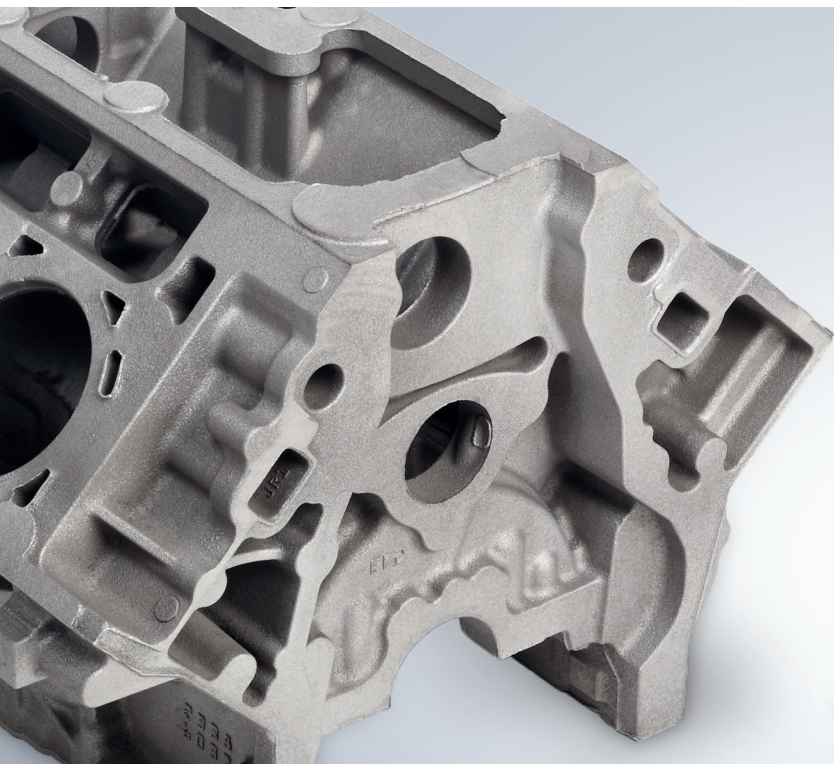




# Cold Box

Product Line Overview



# Tried-and-tested Technology from the Inventors of the Cold Box System

The development of Cold Box technology constitutes a milestone in the history of ASK Chemicals. First-class expertise and comprehensive know-how in the field of binding agent technology are a given here. Our invention of the polyurethane Cold Box system (PUCB) in 1968 set a standard that still applies to this day and led to a change in the production processes in foundries worldwide. The development of this technology gave the market a high-performance and highly productive core manufacturing method that enabled high-quality mass production. Naturally, though, technologies and market requirements are changing all the time – in terms of what both customers and suppliers want. For this reason, ASK Chemicals continues to play a leading role in innovation and is always looking for new ways to enhance our offerings and provide our customer's greater value.

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.



- Inventor of Cold Box technology
- Leading research and development team
- Application-specific solutions
- Holistic approach with value-adding services

# Basic Information

## Major Cold Box technologies

### ➤ Phenolic urethane Cold Box binders

#### **PUCB**

- Invented by ASK Chemicals in 1968
- Known for high productivity & low cost in-use

### ➤ Epoxy acrylic SO<sub>2</sub> Cold Box binders

#### **EASO<sub>2</sub>**

- Fastest curing Cold Box technology
- Indefinite mixed sand life

### ➤ Alkaline phenolic Cold Box binders

#### **APCB**

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

### ➤ CO<sub>2</sub> cured Cold Box binders

#### **CO<sub>2</sub>**

- Water-based resin
- Usable with most sand types

### ➤ Hybrid phenolic epoxy Cold Box binders

#### **HPE**

- Highest dimensional accuracy
- Invented by ASK Chemicals in 1990's

## ASK Chemicals brands

### ➤ ISOCURE™ **PUCB**

The original and universal Cold Box binder

### ➤ ECOCURE™ **PUCB**

The environmentally driven phenolic urethane Cold Box binder

### ➤ ISOSET™ **EASO<sub>2</sub>**

Highest production, fastest cure and indefinite bench time

### ➤ ISOMAX™ **HPE**

The elite Cold Box binder possessing the widest positive traits

### ➤ NOVACURE™/AVENOL™ **APCB**

Water-based binder ideal for use with steel castings

## Cold Box classification



## General benefits of Cold Box

- High strength & productivity
- High humidity stability
- Ability to create highly complex molds
- No need for heating mold tools

## Differentiating factors



### Eco-Friendly

- Reduced odor
- Low BTX emissions
- Minimized monomer content
- Few hazardous air pollutants



### Productivity

- Fast cycle times from high reactivity
- Less tooling damage
- Reduced cleaning time
- Long benchlife & high strengths



### Quality

- Less defects due to optimization
- Excellent core dimensional accuracy
- Exceptional deformation resistance
- High core stability



### Cost

- Reduced binder usage
- High tool availability
- Less core waste
- Less catalyst consumption



### Flexibility

- Multiple sand types
- Climate adaptability
- Multiple metal type usability

## 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.

# ISOCURE™

## The original and universal Cold Box binder system

ISOCURE™ binders are the industry standard for high production foundries producing sand cores and precision sand molds. This product family can be used to make all types of cores with both highly automated production equipment and with more manual operations. The broad range of products can be used in high specialized casting process or for more standard types of applications. The use of ISOCURE™ binders can be matched to a foundry whose has the need to produce high production high quality cores and molds.

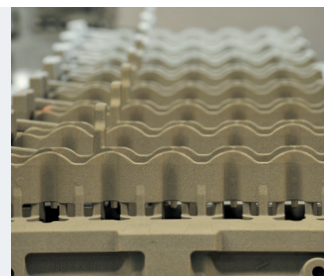
### Benefits

- Optimized for productivity
- Robust system for multiple casting types
- High strength properties
- Low cost in use

#### An amine recycling program

The ISOCYCLE™ program is an amine recovery service that supports ISOCURE™ Cold Box technology – an ideal situation for high efficiency productions.

- Eliminates waste from your scrubbing process
- Reduces cost versus disposal options
- Available for our full line of amine catalyst systems



### Recommendations

Catalyst	Coatings	Additives	Auxiliaries
ISOFAST™ 705 & Catalyst 706	MIRATEC™	VEINO™	ZIP-SLIP™

	Attributes	Application	Quick reference
			<div style="display: flex; justify-content: space-between;"> <span>Major</span> <span>Minor</span> </div>
<b>Premium</b>	Premium strength and speed Excellent humidity resistance Naphthalene depleted Lowest binder consumption	Automotive Heavy truck Aerospace Universal	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Productivity</div> <div style="text-align: center;"> Quality</div> <div style="text-align: center;"> Eco-Friendly</div> <div style="text-align: center;"> Flexibility</div> </div>
<b>Perfor- mance</b>	Excellent strength and speed Good all around performance Lowest environmental impact	Automotive Heavy truck Agriculture Universal	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Quality</div> <div style="text-align: center;"> Flexibility</div> <div style="text-align: center;"> Productivity</div> </div>
<b>Standard</b>	Robust performance Good quality Predictable curing Cost competitive	Automotive Heavy truck Municipal Universal	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Quality</div> <div style="text-align: center;"> Cost</div> </div>

# ECOCURE™



## The environmentally driven phenolic urethane Cold Box binder

ECOCURE™ binders are the newest generation of phenolic urethane technology that has focused on providing foundries with the high end environmental performance without sacrificing the speed and strength of the ISOCURE™ family of products. This is accomplished by not only adjusting the solvents and additives in the binder but also changing the chemistry back bone to produce products with less environmental impact.

### Benefits

- Lowest environmental impact
- High strength properties
- Fast binder that runs clean
- Low binder usage

#### The new Cold Box system for higher productivity

ECOCURE™ HE is the latest Cold Box system that combines productivity alongside sustainability. Enjoy, among other things, increased reactivity, improved binder strength, lower binder usage and reduced amine consumption.



### Recommendations

Catalyst	Coatings	Additives	Auxiliaries
ISOFAST™ 705 & Catalyst 706	MIRATEC™	VEINO™	ZIP-SLIP™

	Attributes	Application	Quick reference
<b>Premium</b>	Lowest environmental impact Excellent humidity resistance Premium strength and speed Lowest binder consumption	Automotive Heavy truck Aerospace Universal	Eco-Friendly              Productivity              Quality              Flexibility
<b>Perfor- mance</b>	Good environmental impact Excellent strength and speed Good all around performance	Automotive Heavy truck Agriculture Universal	Eco-Friendly              Quality              Flexibility

# ISOSET™

## Highest production, fastest cure and an indefinite benchlife

ISOSET™ binders were developed to solve a key problem faced by foundries; the benchlife of mixed sand. As the sand binder mixture ages, in most binder systems, it begins to advance, and at a certain point will no longer be usable to produce quality cores and molds. This is especially costly when there is machine down time, as in most cases this sand binder mix must be discarded or risk making substandard quality castings. ISOSET™ technology solves this problem. The binder can be mixed onto the sand and left indefinitely. It will not cure until it comes in contact with the sulfur dioxide catalyst.

### Benefits

- Minimal core sand waste via unlimited benchlife
- Lower cost to use
- Can reduce need for coating

#### Cost in-use: the benefit of foresight

At one of the leading automotive original equipment manufacturers (OEM's) ISOSET™ is being utilized for cylinder head production. Due to "smart economics" this OEM could install fewer machines and still produce the same number of cores / castings using ISOSET™ – a story about the importance of cost in-use.



### Recommendations

Catalyst	Coatings	Additives	Auxiliaries
SO <sub>2</sub>	MIRATEC™	VEINO™	ZIP-SLIP™

	Attributes	Application	Quick reference
<b>Premium</b>	Premium strength and speed Highest erosion resistance Low mixed sand waste Lower cost to use	Automotive Heavy truck Aerospace Universal	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">                      Productivity                 </div> <div style="text-align: center;">                      Quality                 </div> <div style="text-align: center;">                      Eco-Friendly                 </div> <div style="text-align: center;">                      Flexibility                 </div> </div>
<b>Standard</b>	Robust performance Good quality Cost competitive	Automotive Heavy truck Universal	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">                      Productivity                 </div> <div style="text-align: center;">                      Flexibility                 </div> <div style="text-align: center;">                      Cost                 </div> </div>



# ISOMAX™

## The elite Cold Box binder possessing the widest positive traits

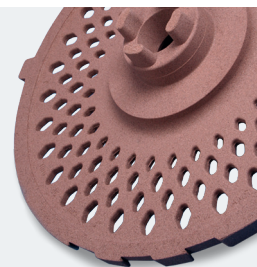
ISOMAX™ binders are a hybrid epoxy phenolic designed to produce repeatable cores at extremely fast cycle times. The dimensional stability of these cores is not surpassed by any current system. The nonferrous version also exhibits the fastest shakeout times currently seen. Coupled with the extended benchlife of these products ISOMAX™ makes for a unique technology that is capable of making world class castings at a low cost to produce.

### Benefits

- Fast cycle times
- Excellent shakeout
- Extended life of mixed sand
- Dimensional stability

#### A productivity boost in brake disc production

ASK Chemicals ISOMAX™ binder system is utilized in one of the largest original equipment manufacturers (OEM's) in the world. Here, ISOMAX™ pumps out millions of disc brake rotors in just one location using two binder productions.



### Recommendations

Catalyst	Coatings	Additives	Auxiliaries
Catalyst 700	MIRATEC™	VEINO™	ZIP-SLIP™

Attributes		Application	Quick reference			
			Major		Minor	
Premium	Excellent dimension stability	Brake disc Manifolds	Quality	Flexibility	Productivity	Cost
	Fastest cycle times					
	Extended life of mixed sand					
	Excellent shakeout					



# NOVACURE™ / AVENOL™

The water-based Cold Box binder with an environmental focus

NOVACURE™ and AVENOL™ binders are water based alkaline phenolic binders with excellent hot strength and were designed specifically for steel applications. However these binders can be used in other ferrous and non-ferrous applications. As a water based binder the environmental footprint can be an attractive option for the foundry. These binder systems also have low odor at sand mixing which reduces employee exposure to fumes.

## Benefits

- Ideal for steel
- Runs clean
- Good shakeout

### High performance automotive focus

NOVACURE™ / AVENOL™ is especially suitable in high performance automotive applications where dimensional accuracy is key. This is due to NOVACURE™ / AVENOL™'s exceptional high hot strength. Another important characteristic to note is its ease of shakeout. These attributes combined make this binder option ideal for automotive applications.



## Recommendations

Catalyst	Coatings	Additives	Auxiliaries
Methylformate	MIRATEC™	VEINO™	ZIP-SLIP™

Attributes		Application	Quick reference		
		Major			Minor
Perfor- mance	Water based binder	Ferrous Non-ferrous Specialty motor blocks	Quality	Flexibility	Eco-Friendly
	Ideal for steel casting				
	Low odor at core and mold making				
	Good shakeout				

# 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

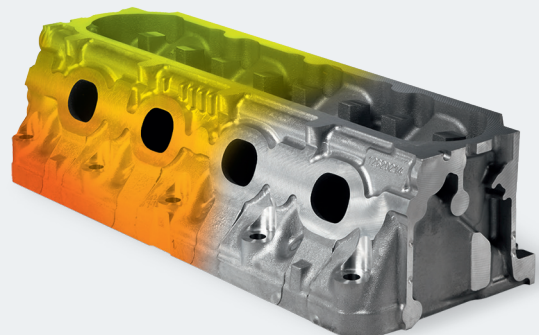
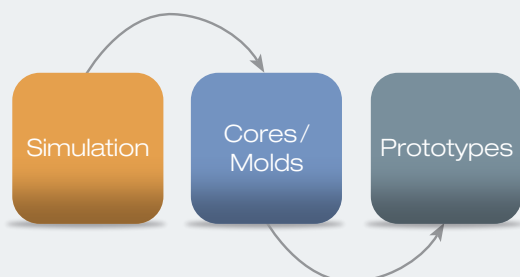
- Higher productivity and optimized catalyst consumption
- Manufacturing process design, including inorganic technology
- Calculation of optimal feed
- Optimized design and manufacture of model plates, core boxes and molds
- Less scrap
- Shorter product launch times
- Quicker time-to-market

### 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



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