Protect from freezing. Keycote binder must be maintained above 35°F (2°C) to prevent the material from precipitating irreversibly and making the product unsuitable for use. Keep in a cool, dry, well-ventilated area. Keep containers tightly closed. Binder stored in transparent or translucent containers should be sheltered from direct sunlight. Shelf life is 1 year from date (MMDDYY) in batch lot number on label. Rotate stock to maximize shelf life.

## Safety

OSHA-approved respiratory protection should always be worn to avoid inhalation of respirable silica dust, which can result in an irreversible lung disease, silicosis. Such exposure includes slurry makeup, casting, knockout and cleanup. See SDS for more information.

## Technical Tips

For additional information and recommendations, refer to the Shell Building, Slurry Control, Autoclaving, FlashFire Dewax Method and Viscosity Cup Correlations Technical Tips available for download at [www.ransom-randolph.com](http://www.ransom-randolph.com).

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