



HUNTSMAN

Enriching lives through innovation

Automotive

AUTOMOTIVE INDUSTRY

Seating, Acoustics and Components



Seating

Superior seating comfort & durability

Huntsman's range of MDI based polyurethane technologies are designed to provide superior comfort and durability, whilst meeting OEM specifications and emissions targets relevant to the global automotive industry.

Advanced Comfort

Comfort and durability no longer have to be a trade-off in seating foam. With Huntsman's patented **ADVANCED COMFORT™** Foam technology, comfort and durability come together in an exceptional combination. This is thanks to the completely new pre-polymerized MDI chemistry used to obtain improved properties. The result is longer-lasting, dynamic comfort (more than 4x longer than conventional foam), with more elasticity



HR+ technology Better comfort performance

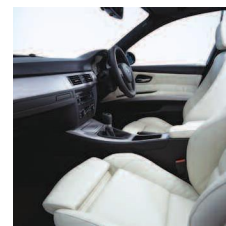


Huntsman's HR+ line of high resilience seating foams provides better comfort and better durability performance combined with low VOC requirement thanks to the unique formulation of the polyurethane MDI.

Benefits

- Better comfort
- High resilience
- Low emissions (low odor)
- Surface softness
- Deep-down firmness
- Lightweight
- Cost effective
- Excellent processing characteristics
- Fast demold times
- Can be used in in-situ, foam-in-fabric systems.

Huntsman Polyurethanes is one of the world's leading producers of MDI – a key ingredient in the production of polyurethane. The company also produces flexible and rigid polyethers, polyesters, polyether amines, polyurea amines, propylene oxide, polyols and fully formulated polyurethane systems and polyurea systems.



For the past 25 years Huntsman Polyurethanes has been one of the leading suppliers of high performance, cost effective MDI seating systems into the automotive market.

RUBIFLEX® Systems for Production Simplicity



To meet the needs of our customers we have developed a new seating technology design to provide simplicity in meeting a broad range of seating specifications. The technology is delivered in the form of a fully formulated system and requires no modification to produce a broad range of specifications.

The systems afford a number of benefits to our customers:

- Efficient and economic in use
- Provides excellent flow and stability
- Effective over a broad range range of index
- Effective in all mould types
- No Polymer Polyol required
- Achieves many OEM specifications including Fiat, RSA, PSA & Toyota.

THE CHOICE IS SIMPLE

RUBIFLEX® HR

- Exceptionally robust
- Ultra low density variants

The technology
can be delivered
in two fully
formulated systems

RUBIFLEX® HR+

- Produces low emission foam
- Enhanced comfort and durability

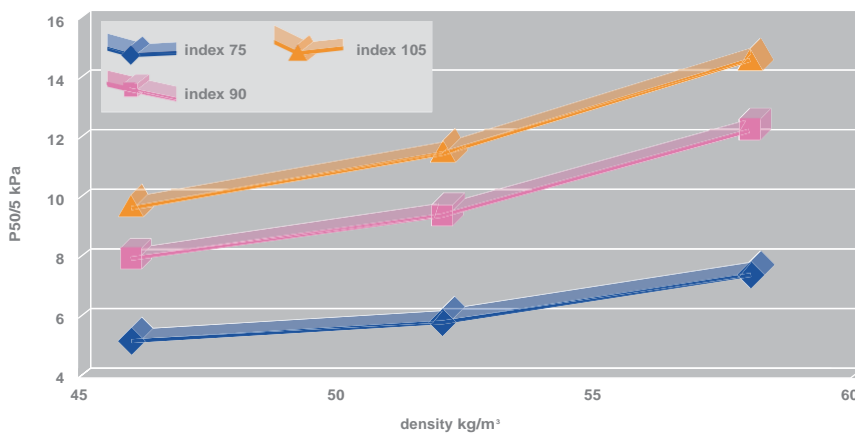
Typical physical properties

RUBIFLEX® HR⁺ VW properties from high pressure moulding (method PV3410).

| Norm | Test | Condition | Unit | index 75 | index 90 | index 105 | Target FSC PV3410 |
|-------------------|-------------------------------|--|-------------------|----------|----------|-----------|-------------------|
| DIN EN ISO 845 | Density core | | kg/m ³ | 42-50 | 42-50 | 42-50 | |
| | Density with top skin | | kg/m ³ | 45-55 | 45-55 | 45-55 | |
| DIN EN ISO 1856 | Compression set (deformation) | Fresh – core | % | <6 | <6 | <6 | <10 |
| | | Aged – core +90°C, 100-6% r.H., 200h | % | <12 | <13 | <15 | <15 |
| DIN EN ISO 3386-1 | Hardness change | Humid heat aged +90°C, 100-6 % r.H, 200h | % | -20 | -15 | -15 | max. -25% to +10% |
| DIN EN ISO 1798 | Tensile strength | Fresh | kPa | >90 | >130 | >150 | >90 |
| | | Heat aged: +90°C, 200h | kPa | >90 | >120 | >130 | >90 |
| | | Humid heat aged: +90°C, 100-6% r.H, 200h | kPa | >90 | >100 | >90 | >90 |
| DIN EN ISO 1798 | Elongation | Fresh | % | >100 | >100 | >80 | >80 |
| | | Heat aged: +90°C, 200h | % | >100 | >90 | >80 | >80 |
| | | Humid heat aged: +90°C, 100-6% r.H, 200h | % | >110 | >100 | >100 | >80 |
| DIN 53356 | Tear strength | Mean | N/cm | 1.7-2.1 | 2.0-2.5 | 2.4-3.0 | >2.0 |
| | | Maximum | N/cm | 1.9-2.5 | 2.2-3.4 | 2.8-3.6 | |

RUBIFLEX® HR⁺

CLD 50% (5th cycle with skin)



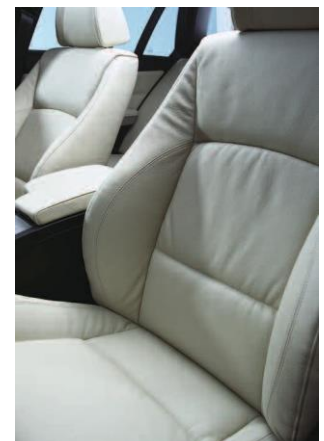
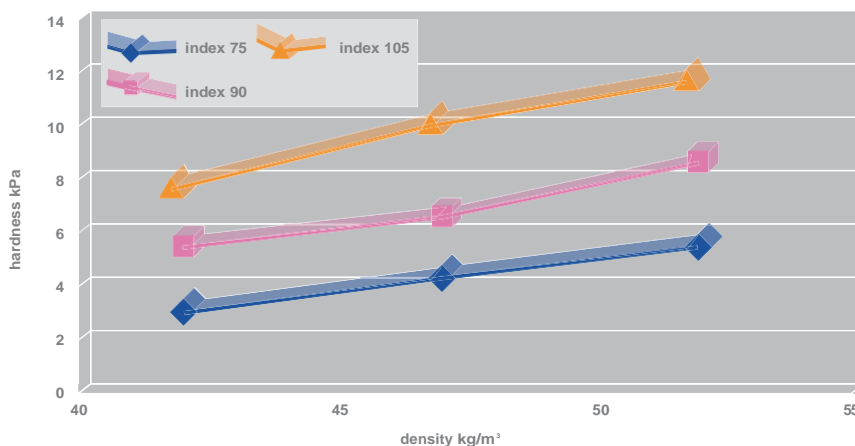
Plots showing the impact of index and density on the measured hardness according to typical industry test methods:

CLD 50% (5th cycle with skin):
Indicative of Renault test methods

F40% CLD (4th cycle):
Indicative of VW test methods

RUBIFLEX® HR⁺

F40% CLD (4th cycle)



Acuistics

A RANGE OF **BIO-BASED** TECHNOLOGIES

Advanced acoustic solutions for automotive applications



BIO-BASED
CONTENT

WHY BIO-BASED PRODUCTS?

With society moving towards a circular economy, industries are searching for alternative resources to fossil-based chemistry and increasingly move toward renewable bio-based technologies for the production of chemicals, materials and fuels.

HUNTSMAN – AN INNOVATIVE SUPPLIER OF BIO-BASED TECHNOLOGIES COMBINED WITH ISOCYANATES

The automotive industry experiences a revolutionary switch towards sustainability in both manufacturing and use of vehicles by focusing on lightweight materials, alternative powertrains and the adoption of bio-based products.

Huntsman's commitment to support the automotive sustainability goal is reflected in the ongoing development of technologies, that incorporate increasingly higher levels of bio-based components while improving performance and maintaining quality consistency.

Our bio-based chemistry is compatible with Huntsman's MDI pre-polymer technologies. Meeting both automotive specification requirements and performance expectations, these bio-based systems and pre-polymers can help automotive manufacturers to achieve above a 9% level of bio-based content (measured according to ASTM-D6866-12).

BENEFITS OF BIO-BASED PRODUCTS FROM HUNTSMAN

- Compatible with existing foaming production installations
- Comparable viscosity to existing technologies – product consistency and mixing is unaffected
- No extra material stream required
- Good curing characteristics, green strength and stability
- Low odour
- Low emission
- Excellent mechanical properties
- Low impact on dynamic performance

OUR FAMILY OF BIO-BASED TECHNOLOGIES

Our range of bio-based technologies offer similar performance levels as current technology solutions and the potential to promote exciting, new and impactful green credentials to OEM's.

ACOUSTIFLEX® range for advanced acoustic

- ▶ **ACOUSTIFLEX® HR BIO** bio-based, High Resiliency (HR) polyurethane flexible foam technology delivers lightweight insulation for closed-pour and open-pour acoustical applications such as carpet inlays, dash insulations and stuffer pads. It is also available as a semi-rigid foam for elastomeric, heavy-layer noise barriers such as wheelhouse, transmission tunnel and pillar cavity fill insulators.

RUBIFLEX® range for better comfort

- ▶ **RUBIFLEX® HR BIO** bio-based, High Resiliency (HR) polyurethane flexible foam technology delivers comfort for standard molded seat pad applications with robust processing requirements and offers superior comfort and support for head restraints, armrests and center consoles.
- ▶ **RUBIFLEX® H BIO** bio-based, polyurethane semi-flexible foam technology delivers support for molded cut-and-sew Head (H) restraint, armrest and console applications with robust processing requirements.

RUBITRIM® range for luxurious touch and feel

- ▶ **RUBITRIM® SR BIO** bio-based, polyurethane Semi-Rigid (SR) foam technology delivers a soft touch in a variety of transportation related molded trim applications including instrument panels and door panels.

STRIVING FOR SUSTAINABILITY

Our new bio-based technology platform continues to support the United Nation Sustainable development most relevant industry goals.

8 DECENT WORK AND ECONOMIC GROWTH



Maintain **high comfort properties** and **low emission performance**

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Ensure efficient use of **natural resources**

13 CLIMATE ACTION



Maintain low density high performance for **lightweight design** fuel efficiency

CONTACT US

A global provider of innovative solutions and one of the leaders in MDI based polyurethanes, Huntsman is proud of their long and successful track record of delivering PU resins for automotive applications including acoustics, seating and composite materials. Huntsman is dedicated to providing our customers with the finest quality of products and services available. Our technical experts are ready to work in partnership with you on your next project and help solve complex design issues with differentiated, bespoke, cost effective solutions.

We invite you to contact us for further information or immediate assistance at polyurethanes_eu@huntsman.com



A liquid polyurethane resin technology for strong and durable composites

Our family of VITROX® resin systems continues to advance in its capabilities to offer very good performance for the production of automotive composite parts..

The VITROX® RTM 00410 resin system

Designed for reinforcement of semi-structural, integrated, fiber components such as lightweight composite sandwich panels used in automotive assembly, VITROX® RTM 00410 resin system is an injectable two-component snap cure polyurethane resin suitable for HP-RTM processing. Its use enhances the finished component by delivering:

- Very good rigidity
- High impact strength
- Long-term durability

Discover new design possibilities for

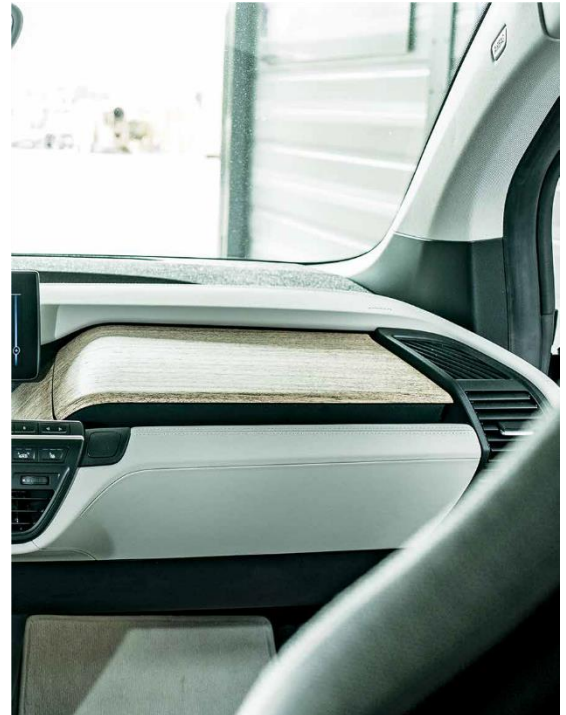
- Semi-structural, fiber-reinforced components in monolithic or sandwich designs
- Complex, three-dimensional parts which have tight tolerances

Optimize your processing and produce high performing components

- Cost effective, high-volume manufacturing
- Low viscosity
- Adjustable open time
- Snap cure temperature activation, enabling fast cure
- Processable by WCM, DFCM or HP-RTM for fast cycle times..

Main application:

- Load floors
- Door panels
- Instrument panels
- Steering wheels
- Arm rests
- Heavy layers
- Air filters





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About Huntsman:

Huntsman Corporation is a publicly traded global manufacturer and marketer of differentiated and specialty chemicals with 2018 revenues more than \$9 billion. Our chemical products number in the thousands and are sold worldwide to manufacturers serving abroad and diverse range of consumer and industrial end markets. We operate more than 75 manufacturing, R&D and operations facilities in approximately 30 countries and employ approximately 10,000 associates within our four distinct business divisions.

For more information about Huntsman, please visit the company's website at www.huntsman.com.

Huntsman Polyurethanes warrants only that its products meet the specifications agreed with the buyer. Typical properties, where stated, are to be considered as representative of current production and should not be treated as specifications.

