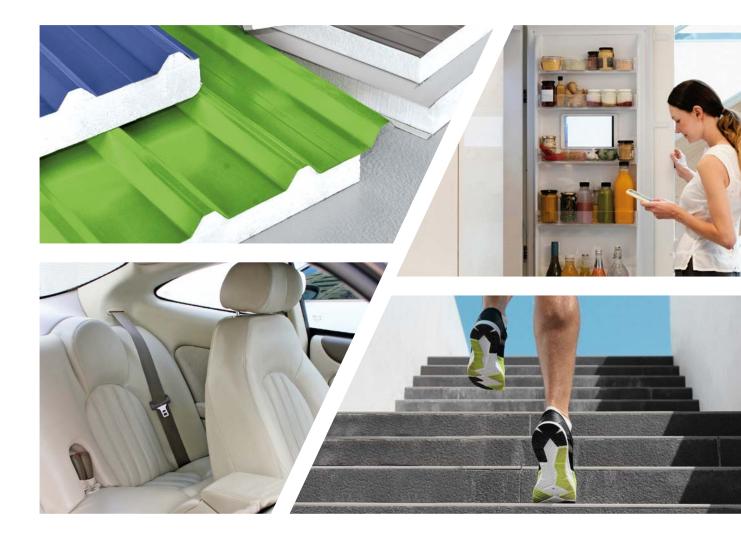




EMEAI - EUROPE, MIDDLE EAST, AFRICA & INDIA

# POLYURETHANE ADDITIVES GUIDE

RIGID & MOLDED FOAMS, SPECIALTY APPLICATIONS









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## A LEADER IN POLYURETHANE ADDITIVES

Momentive Performance Materials offers one of the most trusted and diverse polyurethane additive product lines in the industry, ranging from a broad array of silicone stabilizers and a full portfolio of amine and metal-based catalysts to a selection of organic-based property modifiers.

Developed in 1962, Niax brand additives have long been essential ingredients in polyurethane formulations used to meet the specialized processing and performance needs of customers across the globe. Niax grades include a comprehensive line of silicones, catalysts, and process modifiers for polyurethane foam production.

Momentive is a pioneer in the polyurethanes additives industry and continues to serve customers with leading innovations, creative solutions, and excellent application expertise.

### MOMENTIVE POLYURETHANE **ADDITIVES GLOBAL SITES**



### **POLYURETHANE ADDITIVES FOR RIGID & MOLDED FOAMS AND SPECIALTY APPLICATIONS**



SILICONES FOR MOLDED FOAMS Automotive seating Head rest NVH applications



#### SILICONES FOR SPECIALTY APPLICATIONS

Shoe soling Automotive parts Cushioning Mechanical froth CASE





SILICONES FOR RIGID FOAMS Appliances

Panels Discontinuous applications Spray One Component Foam



CATALYSTS Amine catalysts Trimerisation catalysts and additives Metal catalysts Low-emission catalysts

# **NIAX** MOLDED FOAMS



Silicones	HR TDI	TDI / MDI	HR MDI	VE MDI	Product Description
L-3881				0	Stabilizing low-emission silicone for viscoelastic foams, co-silicone together with L-3639
L-3882				0	Balanced low-emission silicone for viscoelastic foams, fine cell structure, stand alone
L-3639		0	0	0	Very low-emission, medium-potency silicone providing good stabilization along with good foam openness, co-silicone for VE
L-36395		0	0	0	Very low-emission, medium-potency silicone offering good stabilization along with good foam openness, co-silicone for VE, water-soluble
L-3415			0		Low-emission silicone with high cell-opening
L-3416		0	0		Low-emission silicone with medium cell-opening
L-3417		0	0		Low-emission; stabilizing silicone
L-3640	0	0			High-efficiency, low-emission silicone for TDI/MDI technology
L-3556S	0				Low-emission, medium-potency, water-soluble silicone
L-3558	0	0			Low-emission, medium/high-potency silicone for TDI
L-3555	0				High-stability, low-emission silicone
L-3185	0				Low-emission, high-efficiency balanced silicone
L-3167	0	0			Cell regulator; co-silicone surfactant for TDI
L-5309J	0				High-efficiency balanced silicone
L-3629J	0	0			Low fogging, high-efficiency surfactant for TM20 and TDI technology
L-3001		0	0		High cell-opening silicone
L-3002		0	0		Medium cell-opening silicone, low freezing point
L-3222		0	0		Medium-potency, high-efficient cell-opening
L-2171	0	0	0		High-efficiency; balanced silicone
L-3627			0		Low fogging surfactant, medium cell-opening for MDI rich technology

Catalysts	Blow Amine Catalyst	Balanced Amine Catalyst	Gel Amine Catalyst	Product D
Low-emiss	ion Catalysts			
EF-100	0			Reactive low-
EF-150	0			Delayed-actio
EF-600		0	0	Balanced cata
EF-602		0	0	Balanced dela
EF-620		0	0	Balanced cata
EF-680		0	0	Balanced dela
EF-700	0	0		Balanced cata
EF-705	0	0		Balanced cell
EF-708	0	0		Balanced cata
A-337		0	0	Surface-curin
A-338		0		Tertiary amine
Niax Cataly	/sts			
A-1	0			Standard blov
A-107	0			Delayed-actio
A-400	0			Delayed-actio
A-440	0			Delayed-actio
A-4	0			Catalyst for in
C-174	0			HR MDI blow
C-225		0		Balanced dela
C-247			0	Delayed-actio
A-300			0	Delayed-actio
A-33R			0	Key gel cataly

TDI/MDI = Typically 80/20 blend, TDI = Toluene Diisocyanate, MDI = Methylene Diphenyl Diisocyanate, HR = High Resilience, VE = Viscoelastic



#### Description

-emission blow catalyst

ion reactive low-emission blow catalyst

talyst; predominantly gel

elayed catalyst; predominantly gel

talyst, predominantly gel, high-efficiency, low water

elayed catalyst; predominantly gel can offer improved curing

talyst; predominantly blow

ll-opening delayed catalyst; predominantly blow

talyst; predominantly blow

ng catalyst; low mold temperature (MDI & MDI/TDI)

ne catalyst that can help to improve skin cure at low mold temperatures

ow catalyst

ion blow catalyst

tion load building (TDI), cell-opening, improved flowability MDI

ion load building (TDI), higher cell-opening, improved flowability MDI, low water

improved surface cure

w catalyst

elayed-action catalyst

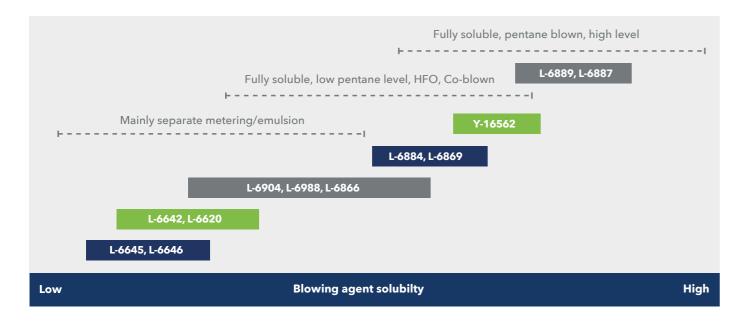
ion gel catalyst

tion load-building; cell-opening gel catalyst (low corrosion)

lyst



Relative Scale of Niax Silicone Contribution to Blowing Agent Solubility in Rigid Foam System Applications



# NIAX RIGID FOAMS

#### SILICONES FOR DISCONTINUOUS APPLICATIONS

Silicones	Fine Cour	Pentane Solubili.	Blowing Agent	Cell Stabili	Foam Flore	Void Reduce:	Product Description
L-6869	0000	000	000	000	0000	000	Can be used with hydrocarbons or HFO to improve foam flowability and provide low thermal conductivity
Y-16562	0000	0000	000	000	000	0000	High-purity silicone, can be used with hydrocarbons or HFO to improve foam voids and provide low thermal conductivity and excellent solubility
L-6887	0000	0000	0000	0000	000	000	Excellent polyol/pentane solubility - can provide very fine cells for discontinuous applications especially refrigerators
L-6884	0000	000	00	0000	000	000	Can improve polyol/pentane or HFO compatibility - can provide very fine cells and good flow, for refrigerators and all discontinuous applications
L-6866	0000	00	00	0000	000	0000	For pentane-blown refrigerators and discontinuous panels to reduce surface voids formation, while still delivering excellent lambda value
L-6988	0000	00	000	000	000	000	Very fine cells with pentane and HFO/HC, increase froth shear stability thus reducing voids formation, good storage stability in acidic condition
L-6904	0000	00	0000	0000	0000	000	Strong emulsifier, fine cells with all blowing agents - continuous and discontinuous applications
L-6889	000	0000	000	0000	0000	000	Very high polyol-pentane solubility for excellent blend stability, good flow and void reduction
L-6112	00	0000	00	000	000	0000	High-purity silicone, can be used with hydrocarbons or HFO, produce foams with good dimensional stability, low voids, and good fire properties
Y-16533	00	0000	00	000	0000	000	High-purity silicone, excellent storage stability with HFO, improved flow and fire properties

**HFO** = Hydroflouoro Olefin, **PIR** = Polyisocyanurate, **PUR** = Polyurethane, **HC** = Hydrocarbons Features: Strong = ••••, Moderate = •





#### SILICONES FOR CONTINUOUS APPLICATIONS

Silicones	Fine Cells	Pentane Solubilit. In B. Solubilit.	Blowing Agents Emulsificast	Cell Stabilizas:	Foam Flore	Void Red.	Product Description
L-6620	0000	00	000	00	000	000	For HFO and pentane, good flow and dimensional stability
L-6633	000	000	000	000	000	000	Reduced foam voids formation in continuous and discontinuous applications
L-6645	00	00	00	00	000	0000	Excellent silicone properties offering a reduction in foam voids
L-6646	00	00	00	00	000	0000	High-purity, premium-grade silicone to reduce voids contributing to outstanding surface quality in metal faced panels
L-6642	000	00	00	00	0000	000	Balanced stabilizer with good voids control and flow for both continuous and discontinuous processes, suitable for all blowing agents included formic acid and HFOs
L-5210	0000	00	0000	000	000	00	High-purity surfactant, excellent candidate for maximizing the nucleation step, helping to reduce the cells size in the final foam
L-5111	0000	0	000	0	000	00	For boardstock fine cells with pentane blowing agents - for PIR/PUR boardstock lamination
L-5112	0000	00	0000	00	000	000	For boardstock, offers improved mixing quality and emulsification of pentane up to high usage level. Typically improves foam quality and reduces laydown defects
L-5164	0000	00	000	000	000	000	High-purity surfactant for boardstock, fine cells, wide latitude, and broad compatibility with all polyester polyols and pentanes
L-5158	000	0	000	00	0000	0000	For PIR boardstock, offers better processing and edge stability, can help reduce surface defects and emulsion viscosity
Y-16541	0000	00	000	000	000	0000	High-purity surfactant for boardstock and block foams, showing strong nucleation and stabilization, can reduce surface voids and deliver excellent surface quality with aluminum facings

**HFO** = Hydroflouoro Olefin, **PIR** = Polyisocyanurate, **PUR** = Polyurethane Features: Strong = ••••, Moderate = •



#### SILICONES FOR ONE COMPONENT FOAMS

Silicones	Yield	Dimensional Stabili	Structure	Flow	Solubility	/
L-5345	0000	000	000	000	000	E) e)
L-5348	0000	000	000	000	000	Н
L-5350	00	00	000	00	00	Μ
L-5351	0000	000	000	000	000	In Re
L-5360	00	00	000	00	00	B
Y-16371	0000	00	0000	0000	000	E) ra
Y-16450	0000	0000	000	0000	000	In
L-5388	0000	00	000	0000	00	E) p
L-6164					0000	Ve

#### **Product Description**

Excellent candidate for fine cells and good dimensional stability performance. Can provide excellent performance in summer/winter formulations with high levels of fillers

ligh froth volume, good compatibilization, and excellent storage stability

Multipurpose stabilizer mainly for straw foam applications

Improved miscibility of components, smooth flow, fine cells, and good dimensional stability. Recommended for high-yield foams, winter grades and formulations, including chloroparaffin

Balanced properties in a variety of formulation types also when high levels of fillers are used

Excellent performances in winter conditions and premium foams. Easy flow and low expansion rate

mproved dimensional stability at low density, well balanced, easy flow and pop-corn like froth

Excellent for low-density foams, also open cells spray and packaging. Wide compatibility with polyethers and polyesters, strong foam stabilization

Very efficient cell-opener and cell regulator, use level 0.1 - 0.7 % on prepolymer composition



#### SILICONES FOR SPRAY FOAM SYSTEMS

### Closed Cells Spray Foam Systems

Silicones	Fine Cells	Blowing Agents Emulsit: Agents	Cell Stabilic	Poam Flor	Void Reduce:	Product Description
L-6642	000	00	00	0000	000	Balanced stabilizer giving excellent nucleation, fast foam thickening with good voids control and flow, also used in continuous and discontinuous panels production, can be used for all blowing agents
L-6265	00	000	000	00	00	For roofing applications, efficient compatibilizer delivering good leveling, smooth surface, and improved dimensional stability, can be used with hydrocarbons, mainly panels, or HFO
L-6112	00	00	000	000	0000	High-purity silicone, can be used with hydrocarbons or HFO, produces foams with good dimensional stability, low voids, and good fire properties
Y-16533	00	00	000	0000	000	High-purity silicone, excellent storage stability with HFO, improved flow and fire properties

**HFO** = Hydroflouoro Olefin

#### Open Cells Spray Foam Systems

Silicones	Fine Cellc	Cell-openi.	Cell Stabili <sub>sae:</sub>	Product Description
L-6186	00	0000	00	Open-cells systems, polyester or polyether-based, for densities up to 30 kg/m <sup>3</sup>
L-6188	00	00	0	Open-cells systems, polyesters or polyether-based, foam density > 30 kg/m <sup>3</sup>
L-6189	0000	000	000	Excellent for low-density foams, 10-15 kg/m³, water-blown, polyethers or polyesters-based, fine and homogeneous cell structure, good polyol solubility
L-5388	000	0	0000	Excellent for low-density foams such as packaging and OCF. Wide compatibility with polyethers and polyesters, strong foam stabilization

Features: Strong = ••••, Moderate = •

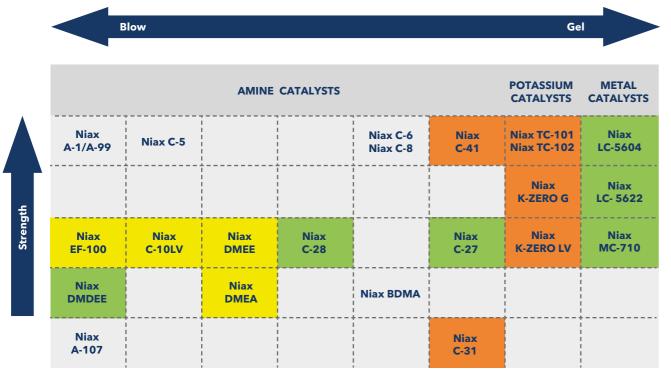
Catalysts	PUR Discontinuc.	Lamination bulous	Lamination 2 Lamination 2 Lamin	Vater Block	Packaging, On	Product Description
A-1	0	0	0	0	•	Very effective blowing catalyst, promote selectively water-NCO reactions, can improve foam flow and rate of expansion
C-5	0	0	0			General-purpose blowing catalyst
EF-100	0	0	0	0	0	Reactive blow catalyst, excellent candidate for applications where low odor is a relevant feature
C-6		0	0			Efficient gel catalyst for a variety of PU applications
C-8	0	0		0	•	General-purpose PUR catalyst
C-10LV		0	0	0	0	Reactive amine catalyst, ideal for spray and open-cell applications. Blowing catalyst giving a smooth reaction profile, good candidate also in flexible molded foams
PM-40		0	0			Blowing catalyst based on A-1, moderate odor and viscosity and may be used with direct metering
BDMA	0	0		0	0	Dimethylbenzylamine, weak gel catalyst, can reduce surface friability and can improve foam adhesion in particular with mainly water-blown foams
DMEA	0	0				Moderate odour, typically cost-effective, reactive catalyst
DMEE	0			0	0	Moderate odour, typically cost-effective, reactive catalyst, more blowing efficiency compared to DMEA
DMDEE	0				0	Moderate-activity blow catalyst, excellent storage stability also in isocyanate and prepolymers, 1K/OCF foams
PM-20 PLUS		0	0	0	0	Blow-gel catalyst for direct in line metering in the continuous lamination of PUR or for PIR in combination with a potassium catalyst
C-27	0	0	0	0	0	Low odor catalyst offering improved shelf life for water co-blown systems
C-28	0	0	0	0	0	Balanced blow-gel catalyst, good shelf life with HFO-1233zd
C-31	0	0	0	0		Delayed-action catalyst for PIR and PUR, improve green strength and surface curing, reduce post expansion in thick panels
C-41	0	0	0			Strong gel catalyst promoting both PUR and PIR reaction, promote fast crosslinking, can reduce demold time and improve foam adhesion
A-107	0			0		Acid-blocked delayed-action blow catalyst
C-520		0	0			Formulated blowing catalyst for a safer and more accurate handling
MC-710					0	Bismuth-based catalyst, exhibiting strong gel catalytic activity

**HFO** = Hydroflouoro Olefin, **PIR** = Polyisocyanurate, **PUR** = Polyurethane

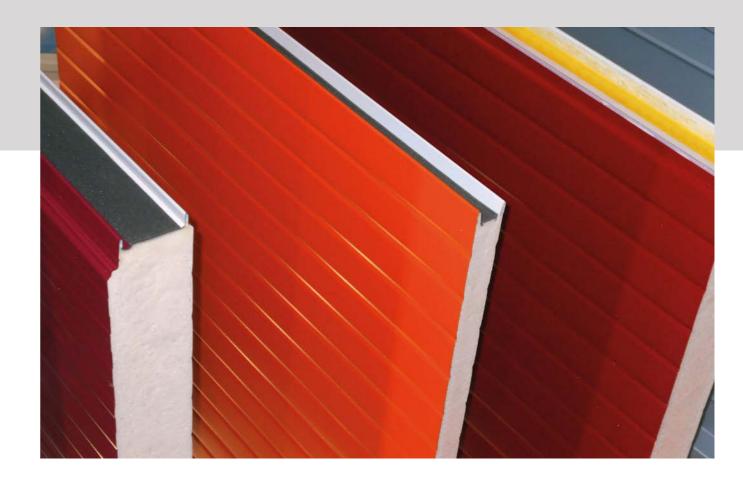
Catalysts / Niax Special Add	PUR Discontinue	PIR Discontinuous Panel	Lamination Continuous	Spray	Water Blown Pin-	Packaging, Oc	Product Description
RA-1		0	0		0		Can speed up foam hardening and adhesion without influencing gel time, in particular for PIR foam made with aromatic polyester polyols
AP-01	0	0	0		0		Adhesion promoter additive, can reduce surface friability in high water and/or high index formulations
FRP Polyols	0	0	0	0	0	0	Halogen free additives to help improve fire properties in both PUR or PIR foams
NA-01			0				Silicone-based composition enhancing the nucleation of gas. In combination with a conventional silicone, it reduces the cell size, potentially leading to lower foam thermal conductivity

**PIR** = Polyisocyanurate, **PUR** = Polyurethane

### **Niax Catalysts for Rigid Foams Applications**



Reactive amines Improved shelf life with HFO-1233zd Trimerization activity



#### NIAX TRIMERISATION CATALYSTS

Catalyst	Viscosity (typical value @ 25 °C)
Potassium Octoate LV	2200-2800
Potassium Octoate	5000-7000
K-ZERO G	3000
K-ZERO LV	600
Potassium Acetate	120
TC-101	180
TC-102	180

MDI = Methylene Diphenyl Diisocyanate, PIR = Polyisocyanurate, PUR = Polyurethane

#### **Product Description**

Potassium-based trimerisation catalyst, 15% K, ideal candidate for direct metering in continuous production of PIR panels, also used as curing additive in PUR formulations for lamination

Potassium-based trimerisation catalyst, 15% K, also used as curing additive in PUR formulations for lamination

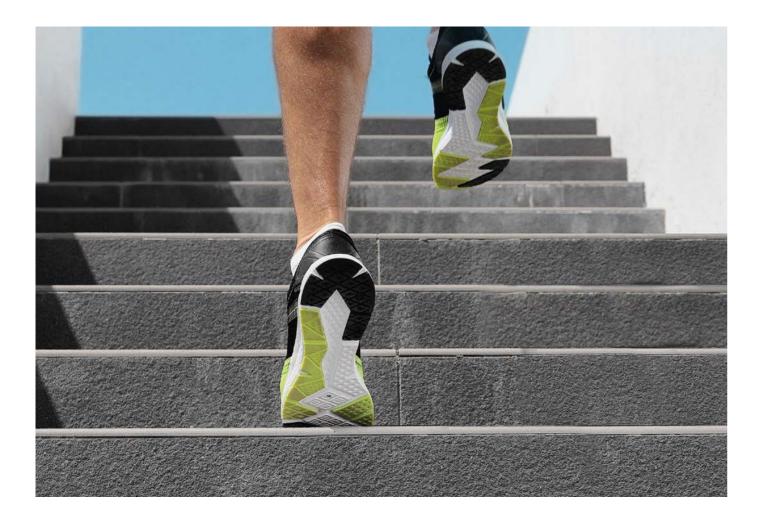
Glycol-free potassium octoate, reduced MDI use and improved cell isotropy in the production of PIR panels

Glycol-free potassium octoate, reduced MDI use, low viscosity to facilitate in-line metering

15% K containing PIR catalyst

Trimerisation catalyst based on a non-reprotoxic salt, increased efficiency and enhanced trimer conversion versus standard octoates. Low viscosity to facilitate on-line metering

Trimerisation catalyst based on a non-reprotoxic salt, increased efficiency versus standard octoates, smoother rise profile. Low viscosity to facilitate on-line metering





# NIAX SPECIALTY APPLICATIONS

#### **NIAX SILICONES**

Silicones	Microcellular (Polyeth.ular	Microcellular (Polycocellular	SRIM/Com.	Integral Skin -	PU Leather/Cost.	Mechan	Tranical Froth
L-1500		0					Standard si
L-1501	0	0					Wide proce
L-1507	0	•		•			Low-density (> 0,3 g/cc
L-1568	0	0		0			Low density skin and fir
L-1541		0	0				High-densi
L-1510	0		0	0			General-pu
L-5309J	0		0	0			Surfactant
L-5306	0			0			Low VOC st
L-5302	0		0	0			Medium-st polyether-l
L-1131					0		Cell stabili DMF and v
L-1160					0		Linear read leveling in
L-1169					0		Linear read
L-5614						0	Industry-st
L-5617						0	Low VOC s
L-5639						0	A low VOC i reducing b
L-5690						0	Co-surfacta mechanica
L-5641						0	Low VOC s

**HFO** = Hydroflouoro Olefin

#### POLYURETHANE COATINGS, ADHESIVES, SEALANTS, AND ELASTOMERS (CASE)

#### **Product Description**

surfactant for microcellular systems (PES)

cessing lattitude with excellent open cells for low-medium density systems

ty polyester or polyether-based microcellular systems with excellent emulsification

ty (0,25-0,35 g/cc) polyester or polyether based microcellular systems, good stabilization, ine cell structure

sity polyester-based microcellular systems with thick skin and SRIM applications

purpose surfactant for polyether shoe sole and rigid foam systems, low freezing point

t for I-skin with HFO or CP, medium-low stabilization, good open foam content

strong stabilizing surfactant for I-skin and high-density microcellular applications

stabilizing surfactant can be considered for use in integral skin and high-density -based microcellular systems

lizer for wet process PU leather, provides good deposition, increases thickness, speeds up water exchange

active silicone, enhance anti-sticking property, good solubility in PU system. Improves n coating application

active silicone, enhance anti-sticking property, good leveling, and silky hand feeling

standard surfactant for the mechanically frothed foam process

surfactant analog of L-5614, used in the mechanically frothed foam processes

mechanical froth surfactant, non-hydrolysable, provides high closed cell content while both froth density and shear induced-cell collapse

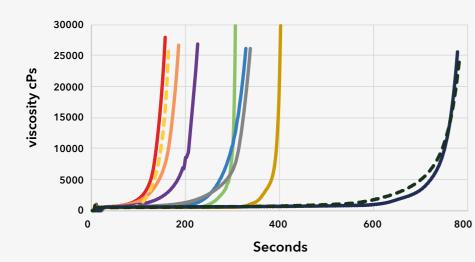
tant that enhances froth stability and reduce foam density when used with standard cal froth surfactants

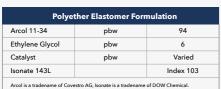
surfactant for increased closed cell content and decreased density (< 300 kg/m<sup>3</sup>)

#### **NIAX AMINE & SPECIALTY CATALYSTS**

Catalysts	Microcellut	SRIM/Shoe Sole	EL.	Sprav C	Inter-	PU Log	Binder Binder Buder bot Life Curing Speed Hydrolytic Stability
A-440	0	0			0		Delayed-action, blowing-selective amine catalyst 2 2 4 developed for microcellular foams
A-533	0	0	0	0	0	0	Industry-standard TEDA catalyst in (mono)ethylene 1 4 4 glycol
A-525	0	0	0	0	0	0	Industry-standard TEDA catalyst in BDO 1 4 4
A-534	0	0	0	0	0		Delayed-action, improve flow, demold and mechanical 3 2 4 properties
A-535		0	0			0	Delayed-action gel catalyst for microcellular/SRIM/PUL 3 3 4 applications
A-575	0	0	0		0		DBU based temperature-activated, delayed-action, 3 2 4 powerful, gelling-selective catalyst
A-577		0	0		0		Delayed-action, powerful, gelling-selective catalyst 3 2 4
LC-5636		0	0			0	Heat-activated catalyst Sn/Hg/Ni free 4 1 2
MC-710	0	0		0	0	0	Enhanced reactivity and stability over MC-810 1 4 3
LC-2901							Heat-activated catalyst for isocyanate binder formulations (Sn-free)

4 = more ; 1 = less





In order to describe the relative behavior, catalysts have been tested in the Polyether based Elastomer formulation shown on the left. Viscosities of reacting mix are determined via Brookfield viscometer (RT cure) coupled with DasyLab software. All chemicals are maintained at 20 °C prior to mixing.



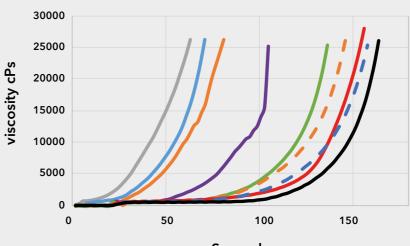
Visc. A-533 at 0.30 pph

Visc. A-533 at 0.15 pph

#### NIAX METAL CATALYSTS BASED ON SN

Catalysts	SRIM/C.	Elact	PU Leath C	One Short	Elastomers	Product Description		rot Life Curi:	Hydrolytic Staki
LC-5604	0	0	0	0		General-purpose organotin catalyst (DBTDL)	1	4	1
LC-5622	0	0	0			Higher active organotin analog of Niax LC-5632, especially suitable for HFO-containing formulations	1	4	3
LC-5628	0	0	0	0	0	Highest active organotin catalyst, low freezing point	1	4	1
LC-5629	0	0	0			Most delayed organotin catalyst, improved flow, can be used in mechanical frothed foam applications	2	3	2
LC-5632	0	0	0			Organotin catalyst with very good hydrolytic stability	1	4	3
LC-5638	0	0	0	0		Organotin catalyst with moderate activity compared to Niax LC-5604 for improved flow combined with an improved hydrolytic stability	1	4	2
LC-5650	0	0	0	0	0	Organotin catalyst analog to Niax LC-5628 with improved hydrolytic stability	1	4	2
LC-5654	0	0	0			More active organotin catalyst analog to Niax LC-5629 with powerful end-cure activity at elevated temperatures	2	3	2
LC-5659	0	0	0	0		General-purpose organotin catalyst (DOTDL)	1	4	2
LC-5619	0	0	0		0	Gel-selective tin carboxylate catalyst for polyurethane production, transesterification catalyst	1	4	2

**HFO** = Hydroflouoro Olefin 4 = more ; 1 = less



Seconds

	Visc. LC-5619 at 0.1 pph
—	Visc. MC-710 at 0.03 pph
—	Visc. LC-5604 at 0.018 pph
—	Visc. A-533 at 0.30 pph
—	Visc. LC-5654 at 0.017 pph
—	Visc. LC-5628 at 0.014 pph
—	Visc. LC-5622 at 0.02 pph
	Visc. LC-5632 at 0.021 pph
	Visc. LC-5659 at 0.021 pph

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#### **CUSTOMER SERVICE CENTERS**

#### **AMERICAS**

+1 800 295 2392 Toll free\* +704 805 6946 Direct number \*All American countries

#### LATIN AMERICA

BRAZIL +55 11 4534 9650 Direct number

MEXICO +52 55 2169 7670 Direct number

#### EMEAI- EUROPE, MIDDLE EAST, AFRICA & INDIA

**EUROPE** +39 0875 758888 Direct number

#### **INDIA, MIDDLE EAST & AFRICA**

+91 44 71212207 Direct number\* \*All Middle Eastern countries, Africa, India, Pakistan, Bangladesh, Sri Lanka.

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#### **ASIA PACIFIC**

#### CHINA

800 820 0202 Toll free +86 21 3860 4892 Direct number

JAPAN Sales-JP.Silicones@momentive.com

**KOREA** +82 2 6201 4600 Direct number

# SOUTH EAST ASIA, AUSTRALIA & NEW ZEALAND

+60 3 9206 1543 Direct number\* \*South East Asia countries (Malaysia, Singapore, Thailand, Indonesia, Vietnam, Philippines, Cambodia, Myanmar / other countries located in Pacific region).

