



SHAKUN INDUSTRIES[®]
Promising Quality Since 2001.

Company Brochure

CFC Free Solutions
Offering wide range of
eco-friendly solutions to
the polyurethane industry.

**India's Best
Polyurethane Provider**
Featured in Industry Outlook
as the Top 10 Chemical
Companies in 2020.

www.shakunindustries.com

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COMPANY VISION

Polyurethane Polymers are Everywhere!

Polyurethanes are an essential part of our lives, without us knowing about it. Be it your insulated walls, roofs, water jugs, tiffin boxes, or your flexible sofa sets, mattresses, or cushion seats.



TRUE POTENTIAL & IMPACT OF POLYURETHANES

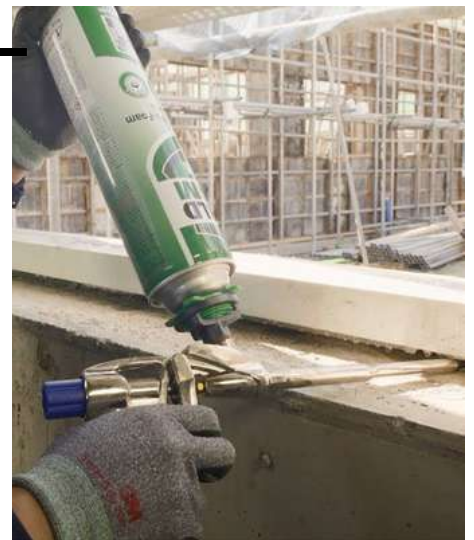
FEW WORDS BY PRAVEEN K. GOYAL

Shakun Industries' core business involves developing polyurethane polymers and solving critical problems everyday. We are a nation-wide supplier of isocyanates, pre-blended polyurethane polyol systems, and specialty polyester polyols. We pursue an integrated strategy of handling multiple business activities as efficiently as possible. With our 20+ years of experience, industry expertise, and technical capabilities, we convert ideas into concrete solutions. Shakun Industries works together with its customers as a partner to develop innovative solutions and drive customer satisfaction. The world is our market, and we are supplying from our production facility in Haryana, India. We are guided by technological advances and customer needs. We regard social and technological change as an opportunity. With our products and services, we devote a great deal of effort to preserve our natural resources.

Our vision stands to create concrete solutions via our products and services while maintaining social responsibility and harmony. Apart from providing our current products, we aim to enhance our product line to various other sectors in the foreseeable future. The polyurethane industry is already booming, and we ought to become a major contributor in the industry. Our business philosophy is to develop polyurethane solutions in close partnership with our customers. We offer our global knowledge and expertise network to identify our customers' complex, application related problems and to develop specific and innovative solutions - bearing all economic and practical considerations.

applications that matter.

SIPOLYNATE® | ESPUREPOL®



ABOUT SHAKUN INDUSTRIES®

Shakun Industries is an ISO 9001:2015 and ozone certified chemical company, which was founded in 2001 by Late. Shri Ram Niwas Goyal. The company is currently under Mr. Praveen Goyal and Mr. Keshav Goyal. Company offices and production facilities are located at Reliance Model Economic Township, Haryana, India.

The company manufactures polyurethane polyol systems, which are further used to manufacture polyurethane foams. Polyurethane (PU or PUR) polymers are traditionally and most commonly formed by reacting a di- or tri-isocyanate with a polyol component. Polyurethane foams can be classified further into sub-categories according to their physical properties and industrial applications. These categories are rigid, flexible, semi rigid or integral skin, and elastomeric foams.

The company launched its industrial operations by blending polyols used in the rigid PU industry. The facility was upgraded in 2007, with an in-house setup for manufacturing both polyester and polyether based blended polyurethane systems. This enabled the company to offer consistent quality to the polyurethane industry.

POLYURETHANE POLYOL SYSTEM HOUSE

Established in 2001, catering to different industrial polyurethane applications in and around India.



The company further expanded in the year 2009, setting up manufacturing facilities for a wide range of specialty polyester polyols. This expansion opened up opportunities for participating in newer industry segments like coatings, adhesives, sealants and footwear. The present success can be attributed to the company's path-breaking research & development efforts. The scientists have indigenously developed various types of formulations for diverse industry segments.

Shakun Industries is among the best polyurethane system houses in India, having ultramodern in-house facilities and expertise for producing polyesters and blended polyurethane polyol systems. The company has a vast experience of 20+ years and believes in constantly developing innovative solutions for all polyurethane applications. The company has thrived over the years, and lives by the saying 'Promising Quality Since 2001.'



WHY US?

India's chemical story is complex and one of outperformance and promise. A consistent value creator, the chemical industry remains an attractive hub of opportunities, even in an environment of global uncertainty. Worldwide trends affecting the global chemical industry could lead to near-term opportunities for chemical manufacturing companies in India. The polyurethane industry in India is a booming sector and has an estimated growth rate of more than 15% in India and a CAGR of 5.8% worldwide as of 2020. However, the Indian players still have to deal with a lot of challenges when it comes to raw material supply chain logistical dependencies, adhering to environmental laws, and coping up with technological advances.

Shakun Industries, currently, is among the top 5 polyurethane chemical companies (system houses) in India. The company serves the rigid polyurethane industry, specifically which caters to all the thermal/sound insulation, buoyancy, and heavy load bearing support applications. We have a capacity of producing more than 300 MT per month.

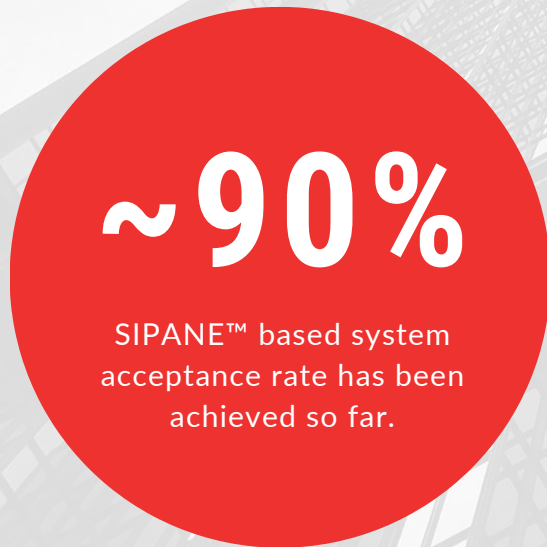
Technological advances, pricing strategy, and industry reputation are the key factors that give Shakun Industries an edge over other players in the industry. Our products have always been perceived as better in quality. Moreover, the product offerings are well differentiated in India in terms of technology exclusivity, manufacturing capabilities and quality standards.

We have a very strict yet efficient quality management system. Adhering to the quality code of conduct, we have streamlined our operations, and source our raw materials only from verified and trusted vendors.

Over the years, Shakun Industries[®] has established an impregnable brand equity and market share in the industry.

Among India's Top Chemical Companies in 2020.

Shakun Industries got featured in India's most read B2B magazine - Industry Outlook in 2020.



First to offer CFC Free Polyol Systems.

Shakun Industries was the first polyurethane system house in India to develop and offer safe to use in-house CFC free hydrocarbon based blowing agent - SIPANE™ based polyols for rigid foams.

Promising Quality Since 2001.

Shakun Industries is an ISO 9001:2015 certified company, a member of Plastics Export Promotion Council, and an ozone certified company.





ALTERNATE TECHNOLOGIES

HCFC PHASE OUT

Montreal Protocol Implementation

DECEMBER 2019

The Montreal Protocol on substances that deplete the ozone layer is an international treaty designed to protect the ozone layer by phasing out the consumption of numerous ozone depleting substances (ODS), which are responsible for the depletion of the ozone layer. HCFCs were phased-out in a stage wise manner under the HCFC Phase Out Management Plan, implemented in late 2019.

The Ozone cell of The Union Ministry of Environment, Forests and Climate Change (MoEFCC) also implemented the planned HCFC phase out in the polyurethane foam sector as well. In accordance with the Ozone Depleting Substances (ODS) Amendment Rule 2014 in India, the use of HCFCs (including HCFC 141B) in manufacturing of all the polyurethane foam products should be completely phased out by 1st January 2020.

Several polyurethane system houses and foam manufacturing companies tried to develop alternate technologies, that too in a very short span of time. Nonetheless, only a few succeeded. Shakun Industries had a big role in the implementation of HCFC Phase Out Program, and was the first in India to develop and introduce an in-house CFC free, easy to use hydrocarbon based blowing agent - SIPANE™ - polyurethane blended systems.



Comparison of Blowing Agent Properties

Properties	HCFC 141B	SIPANE™	HFC 365/227	Ecomate (Methyl Formate)	HFO (Solstice)
Molecular Weight	117	70	149.6	60	130
Physical State	Liquid	Liquid	Liquid	Liquid	Liquid
Boiling Point (°C)	32	49	30	31.5	19
Flash Point (°C)	None	-7	None	-19	None
LFL/UFL (%)	5.6/17.7	1.5/9.4	None	5.0/23.0	None
Lambda 25°C (mW/mK)	10.01	12.8	10.7	10.7	10.6
ODP	0.1	0	0	0	0
GWP	630	11	1050	<25	<7

Solutions by Shakun Industries®

The dedicated research and development team at Shakun Industries is continuously involved in innovation and improving performance of the products. We, at Shakun Industries, have achieved an excellence in developing customized solutions as per client capabilities and requirements. With utmost dedication, effort, and patience, we have developed various hassle free wide range of CFC free solutions for the application of the polyurethane industry as listed below:

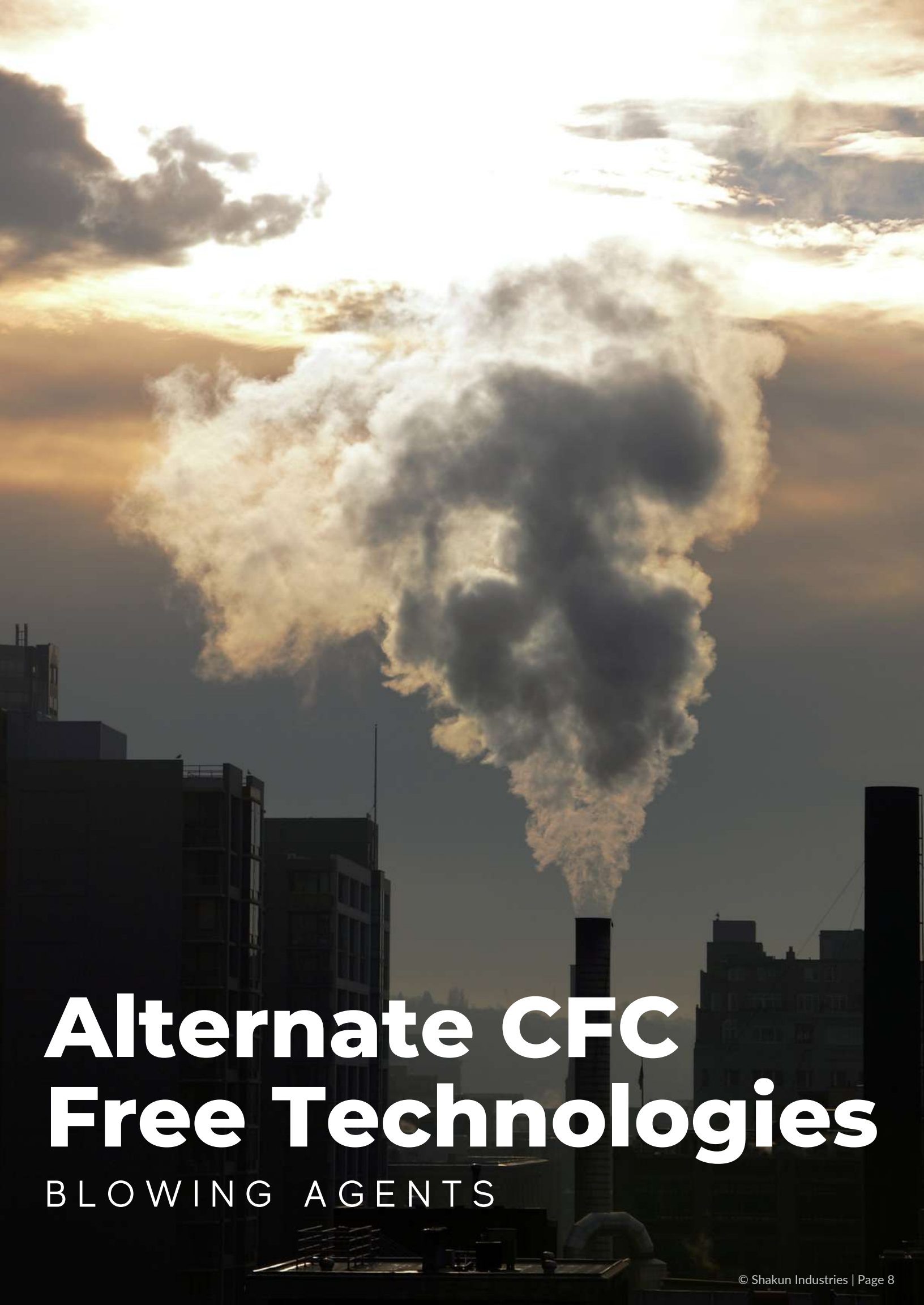
- Water Blown Polyurethane System
- Hydrocarbon (SIPANE™) Based Polyurethane System
- HFC 365/227 Based Polyurethane System
- Methyl Formate Based Polyurethane System
- HFO Based Polyurethane System

All the mentioned alternate technologies including HFCs, water, SIPANE™, methyl formate, and HFOs are compliant with the described Montreal Protocol. However, in the long term, HFCs do not come under the compliancy purview of other protocols such as the Kyoto Protocol, EU legislation, and the F-Gas Regulation. Therefore, employing HFCs, with a relatively high global warming potential, as an alternate technology would be a short term solution.

Comparative Advantages & Disadvantages of Blowing Agents

Properties	Water	SIPANE™	HFC 365/227	Ecomate (Methyl Formate)	HFO (Solstice)
Processability	•••••	••••	•••••	•••	•••
Performance	•	••••	•••••	••	•••••
Environment	•••••	•••••	••	•••••	•••••
Safety	•••••	•	•••••	•••	•••••
Reliability	••	•••••	•••••	••	•••••
Changeover Cost	•••••	•	•••••	••••	•••••
Operation Cost	••	•••••	••	•••••	•
Ease of Changeover	•••••	••	•••	••	•••••

••••• Excellent •••• Very Good ••• Good •• Fair • Poor



Alternate CFC Free Technologies

BLOWING AGENTS

Water

Water is a chemical blowing agent. It reacts with MDI and generates carbon dioxide, which then acts as blowing agent. Water blown foam has high K-factor (poor insulation), which further increases with time as carbon dioxide trapped in the foam cells eventually escapes and "air" enters the cell matrix. The deterioration in insulation value and cell stability can be addressed by adding more material, increasing foam thickness and consequently increasing costs. Water based systems are used in relatively less critical insulation applications such as in-situ foams, surf boards, low density open cell packaging foams, etc.

Hydrocarbons

Hydrocarbons, as blowing agents, are commercially proven in all major countries. They have zero ODP and low GWP. The three isomers of pentane - cyclopentane, n-pentane, and iso-pentane are generally used as foam blowing agents. Among the three, cyclopentane has the lowest k-factor due to its "bulkiness" and thus provides best insulation. N-pentane has the highest (worse) K-factor. Iso-pentane has similar K-factor as cyclopentane and its blend with cyclopentane improves solubility in polyol. Cyclopentane, when used as a blowing agent in insulation foam, provides acceptable K-factors, good dimensional stability, and adhesion to liners or panels, which are critical physical foam properties. In integral skin foams, cyclopentane tends to condense on the foam surface and form a dense skin. Cyclopentane is flammable in nature, but stable pre-blended cyclopentane systems can be used without any necessary modifications like machinery, transportation, storage, etc.

Hydrofluorocarbons (HFCs)

HFCs are physical blowing agent with zero ODP and very high GWP. In comparison with other non-halogenated blowing agents, they have better insulation values (i.e. low K-factors). HFC-245fa has good solubility in polyols and excellent flowability but a very high GWP of 1020. HFC-245fa blown foam has reduced density and reduced panel waste due to easy processing. Its low boiling point makes it difficult to store and transport. HFCs are costlier as compared to other alternate technologies, but these costs can be controlled up till a limit without affecting much of the foam properties.

Methyl Formate (Ecomate)

Methyl Formate (MF) is a blowing agent with zero ODP and low GWP. It is marketed as Ecomate by Foam Supplies Inc. (FSI). MF is a flammable liquid, but its polyol blends have lower flammability and be used safely. The K-factor of MF is acceptable for insulation foams. However, there is an acute need for optimization in the system formulation without which MF blown foams are prone to severe shrinkage. Methyl Formate is unstable in the presence of water and may generate acid as a by-product. To stabilize the system, the polyol blends may contain organic acids such as formic acid.

Hydrofluoroolefins (HFOs)

HFOs are physical blowing agents with least impact on the climate (zero ODP and very low GWP). HFOs are near drop-in for HCFC-141b in insulating foams and, with excellent K-factors, they can be employed in applications that require highest level of energy saving performance. However, high costs and lack of consistent supply are major deterrents for use of HFOs. Superior insulation properties can be achieved by use of single blowing agent or by using a co-blowing agent such as HFCs or HCs to limit the high costs. There is no requirement of machinery retrofitting and the system can be used safely.





Rigid Polyurethane Blended Systems

Rigid pre-blended polyols are used to produce rigid foams, used in applications such as general insulation, buoyancy, wood imitation, and load bearing structures.

At Shakun, our focus is on understanding and meeting our customers' needs: consistent quality, reliable supply and safe handling. Shakun is in an ideal position to answer these imperatives. Needless to say, we develop customized systems for our clientele too.

- Excellent surface finish and inter-laminar adhesion properties.
- Environment friendly solutions with CFC free blowing agents.
- Customized solutions for customer specific needs and requirements.



Comparison of Rigid Blended Polyol Systems - SIPOLYNATE® Series R

Product	Cream Time (seconds)	Gel Time (seconds)	End of Rise Time (seconds)	Free Rise Density (KG/m ³)	Fire Retardancy	Description & Application
SIPOLYNATE® R100FE	18-25	80-100	110-130	25-27	No	Two component system for general insulation purposes including sandwich panels. The foam has a good surface finish and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the primary blowing agent.
SIPOLYNATE® R100FSE	25-45	120-150	150-180	25-27	No	Two component system for the insulation of large vessels, pipe sections, block sections, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has a slow reaction profile that makes it ideal for manual hand pouring.
SIPOLYNATE® R100FTE	10-15	65-80	80-100	25-27	No	Two component system for the insulation of small vessels, pipe sections, refrigerators, and thermo-ware containers. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has a fast reaction profile.
SIPOLYNATE® R100HDE	35-55	100-150	150-200	65-200	No	Two component system for high density applications, such as wood imitation, load bearing supports, fish floats, helmets, etc. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100MDE	18-25	80-100	110-130	30-65	No	Two component system for in-situ pouring and high density sandwich panels. The foam has a good surface finish and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100LDE	10-15	60-80	80-100	22-24	No	Two component system for the insulation of small vessels, pipe sections, block sections, and other intricate moulds. The system can also be used in select few rigid packaging applications. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100FRE-B1	15-25	80-100	105-130	26-28	Yes	Two component system for general insulation purposes and sandwich panels. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has high flame retardancy properties.
SIPOLYNATE® R100FRE-B2	15-25	80-100	105-130	26-28	Yes	Two component system for general insulation purposes and sandwich panels. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has mild flame retardancy properties.
SIPOLYNATE® R100FSRE	25-35	100-130	150-180	26-28	Yes	Two component system for the insulation of large vessels, pipe sections, block sections, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has a slow reaction profile that makes it ideal for manual hand pouring. The system has high flame retardancy properties.
SIPOLYNATE® R100FTRE	10-15	50-70	80-100	25-27	Yes	Two component system for the insulation of small vessels, pipe sections, block sections, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has a fast reaction profile. The system has high flame retardancy properties.
SIPOLYNATE® R100HDFRE	25-40	100-130	150-200	100-200	Yes	Two component system for high density applications, such as wood imitation, load bearing supports, fish floats, helmets, etc. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has high fire retardancy properties.
SIPOLYNATE® R100MDFRE	18-25	80-100	110-130	30-65	Yes	Two component system for medium density applications, such as in-situ pouring or sandwich panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has high fire retardancy properties.
SIPOLYNATE® R100LDFRE	10-15	50-70	80-100	22-24	Yes	Two component system for low density applications, such as small intricate moulds, rigid protective packaging, etc. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system has high fire retardancy properties.
SIPOLYNATE® R200FRX	15-25	90-110	130-150	40-160	Yes	Two component for the production of 100% PIR block and pipe sections. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100FE-2C	8-12	35-45	55-65	31-33	No	Two component system for insulation of continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100FE-3D	18-25	80-100	105-125	25-27	No	Three component system for discontinuous insulation of roof panels, wall panels, vessels, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent, which needs to be mixed proportionately at 16.5 pphp. It is ideally processed through high-pressure impingement mixing.



Comparison of Rigid Blended Polyol Systems - SIPOLYNATE® Series R

Product	Cream Time (seconds)	Gel Time (seconds)	End of Rise Time (seconds)	Free Rise Density (KG/m ³)	Fire Retardancy	Description & Application
SIPOLYNATE® R100FE-2CL	8-12	35-45	55-65	25-27	No	Two component system for insulation of low density continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100FE-3C	8-12	35-45	55-65	31-33	No	Three component system for insulation of continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100FE-4C	8-12	35-45	55-65	31-33	No	Four component system for insulation of continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100FRE-2C	8-12	35-45	55-65	31-33	Yes	Two component system for insulation of continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system also exhibits high flame retardancy properties.
SIPOLYNATE® R100FRE-3D	18-25	80-100	105-130	26-28	Yes	Three component system for discontinuous insulation of roof panels, wall panels, vessels, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent, which needs to be mixed proportionately at 16.5 pphp. It also exhibits high flame retardancy properties.
SIPOLYNATE® R100FRE-2CL	8-12	35-45	55-65	26-28	Yes	Two component system for insulation of low density continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. It also exhibits high flame retardancy properties.
SIPOLYNATE® R100FRE-3C	8-12	35-45	55-65	31-33	Yes	Three component system for insulation of fire retardant continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100FRE-4C	8-12	35-45	55-65	31-33	Yes	Four component system for insulation of fire retardant continuous roof panels and wall panels. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R125OCFE	5-10	40-50	110-130	20-28	No	Two component system for moisture cure rigid foams, primarily used in grouting of roofs, walls, floors, vessels, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent. It is ideally processed through high-pressure injection. The system reacts only in the presence of water or moisture.
SIPOLYNATE® R125OCFTE	5-10	40-50	110-130	25-27	No	One component foam system for open cell rigid foams used in aerosol spray cans to fill gaps and insulate walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R125FSE	30-40	140-180	200-240	30-33	No	Two component spray foam system for hydrophobic grouting of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R125FTE	10-15	50-70	80-100	30-33	No	Two component spray foam system for hydrophobic grouting of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R125MDE	15-25	70-90	90-110	60-65	No	Two component spray foam system for hydrophobic grouting of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R125HDTE	15-25	70-90	90-110	100-120	No	Two component spray foam system for hydrophobic grouting of grounds, roads, pavements, etc. to uplift them. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100HDO	20-30	80-100	120-150	95-105	No	Two component system for offshore field joint insulation purposes. The foam has a minimum 80% open cell structure and a good surface finish. The system uses our in-house CFC free SIPANE™ as the blowing agent.
SIPOLYNATE® R100HDUltra	25-45	100-150	150-180	300-950	No	Two component system for high density applications such as open mould or cast pouring. The system has a slow reaction profile that makes it ideal for manual hand pouring.



Application of Different Grades of Rigid Blended Polyol Systems

SIPOLYNATE ®	R100FE	R100FE	R100FTE	R100HDE	R100FRE	R100FRE	R100FTRE	R100HDFRE	R100FE-2C	R100FE-3C	R100FRE-2C	R100FE-3D	R100FRE-3D	R100HDO	R125FTE
Application															
Insulated Sandwich Panels (Discontinuous)	✓	✓			✓	✓						✓	✓		
Insulated Sandwich Panels (Continuous)									✓	✓	✓				
AHU Panels	✓		✓		✓		✓								
Water Tank Insulation	✓	✓	✓		✓	✓	✓								
Marine Boat Hulls				✓				✓							✓
Fish Floats (Buoyancy)				✓				✓							
Hair Wigs				✓											
Wood Imitation (Cornice, Pillars)				✓				✓							
Heavy Load Bearing Supports				✓				✓							
Concrete Grouting & In-Situ Applications															✓
Ice Boxes & Thermoware	✓		✓		✓		✓								
Refrigerators	✓		✓		✓		✓								
Rigid Blocks & Sheets	✓	✓		✓	✓	✓		✓							
Rigid Pipe Sections		✓	✓		✓	✓	✓	✓							
Solar Water Heaters & Geysers	✓	✓	✓		✓	✓	✓								
Offshore Field Joint Applications														✓	



Spray Foam Blended Polyol Systems

Spray foams are used to insulate walls and roofs using specialized spraying equipment. The foam helps to maintain indoor temperatures and also aids in stopping water leakages from the surfaces.

At Shakun, the development team works closely with the machine manufacturers in order to develop compatible polyol systems and thus provide consistent quality with hassle free handling. Shakun tries to be at the forefront of providing customer centric solutions.

- Excellent surface finish and inter-laminar adhesion properties.
- Environment friendly solutions with CFC free blowing agents.
- Customized solutions for customer specific needs and requirements.



Comparison of Spray Foam Polyol Systems - SIPOLYNATE[®] Series SP

Product	Cream Time (seconds)	Gel Time (seconds)	End of Rise Time (seconds)	Free Rise Density (KG/m ³)	Fire Retardancy	Description & Application
SIPOLYNATE [®] SP100FE	2-5	5-8	10-12	30-32	No	Two component spray foam system for insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system is highly reactive.
SIPOLYNATE [®] SP100FSE	5-8	15-25	35-40	60-70	No	Two component spray foam system for in-situ applications, grouting of roofs, walls, floors, vessels, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent. It is ideally processed through high-pressure impingement uniform spraying. The system is highly reactive.
SIPOLYNATE [®] SP100LDE	2-5	5-8	10-12	20-22	No	Two component spray foam system for low density insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system is highly reactive.
SIPOLYNATE [®] SP100MDE	2-5	5-8	10-12	38-42	No	Two component spray foam system for medium density insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system is highly reactive.
SIPOLYNATE [®] SP100HDE	2-5	5-8	10-12	55-65	No	Two component spray foam system for high density insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system is highly reactive.
SIPOLYNATE [®] SP100-OCFE	2-5	5-8	9-12	19-22	No	Two component water blown spray foam system for insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system is highly reactive.
SIPOLYNATE [®] SP100-OCFLDE	2-5	5-8	9-12	8-12	No	Two component water blown spray foam system for low density insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system is highly reactive.
SIPOLYNATE [®] SP100FRE	2-5	5-8	9-12	30-32	Yes	Two component spray foam system for insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system exhibits high flame retardancy properties.
SIPOLYNATE [®] SP100FSRE	5-8	15-25	35-40	60-70	Yes	Two component spray foam system for in-situ applications, grouting of roofs, walls, floors, vessels, and tanks. The system uses our in-house CFC free SIPANE™ as the blowing agent. It is ideally processed through high-pressure impingement uniform spraying. The system exhibits high flame retardancy properties.
SIPOLYNATE [®] SP100LDFRE	2-5	5-8	9-12	30-32	Yes	Two component spray foam system for low density closed cell insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system exhibits high flame retardancy properties.
SIPOLYNATE [®] SP100MDFRE	2-5	5-8	9-12	38-42	Yes	Two component spray foam system for medium density insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system exhibits high flame retardancy.
SIPOLYNATE [®] SP100HDFRE	2-5	5-8	9-12	55-65	Yes	Two component spray foam system for high density insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system uses our in-house CFC free SIPANE™ as the blowing agent. The system exhibits high flame retardancy.
SIPOLYNATE [®] SP100-OCFRE	2-5	5-8	9-12	19-22	Yes	Two component water blown open cell spray foam system for insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system is highly reactive and exhibits high flame retardancy properties.
SIPOLYNATE [®] SP100-OCFLDFRE	2-5	5-8	9-12	8-12	Yes	Two component water blown low density open cell spray foam system for insulation of walls, roofs, and other surfaces. The foam has a good surface finish with excellent cell structure and good inter-laminar adhesion. The system is highly reactive and exhibits high flame retardancy properties.

All the aforementioned grades cater to varied applications. However, if there are specific requirements, reaction times and free rise densities can be altered easily. We also support new application development at our in-house research & development center, which is equipped with all the necessary apparatus, tools, and raw materials.

Packaging Foam Polyurethane Systems

Packaging polyurethane systems are mainly used in safe packaging applications and can be employed in various containers including corrugated, plastic, wooden boxes, etc.

- Easy to use with excellent shock absorbing properties.
- Environment friendly solutions with CFC free blowing agent.
- Long lasting reliability with good load bearing capacity.



Comparison of Packaging Polyol Systems - SIPOLYNATE® Series P

Product	Cream Time (seconds)	Gel Time (seconds)	End of Rise Time (seconds)	Free Rise Density (KG/m ³)	Fire Retardancy	Description & Application
SIPOLYNATE® P100FE	5-10	20-30	45-55	8-10	No	Two component system for flexible safety packaging purposes. The foam has good compaction and excellent shock absorbing properties. The system uses our in-house CFC free SIPANE™ as the primary blowing agent. The system has low load bearing capacity.
SIPOLYNATE® P100MDE	5-10	20-30	45-55	15-17	No	Two component system for flexible safety packaging purposes. The foam has good compaction and excellent shock absorbing properties. The system uses our in-house CFC free SIPANE™ as the primary blowing agent. The system has medium load bearing capacity.
SIPOLYNATE® P100HDE	5-10	20-30	45-55	21-23	No	Two component system for flexible safety packaging purposes. The foam has good compaction and excellent shock absorbing properties. The system uses our in-house CFC free SIPANE™ as the primary blowing agent. The system has high load bearing capacity.
SIPOLYNATE® P170HDE	10-12	40-60	70-90	20-22	No	Two component system for flexible safety packaging purposes and can also be used in low density foam applications such as automotive roofliners, etc.. The foam has good compaction and excellent shock absorbing properties. The system uses our in-house CFC free SIPANE™ as the primary blowing agent.

All the aforementioned grades cater to varied applications. However, if there are specific requirements, reaction times and free rise densities can be altered easily. We also support new application development at our in-house research & development center, which is equipped with all the necessary apparatus, tools, and raw materials.



Flexible HR Moulded Foam Systems

Flexible molded foam systems are polyurethane foams that can be molded into various shapes and densities. They are commonly used in the automotive, furniture, toys, and bedding industries for cushioning and acoustic insulation.

- Easy to use with excellent physical properties.
- Environment friendly solutions with CFC free blowing agent.
- Long lasting reliability with good resilience.



Comparison of Flexible HR Polyol Systems - SIPOLYNATE® Series F

Product	Cream Time (seconds)	Gel Time (seconds)	Rise Time (seconds)	Free Rise Density (KG/m ³)	Resilience (%)	Description & Application
SIPOLYNATE® F4577	5-10	35-40	45-55	43-47	60-65	Two component system for producing high resilience flexible foams such as toys, smiley balls, etc. The foam has good resilience with fine cell structure. The foam has good surface finish with excellent touch and feel.
SIPOLYNATE® F8077	8-13	40-45	65-70	78-82	50-55	Two component system for producing high resilience flexible foams for furniture. The foam has good resilience with fine cell structure. The foam has good surface finish with excellent touch and feel.
SIPOLYNATE® F4875	15-20	75-95	90-110	46-50	50-55	Two component system for producing high resilience flexible foams for furniture and automotive applications. The foam has good resilience with fine cell structure. The foam has good surface finish with excellent touch and feel.
SIPOLYNATE® F4070	10-15	50-60	65-75	38-42	50-55	Two component system for producing high resilience flexible foams for furniture and automotive applications. The foam has good resilience with fine cell structure. The foam has good surface finish with excellent touch and feel.

All the aforementioned grades cater to varied applications. However, if there are specific requirements, reaction times, free rise densities, and hardness can be altered easily. We also support new application development at our in-house research & development center, which is equipped with all the necessary apparatus, tools, and raw materials.

Integral Skin Foam Systems

Integral skin foams are polyurethane materials with a dense outer layer and a soft, flexible interior. They are often used for automotive, marine, and furniture applications where durability and aesthetics are important. The foam is created by a chemical reaction between a polyol and an isocyanate that is allowed to expand and cure in a mold.

- Easy to use with excellent skin and surface finish.
- Environment friendly solutions with CFC free blowing agent.
- Long lasting reliability with good tear strength.



Comparison of Integral (ISF) Polyol Systems - SIPOLYNATE® Series I

Product	Cream Time (seconds)	Gel Time (seconds)	Rise Time (seconds)	Free Rise Density (KG/m ³)	Shore Hardness (A°)	Description & Application
SIPOLYNATE® I45FE	15-20	30-35	40-45	100-130	58-62	Two component system for general integral skin foam applications such as chair armrests, handles, etc. The foam has good cell structure and thick outer skin. The system uses our in-house CFC free SIPANE™ as the primary blowing agent.
SIPOLYNATE® I55MDE	10-15	30-35	40-45	150-180	60-65	Two component system for hard integral skin applications like steering wheels, automotive parts, etc. The foam has good hardness and excellent cell structure. The system uses our in-house CFC free SIPANE™ as the primary blowing agent.
SIPOLYNATE® I30HDE	35-45	90-120	150-180	225-250	70-75	Two component system for integral skin foam applications such as gasket seals. The foam has good hardness and excellent shock absorbing properties. The system uses our in-house CFC free SIPANE™ as the primary blowing agent.
SIPOLYNATE® I40HDE	15-20	50-60	70-80	300-325	70-75	Two component system for high density integral skin foam applications such as automotive floor mats, etc. The foam has good hardness and excellent cell structure. The system uses our in-house CFC free SIPANE™ as the primary blowing agent.

All the aforementioned grades cater to varied applications. However, if there are specific requirements, reaction times, free rise densities, and shore hardness can be altered easily. We also support new application development at our in-house research & development center, which is equipped with all the necessary apparatus, tools, and raw materials.



Shoe Sole Polyurethane Systems

Shoe sole foam systems are materials used to create cushioning and support in the soles of shoes. They are made from polyurethane and can vary in density and hardness to accommodate different types of footwear and activities. Imported chemical systems including the additives for shoe sole applications can be provided as per customer requirements.

Shoe Sole Applications

Unit Soles	Sports Shoes
Sandals & Slippers	Safety Shoes
Casual Shoes	Insoles



Polyurethane Additives

Polyurethane additives are substances added to polyurethane formulations to enhance their performance, durability, and processing. These additives can include catalysts, surfactants, blowing agents, flame retardants, and fillers. By adjusting the types and amounts of additives used, polyurethane can be tailored to meet specific application requirements.

- Imported goods with guaranteed quality standards.
- Consistent and reliable supply.
- International technical support for additive dosage.



BASE POLYETHER POLYOLS

3000 MW

Covestro
Arcol® 5613

GC Polyols
Genix® GS-3000R

Shell Chemicals
Caradol® SC-5616s

5000 MW

Covestro
Arcol® 1053

GC Polyols
Genix® FA-703

Shell Chemicals
Caradol® SA-3405

6000 MW

Covestro
Arcol® 1362

GC Polyols
Genix® FA-921

Shell Chemicals
Caradol® MC-2802

***Other brands include BASF, Wanhua, SKC, KPX, etc.**

Note: The brands/grades are subject to availability.

Polyurethane Additives

SPECIALIZED POLYOLS

POLYMER POLYOLS

Polymer polyols are polymeric materials used as raw materials in the production of polyurethane foams, coatings, and adhesives. They provide improved physical and chemical properties to these products.

Available Brands: KPX, Wanhua, Mitsui Chemicals, GC Polyols, BASF, etc.

CELL OPENERS

Cell openers are chemical additives used in the production of polyurethane foam to create open-cell structures. They facilitate the release of gas during the foaming process, resulting in a more breathable and flexible foam.

Available Brands: KPX, Wanhua, Mitsui Chemicals, BASF, Covestro, etc.



CATALYSTS & SURFACTANTS

CATALYSTS

PU catalysts facilitate the reaction between isocyanates and polyols, resulting in the formation of the final polyurethane product. These include both blow and gel catalysts such as DMCHA, DMEA, DBTDL, PMDTEA, etc.

Available Brands: Evonik, Momentive, Lanxess, etc.

SILICONES

Silicone surfactants are chemical additives used in the production of polyurethane foam to stabilize the foam structure and improve its properties. They lower the surface tension of the foam, resulting in a more uniform and stable cell structure.

Available Brands: Evonik, Momentive, Wacker, Recaz Chemicals, etc.

Polyester Polyols

Polyester polyols are a class of polymeric materials used in the production of polyurethane products such as foams, coatings, and adhesives. They are produced by reacting diacids or anhydrides with diols or triols, and provide improved chemical and mechanical properties to the final product.

- Consistent and reliable quality.
- Custom tailored solutions.
- Excellent mechanical properties with good shelf life.

AROMATIC POLYESTERS

Aromatic polyester polyols are commonly used in the production of rigid polyurethane foam insulation for building and refrigeration applications due to their high thermal stability, low heat of combustion, and good mechanical properties. They can also be used in the production of coatings, adhesives, and elastomers.



Comparison of Aromatic Polyester Polyol Grades - ESPUREPOL® Series AR

Product	Hydroxyl Value	Acid Value	Viscosity @ 25 °C	Molecular Weight	Functionality	Description & Application
ESPUREPOL® AR4010	430-470	<2	6000-8000	~285	2.2-2.3	Branched polyester polyol for rigid and CASE polyurethane systems. The base monomers are diethylene glycol and phthalic anhydride.
ESPUREPOL® AR300CP	280-320	<2.5	5000-7000	~430	2.1-2.2	Branched castor oil based polyester polyol for rigid and CASE polyurethane systems. The base monomers are diethylene glycol and phthalic anhydride. The polyol shoes good compatibility with hydrocarbons.
ESPUREPOL® AR220HC	200-240	<2.5	4500-6500	~550	2-2.1	Branched polyester polyol for rigid and CASE polyurethane systems. The base monomers are diethylene glycol and phthalic anhydride.
ESPUREPOL® AR350CP	330-370	<2	5000-7000	~360	2.2-2.3	Branched castor oil based polyester polyol for rigid and CASE polyurethane systems. The base monomers are diethylene glycol and phthalic anhydride. The polyol shoes good compatibility with hydrocarbons.

All the aforementioned grades cater to varied applications. However, if there are specific requirements, properties such as hydroxyl values, viscosities, and functionalities can be altered easily. We also support new application development at our in-house research & development center, which is equipped with all the necessary apparatus, tools, and raw materials.

ALIPHATIC POLYESTERS

Aliphatic polyester polyols are often used in the production of coatings and elastomers due to their excellent weatherability and UV resistance, which makes them suitable for outdoor applications. They are also used in the production of thermoplastic polyurethanes (TPUs), as well as adhesives and sealants where flexibility and toughness are required.



Comparison of Aliphatic Polyester Polyol Grades - ESPUREPOL® Series AL

Product	Hydroxyl Value	Acid Value	Viscosity @ 75 °C	Molecular Weight	Functionality	Description & Application
ESPUREPOL® AL5601	55-60	<2	1500-2000	~2000	2	Linear polyester polyol for shoe soles and CASE polyurethane systems. The base monomers are diethylene glycol, ethylene glycol and adipic acid.
ESPUREPOL® AL5603	55-60	<2	3000-3500	~2150	2.1-2.2	Branched polyester polyol for shoe soles and CASE polyurethane systems. The base monomers are diethylene glycol, ethylene glycol and adipic acid. The polyol has good mechanical and physical properties.
ESPUREPOL® AL7801	70-80	<2	2000-2500	~1500	2	Linear polyester polyol for TPU and CASE polyurethane systems. The base monomers are diethylene glycol, ethylene glycol and adipic acid.
ESPUREPOL® AL1001	110-120	<2	400-800	~975	2	Linear polyester polyol for TPU and CASE polyurethane systems. The base monomers are diethylene glycol, ethylene glycol and adipic acid. The polyol has excellent elastomeric properties.

All the aforementioned grades cater to varied applications. However, if there are specific requirements, properties such as hydroxyl values, viscosities, and functionalities can be altered easily. We also support new application development at our in-house research & development center, which is equipped with all the necessary apparatus, tools, and raw materials.

Isocyanates

Isocyanates are highly reactive chemical compounds used in the production of polyurethane products such as foams, coatings, and adhesives. They react with polyols to form polyurethane polymers, and their reactivity makes them a potential health hazard if not handled properly.

POLYMERIC MDI

Polymeric MDI (PMDI) is applicable to many foam processes, this product is compatible with rigid polyether and polyester polyols, making it suitable for a full range of low- to high-density semi-rigid foams, rigid foams and structural RIM processing.

Available Grades:

Covestro Desmodur® 44V20L

Dow Papi™ 27

Tosoh Millionate® MR200

Wanhua Wannate® PM2010

BASF Lupranat® M20S

SABIC MDI 2031



MODIFIED MDI

Modified MDI (MMDI) is a type of isocyanate used in the production of polyurethane products such as flexible foams and elastomers. It is a mixture of MDI isomers that have been modified to have a lower viscosity, making it easier to handle and process. MMDI provides improved mechanical and chemical properties to the final product.

Available Grades:

Wanhua Wannate® 8018

Tosoh Coronate® 1342

Wanhua Wannate® 8626

Tosoh Cosmonate® MX



TOLUENE DIISOCYANATE - TDI 80/20

TDI 80/20 is a mixture of 80% 2,4-toluene diisocyanate (TDI) and 20% 2,6-toluene diisocyanate (TDI). It is a highly reactive isocyanate used in the production of polyurethane products such as flexible foams, coatings, and adhesives. TDI 80/20 has a faster reactivity than other isocyanates and provides good mechanical properties to the final product. However, it can also be a potential health hazard if not handled properly due to its high volatility and reactivity.

Available Grades:

Wanhua Wannate® T-80

Hanhwa Konnate® T-80

Mitsui Cosmonate® T-80

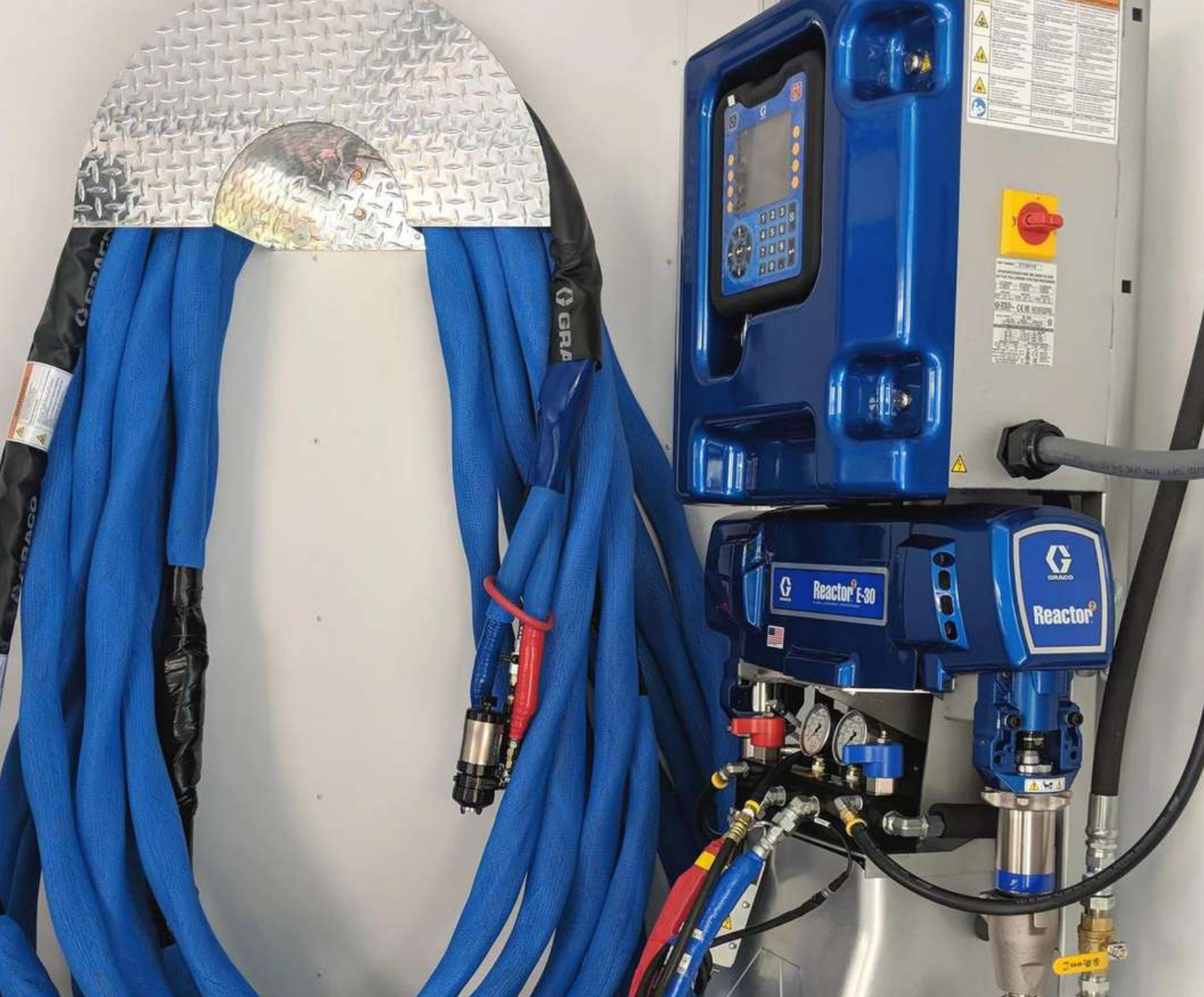
BASF Lupranate® T-80

Dow Voranate® T-80

Sabic TDI 0380

*Other brands include Covestro, GNFC, Kumho, KPX, etc.

Note: The brands/grades are subject to availability.



Polyurethane Spray & Injection Machinery

Polyurethane machinery refers to the equipment used in the production and processing of polyurethane foam and other polyurethane products. This may include mixers, dispensing machines, spraying equipment, molds, and cutting machines.

Principle Partners & Associations





Cleaning Agents

Polyurethane cleaning agents are typically solvent-based cleaners that are specifically formulated to remove uncured or partially cured polyurethane foam or adhesive residue. They may also be used to clean polyurethane-coated surfaces or equipment. It is important to follow the manufacturer's instructions and safety guidelines when using these cleaning agents.

Available Solvents:

Diethyl Phthalate (DOP)

Dimethyl Formamide (DMF)

Acetone (ACT)

Methylene Dichloride (MDC)





On Site Spray PUF Insulation Services

We are glad to introduce a new PAN India service for spray foam (SPF) insulation, providing an effective solution for building insulation needs. We, along with Graco certified machine operators, are here to solve all your insulation needs. This new service offers a cost-effective and energy-efficient insulation option for all residential, commercial, and industrial buildings.

There are several advantages of choosing spray polyurethane foam (SPF) insulation services over other insulation options. Firstly, SPF insulation forms a seamless and airtight barrier, reducing air leaks and preventing moisture intrusion. This helps to improve energy efficiency and reduce heating and cooling costs. Secondly, SPF insulation has a high R-value, providing superior thermal insulation compared to traditional insulation materials. Thirdly, it is a versatile insulation option that can be used for a variety of applications, including roofs, walls, and floors. Finally, SPF insulation is long-lasting and requires little maintenance, making it a cost-effective investment in the long run.



On Site Polyurea Coating Services

We are also offering a PAN India service for spray polyurea coating, providing a highly durable and protective coating solution for a variety of surfaces. Polyurea coating is a two-component system that is sprayed on surfaces and dries quickly, forming a seamless, waterproof, and abrasion-resistant layer. This new service offers a versatile and cost-effective coating option for industrial, commercial, and residential applications, including concrete floors, metal structures, and roofs.

There are several advantages of choosing polyurea coatings over other options. Firstly, polyurea coatings are highly durable and can withstand extreme temperatures, making them ideal for use in harsh environments. Secondly, they have a fast-curing time, allowing for quick turnaround times and reducing downtime. Thirdly, they have excellent adhesion to a variety of substrates, including concrete, metal, and wood, providing a seamless and uniform coating. Additionally, polyurea coatings have high chemical and abrasion resistance, providing long-lasting protection against wear and tear. Finally, they are low in VOCs (volatile organic compounds) and environmentally friendly, making them a safe and sustainable option.

promising quality since 2001.

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