

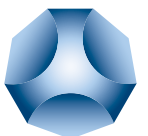


No-Bake

Product Line Overview



ASKCHEMICALS
We advance your casting



An Established Authority on No-Bake Technology

ASK Chemicals has been a leader in developing No-Bake technology throughout the years. Our legacy as No-Bake innovators goes back well beyond the introduction of PEP SET™ in the 1970's, the industry revolutionizing phenolic urethane No-Bake binder system. Today ASK Chemicals continues as progressive trail-blazers within the foundry industry seeking out new and innovative solutions within the No-Bake field. Our latest No-Bake solutions are engineered directly towards the key attributes desired by the market: improved quality, productivity and environmental characteristics. Ultimately, at ASK Chemicals we believe this customer-focused approach will ensure our solutions are always current and needed now, and into the future.

At ASK Chemicals we provide innovation driven research through our product development approach. We focus specifically on market trends and customer demands because of the increasingly complex requirements our industry faces: reduced emissions, casting defect prevention, cost-efficiency, as well as overall casting quality. Such requirements necessitate more than just strong partnerships and outstanding technologies; rather, we believe that first-class research and development that focuses on efficiency, environmentally friendly solutions and key performance parameters is essential.

In addition we offer our customers a holistic approach that goes well beyond merely offering products. Our application technology and technical sales specialists, in particular, always assess the entire production process as a whole. Only this approach allows for customer specific solutions that are precisely tailored to meet customer requirements.

Finally, our specialists' expertise is complemented by a broad range of services that offers our customers real added value. In this way, for example, our design services can be systematically deployed to optimize the process as a whole – from conceptual development to actualized series production – thereby offering important savings and process improvement for our customers.





- Inventors of phenolic urethane No-Bake (legacy)
- Unmatched product development
- A focus on sustainability
- Holistic value added services

Basic Information

Major No-Bake variations

➤ Furan **FNB**

- Largest No-Bake market in the world
- Known for high hot strength & excellent shakeout

➤ Phenolic **PNB**

- Similar characteristics to furan variety without furfuryl alcohol
- Comparatively low resin cost

➤ Alkyd Oil **AONB**

- Predictable “first stage through cure”
- Excellent release properties

➤ Sodium Silicate **SSNB**

- Water based resin
- Usable with most sand types

➤ Phenolic Urethane **PUNB**

- Highly controllable curing reactions
- Ideal for all types of metal-casting applications
- User friendly attributes

➤ Alkaline Phenolic **APNB**

- Water based resins
- Ideal for steel castings

ASK Chemicals brands

➤ PEP SET™ **PUNB**

The most productive & flexible No-Bake in history

➤ LINO-CURE™ **AONB**

An ideal solution for XL castings & art application

➤ CHEM-REZ™ **FNB & PNB**

A multifaceted No-Bake ideal for large castings

➤ ACCOSET™ **SSNB**

An eco-friendly No-Bake for specialty applications

➤ NOVASET™ **APNB**

The No-Bake for steel castings

No-bake classification



General benefits of No-Bake

- Low capital investment
- Production flexibility
- Excels with complex geometries
- User friendly

Differentiating factors

Eco-Friendly	Productivity	Quality	Cost	Flexibility
<ul style="list-style-type: none"> • Reduced odor • Low emissions • Reduced smoke • Renewable raw materials 	<ul style="list-style-type: none"> • High reactivity & ease of shakeout • Superior work-time/strip time ratio • Instantaneous/uniform through cure • Ease of reclamation 	<ul style="list-style-type: none"> • Superior surface finish • Excellent hot strength • Resistance to casting defects • Excellent dimensional accuracy 	<ul style="list-style-type: none"> • Low price volatility • Higher reclaim sand yields • Higher usage rates of reclaim sand • Lowest total cost in use 	<ul style="list-style-type: none"> • Multiple sand types • Superior temp. & humidity resistance • Multiple metal type usability • Ease of use

Custom solutions

Apart from the system solutions mentioned in this brochure, ASK Chemicals also offers you custom solutions to fit your individual process. Please contact us to discuss your specific needs.

PEP SET™

The most productive & flexible No-Bake in history

PEP SET™ is arguably the most trusted name in the No-Bake marketplace. Known for its exceptional quality & highly controllable curing reactions, PEP SET™ has long been the standard in No-Bake excellence. In fact, when placed on an automated production line (roller-loop or turn table) PEP SET™ produce fully cured molds in less than 90 seconds! Clearly, speed, application flexibility and overall ease of use make PEP SET™ ideal in satisfying any mold making requirement. Three primary types of PEP SET™ exist based on a general set of performance criteria.

















Benefits

- Predictable & repeatable cure times
- Excellent core & mold strengths
- Superior work time/strip time ratio
- Ease of reclamation

Unrivaled emission reduction

ASK Chemicals PEP SET™ Quantum series surpasses the competition in reducing emissions. With PEP SET™ Quantum one can achieve low smoke emissions & odor during pouring, cooling, shakeout and mixing. In addition, this premium PUNB offers low viscosity, cold weather stability and high core strength.



Attributes		Application	Quick reference			
			Major		Minor	
Premium	Overall premium performance Overall eco-friendly Low reportable (HAP) quantities	Ferrous & non-ferrous Small – XL castings Most sand types	 Productivity	 Quality	 Eco-Friendly	 Flexibility
Perfor- mance	Overall excellenct performance Reduced odor (core & mold making) Usable with multi-sands	Ferrous & non-ferrous Small – large castings Most sand types	 Productivity	 Quality	 Flexibility	 Eco-Friendly
Standard	Predictable / repeatable cure times Good speed,strength & productivity Cost in-use	Ferrous & non-ferrous Small – large Castings Most sand types	 Productivity	 Quality	 Flexibility	 Cost
Polyol	Overall flexibility Improved shakeout Low VOC's	Non-ferrous aluminum Non-ferrous magnesium	 Flexibility	 Productivity	 Eco-Friendly	 Quality

CHEM-REZ™

A multifaceted No-Bake ideal for large castings

CHEM-REZ™ is the embodiment of both acid-cured furan and phenolic No-Bake technologies. Due to its relatively long cure time it is recommended for No-Bake processes requiring low to moderate productivity levels, making it ideal for larger scale castings (e.g. machine tool bases, windmill components and power generation). In order to accommodate various production processes ASK Chemicals offers CHEM-REZ™ in a wide spectrum of products across two main dimensions: FNB & PNB.

Benefits

- Slow curing mechanism
- High hot strength
- Ease of shakeout
- Ease of reclamation

CHEM-REZ FURY™ – Premium	CHEM-REZ FLEXSET™ – Performance	CHEM-REZ DURASET™ – Standard	
<ul style="list-style-type: none"> • May be slightly modified • May have plasticizers 	<ul style="list-style-type: none"> • Phenolic modified • Contains plasticizers 	<ul style="list-style-type: none"> • Highly phenolic modified • No plasticizers 	

	Attributes	Application	Quick reference
			<div>Major</div> <div>Minor</div>
Premium	Overall excellent quality High reactivity & ease of shakeout Low cost in-use	Iron & steel Medium – XL castings Most sand types	<div>Quality</div> <div>Eco-Friendly</div> <div>Flexibility</div> <div>Productivity</div> <div>Cost</div>
Performance	Overall good quality High reactivity & ease of shakeout Good versatility / flexibility	Iron & steel Medium – XL castings Most sand types	<div>Quality</div> <div>Eco-Friendly</div> <div>Flexibility</div> <div>Productivity</div>
Standard	Economic overall quality Economic high hot strength	Iron & steel Medium – XL castings Most sand types	<div>Quality</div> <div>Eco-Friendly</div> <div>Flexibility</div> <div>Productivity</div>

NOVASET™

The No-Bake for Steel Castings

This two part binder system composed of a water-based resole resin cured with a liquid ester co-reactant is capable of being used in most casting processes. Its partial inorganic nature reduces material handling requirements, as well as casting defects associated with solvent based binder systems. ASK Chemicals offers a wide range of co-reactants allowing for varying levels of productivity. Thus, NOVASET™ is ideal in most large scale casting production, especially in steel applications. It should be noted that APNB technology has specific inorganic properties which can make sand reclamation a primary challenge. ASK Chemicals, fortunately, offers industry leading reclamation additives and technical services to assist in overcoming these challenges.






Benefits

- Wide variety of co-reactants & cure times
- Eco-friendly hybrid binder system (organic & inorganic components)
- Low odor at core & mold making
- Helps reduce casting defects

Reclamation Recommendation – NOVATHERM™

ASK Chemicals recommends the use of NOVATHERM™ reclaim sand additive with all NOVASET™ applications. This unique additive maximizes the removal of residual binder to increase reclaimed sand yields. NOVATHERM™ enables the use of a higher percentage of reclaimed sand during mold-making which ultimately results in lower cost per ton of sand.



Attributes		Application	Quick reference				
			Major		Minor		
Standard	Low odor at mold-making Good shakeout Cost in-use	Ferrous & non-ferrous Small – large castings Most sand types					
			Eco-Friendly	Productivity	Quality	Flexibility	Cost

LINO-CURE™

An ideal solution for XL castings & art applications

ASK's LINO-CURE™ line services two distinctly different segments: foundry & art/education. Nevertheless, several appealing characteristics make this No-Bake ideal for both markets. Firstly, it has uniform and predictable curing characteristics. The flexible nature of the initial cure enables mold stripping to occur hours after the mold has reached its peak handling strength. Additionally, LINO-CURE™ has excellent release properties which allow for its use in older and/or damaged, worn out patterns.

Benefits

- Long, uniform and predictable cure times
- Exceptional release properties
- Flexible packaging options
- Ideal for extremely large castings

Small Batch Packaging

ASK Chemicals offers a comprehensive small batch packaging option ideal for art applications. Inside, one box will contain the following:

(1) 5 Gallon Pail	(1) 1 Gallon Can	(3) 1 Pint Bottle
LINO-CURE™ AA Resin	LINO-CURE™ C Co-Reactant	LINO-CURE™ BA-1 Catalyst



	Attributes	Application	Quick reference		
			<div>Major</div> <div>Minor</div>		
Foundry	Long, uniform & predictable cures Good shakeout Excellent release properties	Ferrous casting Non-ferrous casting Most types of sand			
Art	Special packaging options Easy-to-use Long, uniform & predictable cures	Copper-based alloys Most types of sand			

ACCOSET™



An eco-friendly No-Bake for specialty applications

ACCOSET™ sodium silicate No-Bake binder technology is noted for its environmentally friendly benefits and ability to be utilized on multiple sand types.

ACCOSET™ does require the need for additives to promote shakeout and improve surface finish in ferrous castings, and is prone to comparatively high mold expansion rates. Therefore, this technology is particularly suitable in specialty aluminum applications.






Benefits

- Easy to use
- Good shakeout in aluminum
- Medium to long cure times
- Ideal for medium to large castings

Geared towards cleaner workplace conditions

ASK Chemicals ACCOSET™ binder technology is considered eco-friendly due to its exceptionally low odor & emissions in respect to mold making and pouring, cooling and shakeout. The two part binder is made-up of a water-base sodium silicate resin, as well as a liquid ester catalyst. The water-based resin is what helps provide such an improved work health environment.



	Attributes	Application	Quick reference				
			<div>Major</div> <div>Minor</div>				
Standard	Excellent surface finish Low emissions Cost in-use	Multiple sand types All casting sizes All metal types	 Quality	 Eco-Friendly	 Flexibility	 Productivity	 Cost

Added Value for our Customers

Application technology and technical sales – for complete process transparency

Application technology and technical sales at ASK Chemicals offer our customers comprehensive expertise in all areas of foundry technology and metallurgy. We offer a comprehensive service that focuses on the production process as a whole and helps customers not only to cut costs but also to enhance their processes. ASK Chemicals also conducts casting defect analysis and offers tailored training sessions on the customer's own premises.

Benefits

- Improved decision-making via greater transparency
- Cost in-use reporting (i.e. savings)
- Reliable recommendations
- Casting defect analyses
- Quick response
- On-site training sessions
- Customized solution development

The one-of-a-kind "mobile mini-laboratory"

The mobile mini-laboratory runs a self contained continuous mixer that can utilize several different resin systems. Alongside many additional benefits its premier advantage is its ability to conduct trials without ever interrupting production.

- Uninterrupted production
- Multi-functional mobile tool
- Fast results



Currently, available to NA customers only

Design Services – for perfect casting results

Our Design Services team monitors the entire casting development process from initial design to final production of actual cast parts (i.e. prototypes). Our highly experienced engineers enjoy a wide range of knowledge within all aspects of foundry technology and metallurgy. In addition, we use only the most advanced simulation software offered today: MAGMA, Novacast, FLOW-3D and Arena-Flow®. Beyond fully optimized designs and simulation expertise, the Design Services team cooperates with external companies and service providers to assure proper project alignment for unparalleled results and guaranteed customer satisfaction.

Benefits

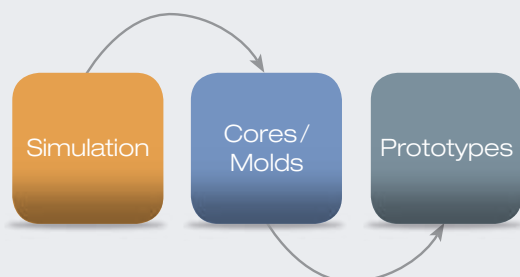
- Higher productivity and optimized catalyst consumption
- Manufacturing process design, including inorganic technology
- Calculation of optimal feed
- Optimized design and manufacture of model plates, core boxes and molds
- Less scrap
- Shorter product launch times
- Quicker time-to-market

Simulation services

The simulation of casting processes provides foundries with invaluable casting mold information. Specifically, this benefit allows for the optimization of gating & feeding systems, overflows, venting design and risers. Moreover, it provides critical insight into the influences and effects directly related to casting integrity such as, cooling & heating measurements and filling & solidification times.

From the idea to the prototype

ASK Chemicals supports your entire process from concept to prototype production. How you benefit: comprehensive expertise from a single source.



Research and development – for innovation near you

Our R&D department performs innovation driven groundwork as well as market and customer driven development. Interaction between these three areas is of fundamental importance in offering our customers technologically sophisticated products and efficiency enhancing solutions at all times. Through close cooperation and the constant exchange of ideas with our application technology and technical sales specialists, R&D at ASK Chemicals is always in tune with the market and also has a presence on the customer's own premises itself.

Benefits

- Highly experienced researchers
- Global presence and availability
- Comprehensive knowledge of the regional sand types and technological requirements
- Short response times for our customers
- First class equipment

Comprehensive research and development services

Pilot foundry

- Fully equipped research foundry
- Mold production, mold/core package assembly and casting
- "Real World" foundry process representation

Metallurgical investigations

- Comprehensive examination of the graphite structure and metallic matrix: Graphite size, Number of nodules, Degree of dispersion, Nodularity, Ferrite/pearlite ratio
- Preparation of metallurgical reports

Sand laboratory

- Examination of high temperature materials
- Testing of tensile strength, compression and transverse loading
- Sand characterization and analysis

Product development and technical support

- Casting defect analysis
- Full spectrum chemical & polymer analysis
- Product, process and test method development



ASK Chemicals L.P.

495 Metro Place South
Suite 250
Dublin, OH 43017
Phone: +1 800 848 7485
Fax: +1 614 761 1741
info.usa@ask-chemicals.com
www.ask-chemicals.com

Global No Bake Manager

Joseph Muniza
Phone: +1 614 763 0272
Joseph.Muniza@ask-chemicals.com

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