NAFTA Region

ADDITIVES FOR COMFORT FOAM EMISSION MANAGEMENT

AMINE CATALYSTS, SILICONE SURFACTANTS, PERFORMANCE ADDITIVES & ALDEHYDE SCAVENGERS

EVONIK
Leading Beyond Chemistry

EVONIK – LEADING THE WAY IN REDUCING VOC EMISSIONS IN POLYURETHANE FOAM

We are the global leader in polyurethanes offering you the broadest choice of additives for use in the production of low emission polyurethane slabstock foams including:

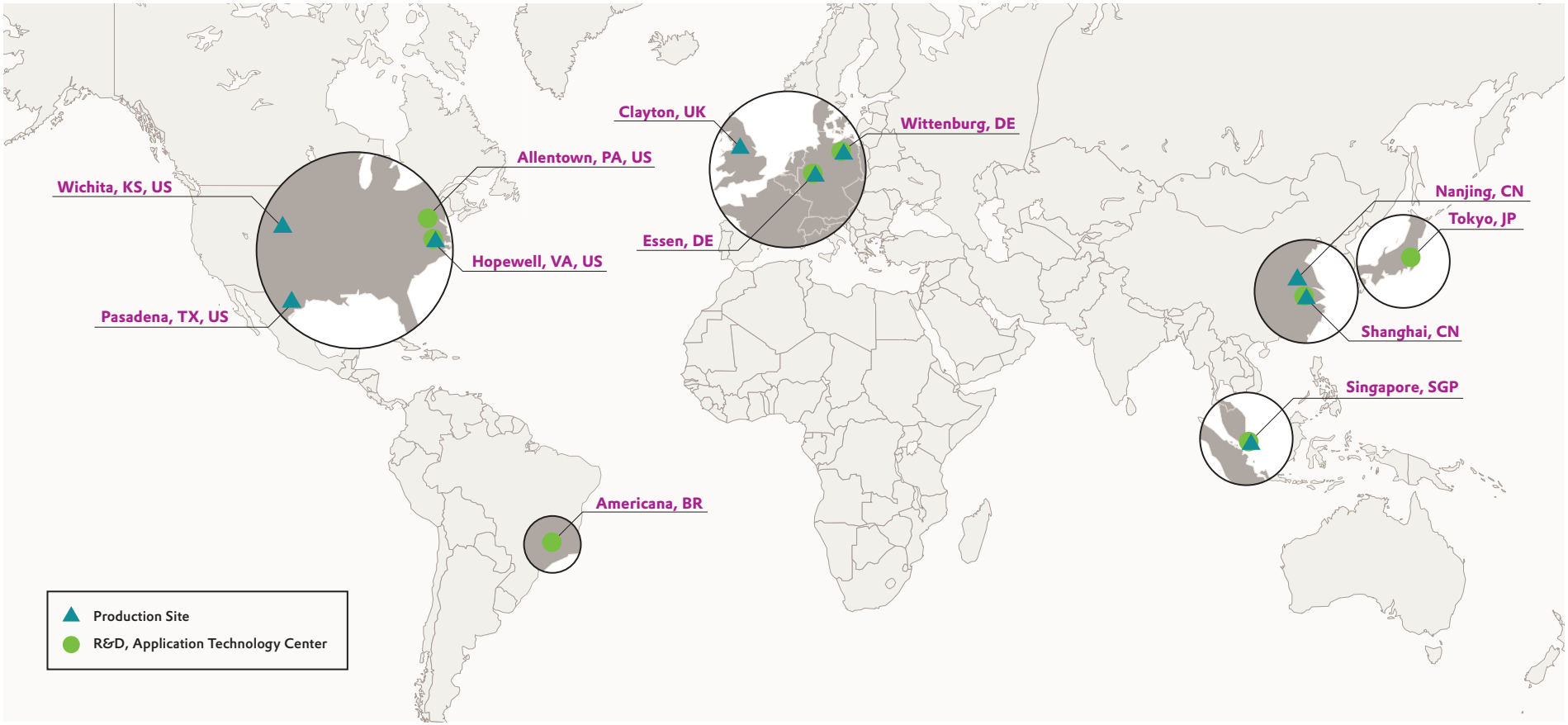
- **Amine Catalysts**
- **Silicone Surfactants**
- **Performance Additives & Aldehyde Scavengers**

Over several decades, we have developed a large variety of different specialized products that generate 'value' for our customers, and a significant number of our additives can be found in final consumer applications in the market. Today, Evonik provides the industry's broadest range of polyurethane additives for use in the continuous and discontinuous production of polyurethane slabstock foams. In comfort applications these foams come into close contact with people, often in enclosed areas, therefore the emissions and extractables from these polyurethane materials need to be reduced to meet customer expectations and accepted industry requirements. We offer a full line of additives that significantly reduce, or essentially eliminate certain undesirable emissions while providing the processing performance necessary for economic sustainability. In this product overview, you can find a guide to our specific Evonik additives that can help foam manufacturers to manage emissions and extractables from Comfort foams.

WE ARE WHERE YOU ARE

Our products are backed by a global network of support services – and with manufacturing sites and laboratories in all major regions – we are well positioned to provide innovative solutions for your current NAFTA regional needs, and help you meet any future global challenges. The teams in our dedicated technology centers provide customer-specific product development and strong innovation capabilities.

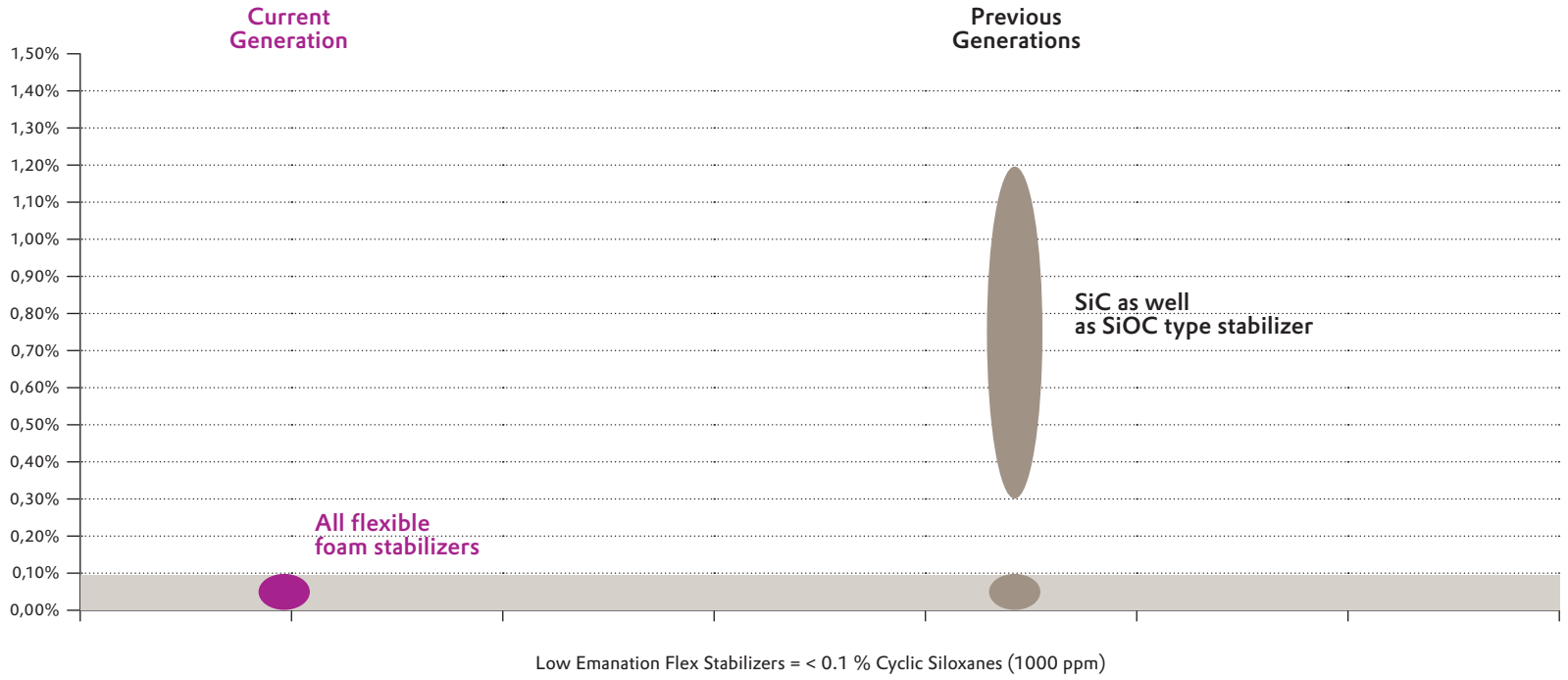
We look forward to opening a dialogue with you to discuss your best additives, solution for your Comfort Foam Emission Management formulations.



SURFACTANTS FOR POLYURETHANE FLEXIBLE SLAB PRODUCTION

Nearly all our silicone surfactants for continuous flexible Polyether foam production, including rigid surfactants used in visco applications, are stripped to contain less than 0.1% by weight volatile siloxanes which are a type of Volatile Organic Compound (VOC). As a result of this stripping process the choice of Evonik surfactants for use in low emission foams is almost unlimited. For surfactants used in High Resiliency (HR) and polyester foams – where low VOC content and exceptional processing characteristics can be more difficult to achieve through distillation alone – we also offer several well designed low VOC HR and Ester surfactants that also provide excellent process characteristics.

Content of Cyclic Siloxanes in Flexible Foam Stabilizers



Low emission surfactants for High Resiliency (HR) slabstock foam production

Product	Product Description
TEGOSTAB® B 8707 LF 2	Established surfactant optimized for the lowest VOCs of all HR surfactants
TEGOSTAB® B 8790 LF 2	Well-balanced surfactant providing fine cell structure, with very low VOCs and suitable for formulations containing NOP

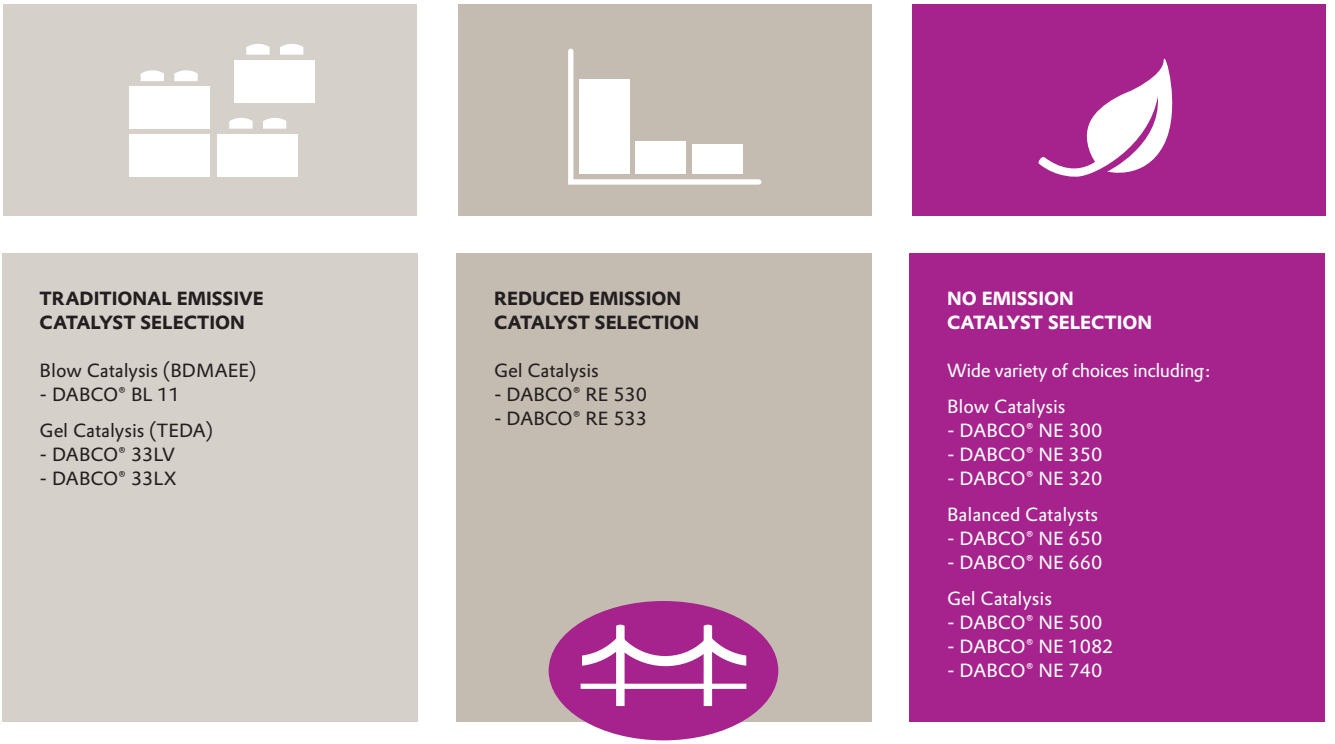
Low emission surfactants for Polyester foam production

Product	Product Description
TEGOSTAB® B 8300 CL	Well balanced universal surfactant with broad process lattitude
TEGOSTAB® B 8301 CL	Cell-opening surfactant especially useful for very high density foams
TEGOSTAB® B 8325	Universal surfactant with improved stability in sensitive foam grades
TEGOSTAB® B 8383	FR optimized silicone surfactant with excellent processing and finest cell structure

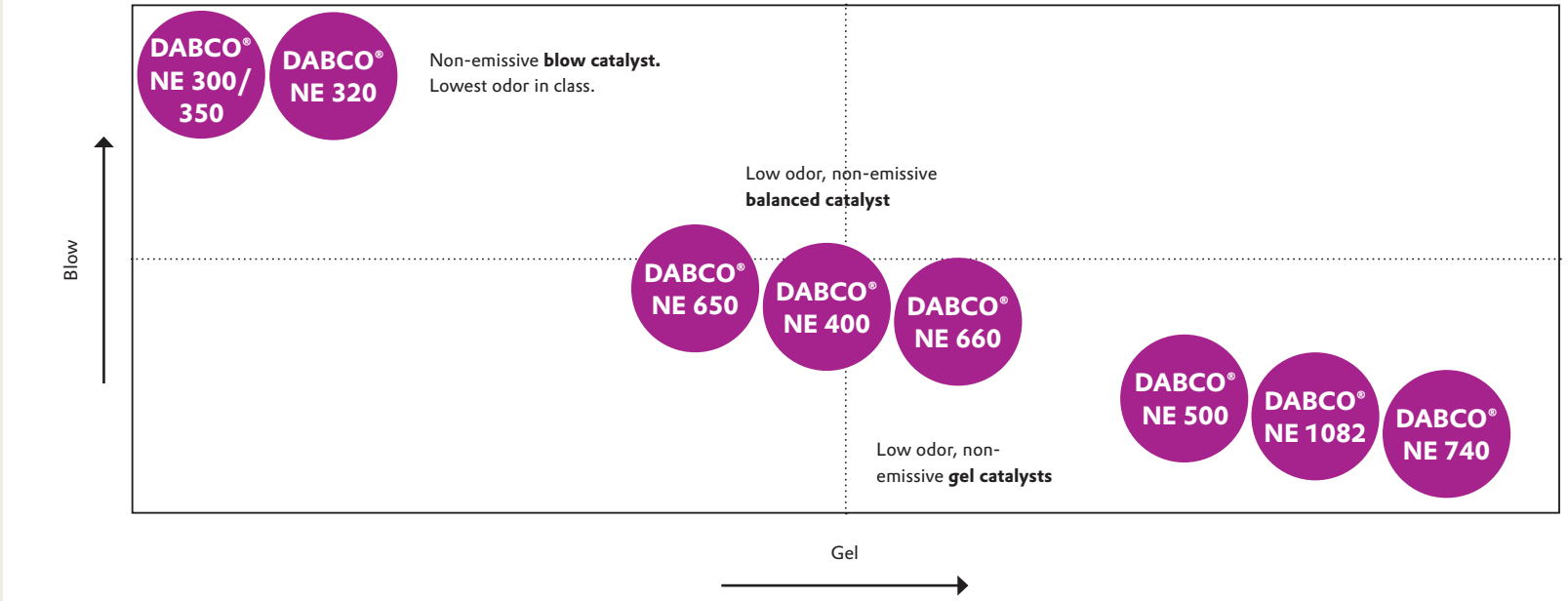
AMINE CATALYSTS FOR POLYURETHANE SLABSTOCK PRODUCTION

Traditional amine catalysts like triethylenediamine (TEDA) and bis (2-dimethylaminoethyl) ether (BDMAEE) can contribute to high foam VOC emissions at room temperature and especially at the elevated temperatures often found in automobile interiors. Evonik offers a range of reactive amine catalysts that provide zero, or reduced foam emissions by binding to the polyurethane matrix during the foaming process helping to reduce, or prevent the release of the amine from the foam after processing is complete.

Emission Management



Evonik's growing portfolio of emission free amine catalysts provide the lowest level of emissions for polyether and polyester formulations.



Amine catalysts that provide zero and reduced emissions for Polyether flexible foam production

Product	Product Description
DABCO® NE 300	Non-emissive and low odor, blow catalyst for all types of slabstock foam and molded foams offering similar activity and foam physical properties to BDMAEE
DABCO® NE 320	High purity, non-emissive fourth generation blow catalyst that binds chemically into the polyurethane foam matrix while maintaining foam properties in MDI or TDI systems
DABCO® NE 350	Non-emissive third generation blow catalyst that binds chemically into the polyurethane foam matrix while maintaining foam properties in MDI or TDI systems
DABCO® NE 500	Non-emissive gel catalyst alternative to TEDA
DABCO® NE 650	Non-emissive balanced amine catalysts with 1:2 blow-gel ratio
DABCO® NE 660	Non-Emissive balanced amine catalysts with higher gel activity vs NE 650 with 1:4 blow-gel ratio
DABCO® NE 740	Special non-emissive gel catalyst for very demanding slow cure applications including visco and hypersoft formulations
DABCO® NE 1082	2nd generation non-emissive gel catalyst with higher activity than NE 500 especially in high density formulations
DABCO® RE 530	high efficiency gel catalyst designed to be used at approximately half the use level of industry standard gel catalysts
DABCO® RE 533	Gel catalyst is one in a series of reduced emission catalysts designed to be used as an alternative to industry standard catalysts

Balanced catalysts that provide zero and reduced emissions for Polyether and Polyester foam production

Product	Product Description
DABCO® NE 400	Non-emissive, low odor, balanced catalyst that can be used as the sole catalyst providing cell opening properties and excellent processing
DABCO® 2039	Low VOC, low odor alternative to morpholine (NEM, NMM & BDMA) based catalysts

TIN CATALYSTS FOR POLYURETHANE SLABSTOCK PRODUCTION

Evonik provides a full range of tin catalysts that allow foam manufacturers to meet all of the current foam emission requirements.

Tin catalysts that provide zero and modified emissions for polyurethane foam production

Product	Product Description
KOSMOS® EF	Emission Free tin catalyst that does not contribute to foam VOC at room temperature or elevated temperature for auto applications and tests
KOSMOS® PRO 1	Zero 2-Ethylhexanoic Acid (2-EHA) emissions especially in elevated temperature auto applications and tests

PERFORMANCE ADDITIVES FOR POLYURETHANE SLABSTOCK PRODUCTION

Evonik has developed a broad range of performance additives that give foam manufacturers the option to modify foam properties, or adjust processing parameters without contributing to foam emissions. This group of additives now includes newly developed molecule tailored scavengers to help reduce undesirable emissions, extractables, and the odors generated during foam production or the ageing process.

Performance additives offering zero and reduced emissions as well as scavengers and co-additives for foam production

Product	Product Description
ORTEGOL® AO7	Non-emissive high efficiecy antioxidant that does not contribute to foam VOC at room temperate or elevated temperatures required in automotive applications
ORTEGOL® FLA	Phenol free low VOC flame lamination additive for improved adhesion of polyether polyurethane foam to fabric
ORTEGOL® LA 2	Additive to reduce aldehydes, especially formaldehyde, emissions from polyether foams, including molded foams
ORTEGOL® 204	Co-additive with KOSMOS® 29 / DABCO® T 9 to replace dibutyltin dilaurate (DBTDL) in HR foam eliminating extractable organo tin compounds
ORTEGOL® HA 1 **DABCO® 2035**	Foam hardener for increased ILD avoiding the use of high VOC SAN filled polyol
DABCO® BA 100	Non-emissive amine catalyst blocking additive to delay catalytic activity for better process control
DABCO® BA 306	Non-emissive co-additive for use with reactive amines to improve foam aging properties

Please contact your local Evonik representative, who will be pleased to help you select the most appropriate additives solution for your application.

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To discuss your Polyurethane Additives for comfort foam requirements, or for more information about regional product availability, Please visit:

www.evonik.com/pu-contacts

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For more detailed information or to obtain a brochure which addresses a specific area of interest, please visit our website.

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