63639_Therban_KA013_0306.qxd 05.04.2006 8:34 Uhr Seite 1

LANXESS
Energizing Chemistry

Therban®
Hydrogenated acrylonitrile-butadiene rubber (HNBR)

Introduction and overview

63639_Therban_KA013_0306.qxd 05.04.2006 8:34 Uhr Seite 2

Therban® from LANXESS – the answer to your needs

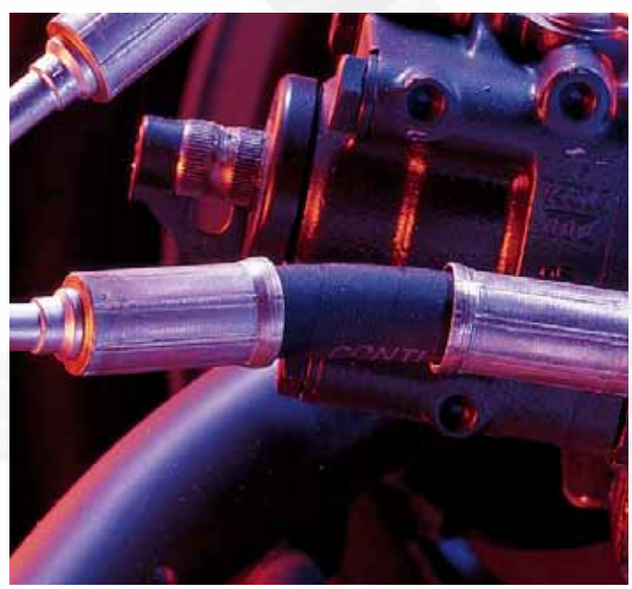
www.therban.com

Modern automotive engineering demands elastomers that can withstand high temperatures and aggressive substances and can meet the particular requirements of fuel-saving engine and car body designs. The demands in the oil exploration industry are just as stringent. Here, elastomers must weather aggressive environments, explosive decompression and high mechanical stresses.

Standards were set in these fields over 25 years ago with the invention of Therban®, the world's first hydrogenated acrylonitrile-butadiene rubber. Since then, our research scientists have been constantly working on improvements. The result is a range of new Therban® grades which will help you to find solutions for the most demanding applications. Our committed team of experts will give you the necessary detailed advice.

Therban® offers:

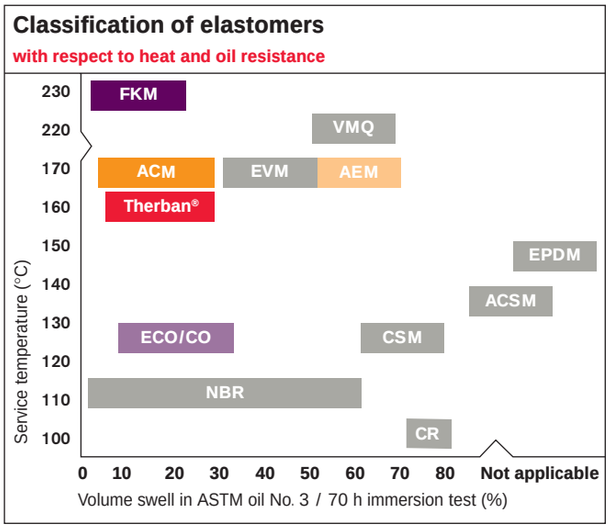
- high resistance to oil and grease
- ability to function at temperatures from - 40 °C to 165 °C
- superior performance in aggressive fluids such as power steering fluids, automatic transmission fluids, engine oils, fuels, diesel and brake fluids
- a unique range of thermally stable grades with both partial and full saturation, ranging from 20 % ACN to 43 % ACN
- a new class of polymers with significant advantages in mixing, processing and parts performance (Therban®AT)



The new HNBR generation

In a class of its own

Therban® is an adaptable high-performance elastomer that can replace many other specialty materials because Therban® combines exceptional performance with cost-efficiency and versatility.

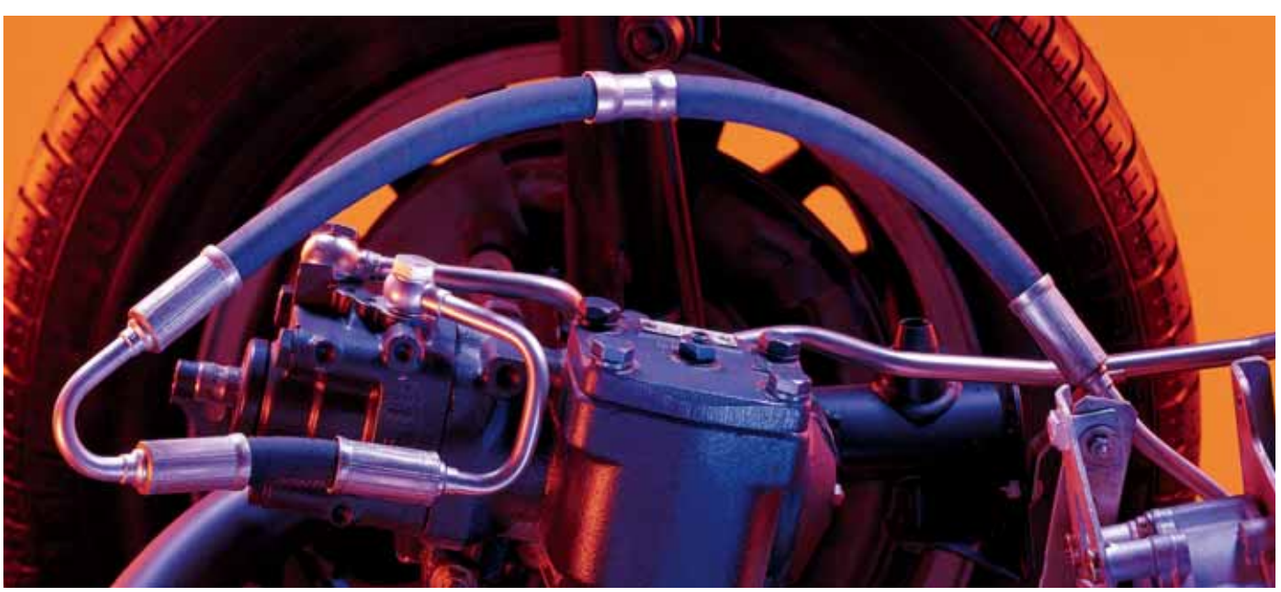


The material which assures market success

Better performance gives the competitive edge. For Therban®, high performance is standard. And that means wherever and however it is used. The outstanding property profile ensures excellent vulcanizate properties. Our specialists from research and development will help you to find the Therban® grade that will best meet your needs.

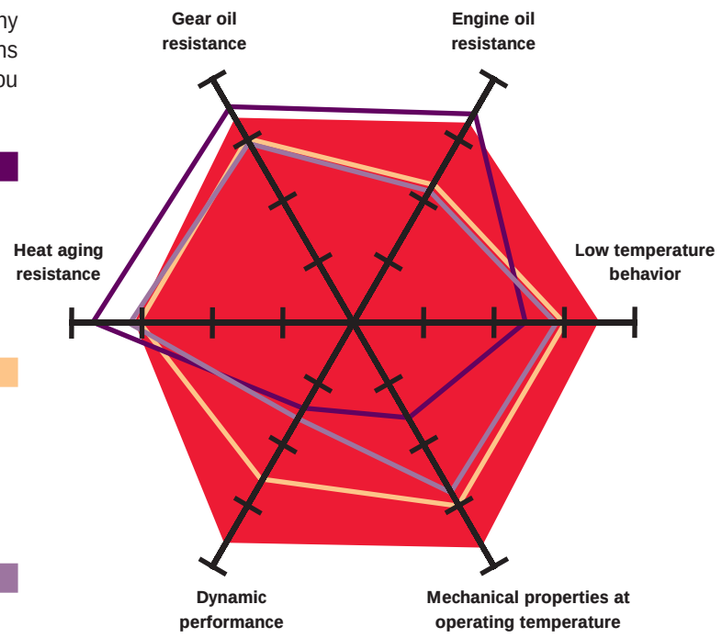
Achievable Therban® vulcanizate properties

Hardness (Shore A)	**30-95**
Hardness (Shore D)	**up to 70**
Tensile strength	15-38
Elongation at break	**100-600**
Modulus at 100 % elongation (MPa)	3-20
Modulus at 300 % elongation (MPa)	5-30
"Resilience" (%)	
RT	30-55
70 °C	55-65
Compression set (examples)	
70 h/RT	15
70 h/150 °C	20
70 h/200 °C	25
Abrasion (measured according to DIN 53516)	
RT (mm^3 loss)	30-80
150 °C (mm^3 loss)	50-80
Low temperature properties	
Gehman T10	-31 °C
Temperature retraction TR 10	-33 °C
Brittle point	<-70 °C



Superior in many disciplines

A direct comparison shows that Therban® is superior to many other elastomers and materials in several respects. This means that you can turn to Therban® HNBR in applications where you previously needed more expensive solutions.



FKM

Therban® is superior to FKM (fluoroelastomer) in:

- mechanical properties at operation temperature
- chemical resistance to alkaline oil additives
- low temperature properties
- adhesion

AEM

Therban® is superior to AEM (ethylene-acrylic elastomer) in:

- oil and fuel resistance
- processing properties
- physical properties at high operating temperature
- odor

ACM

Therban® is superior to ACM (acrylate elastomers) in:

- processing behavior
- low temperature properties
- physical properties
- adhesion

ECO/CO

Therban® is superior to ECO/CO (epichlorohydrin) in:

- heat resistance
- sensitivity to certain oil additives
- corrosion resistance
- sour gas resistance

CM/CSM

Therban® is superior to CM/CSM (chlorinated/chlorosulfonated polyethylene) in:

- heat resistance
- sensitivity to certain oil additives
- corrosion resistance
- sour gas resistance

EVM

Therban® is superior to EVM (aka EAM) (ethylene-vinylacetate copolymers) in:

- physical properties
- low temperature behavior
- oil swell

Applications

A winning formula in practice

Therban® is already indispensable in automotive systems, oil exploration, mechanical engineering and aerospace. Our research and application development team is focused on extending this advantage.
Why not contact us to find out more? We would be delighted to help you discover new applications and develop new projects.

Seals

Therban's® superior line of fully saturated grades with high heat resistance is suited to seal applications in automotive systems and heavy equipment.
Our fully saturated LT grade Therban® VP KA 8882* provides an excellent combination of high and low temperature, ozone and oil resistance and is ideal for long-term performance in off-the-road vehicle and automotive seals which come into contact with oil and grease.

Use Therban® for:
- wheel bearing seals
- shock absorber seals
- camshaft seals
- power steering assembly seals
- O-rings
- water pump seals
- gearbox shaft seals
- air conditioning system seals
- fuel system seals for diesel and RME

Oil well specialties

High ACN saturated grades are best for low swell and explosive decompression resistance. This also applies to fuel and refrigerant applications. No other supplier offers a line of fully saturated HNBR grades that equals Therban® for performance.

Use Therban® for:
- blow-out preventers
- packers
- drill-pipe protectors
- stator pumps
- drilling motors

Wires and cables

Medium-high ACN fully saturated grades are ideal for wire and cable applications.

Use Therban® for:
- protective components for electrical systems
- protective jackets for electrical cables and wires
- blends with EVM / $Al(OH)_3$ for cable jackets with excellent flame retardant properties

Belts, hoses, mountings

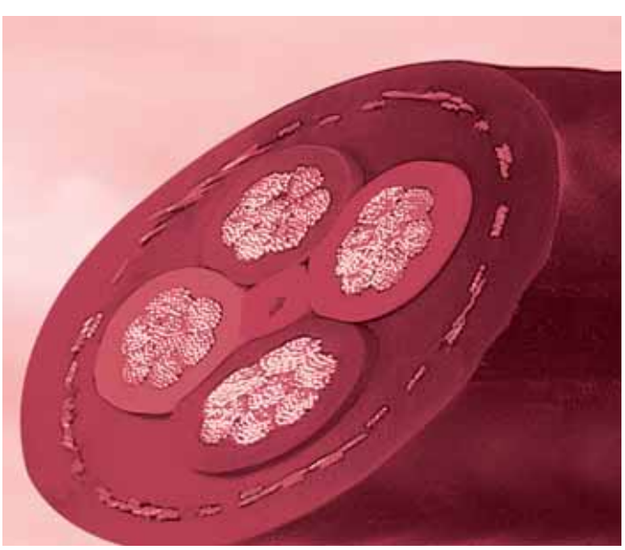
Therban® LT grades are especially suitable for applications where cold flex cracking is a problem, as in snowmobile belts. Therban® partially hydrogenated grades are the right choice in these dynamic applications.

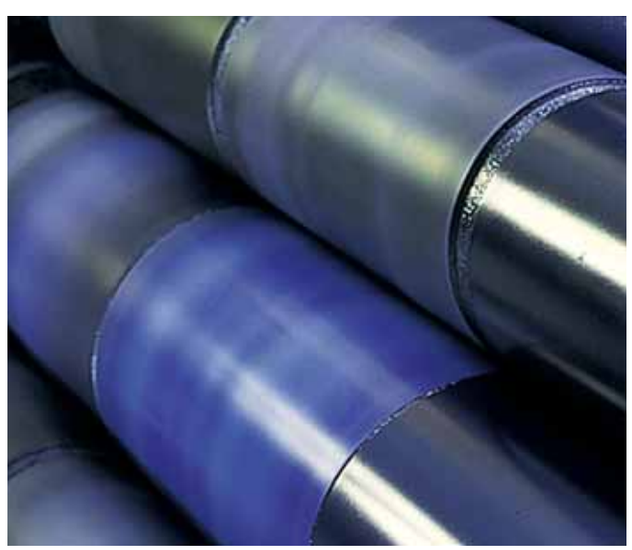
Use Therban® for:
- air conditioning hoses
- timing belts
- engine mountings
- oil-cooler hoses
- poly-v-belts
- torsional vibration dampeners
- boots and bellows
- chain tensioning devices
- fuel hoses
- overflow caps
- power steering hoses
- ship couplings
- high pressure hydraulic hoses with a high dynamic load

Roll coverings

Therban® ART grades are especially suited to high hardness roll applications; they combine high modulus and good dynamic properties with low compound viscosity.
All partially saturated Therban® grades from LANXESS are ideal for these dynamic applications.

Use Therban® for:
- metal-working rolls
- paper industry rolls
- printing rolls
- elastomer components for looms
- textile rolls
- rolls for transport of containers in aircraft





Product range and typical properties

Product range and typical properties

Product	Acrylonitrile content (%)	Mooney viscosity [1] ML (1+ 4) 100°C	Residual double bond content (%)	Density (g/cm³)	Standard packaging	Remarks
Fully saturated (suitable for peroxide crosslinking)						
Therban® A 3407	34.0	70	max. 0.9	0.95	bulk box with 20 bales of 25 kg each wrapped in polyethylene film or 25 kg bales individually packed in boxes	for lifetime belts, O-rings, gaskets and seals requiring maximum heat resistance and dynamic performance combined with an optimal compromise of low temperature properties and oil resistance
Therban® A 3406	34.0	63	max. 0.9	0.95		similar to Therban® A 3407, but with improved flow behavior[2]
Therban® A 3607	36.0	66	max. 0.9	0.96		lower swelling compared to Therban® A 3407
Therban® A 3907	39.0	70	max. 0.9	0.97		further improved oil swelling resistance compared to Therban® A 3607, excellent for fuel resistant hoses, belts, seals, O-rings and gaskets
Therban® A 4307	42.5	63	max. 0.9	0.98		very high temperature resistance combined with minimal swelling in oils and fuels; optimal sour gas resistance; ideal for severe application conditions in hoses, diaphragms, O-rings and seals for automotive and oil field applications
Therban® A 4309	43.0	100	max. 0.9	0.98		similar to Therban® A 4307 for special compounds with high filler and plasticizer loads
Partially saturated grades (suitable for peroxide and sulfur crosslinking)						
Therban® C 3446	34.0	61	4.0	0.95	bulk box with 20 bales of 25 kg each wrapped in polyethylene film or 25 kg bales individually packed in boxes	optimal combination of heat resistance, dynamic properties and processing
Therban® C 3467	34.0	68	5.5	0.95		recommended standard grade for sulfur cure; excellent dynamic properties
Therban® B 3627	36.0	66	2.0	0.96		special low RDB type, comparable to Therban® A 3607 (peroxide cure recommended) to increase crosslink density for high module and/or low compression set applications
Therban® B 3629	36.0	87	2.0	0.96		special low RDB type similar to Therban® B 3627 for higher filler load capacity (peroxide cure recommended)
Therban® C 4367	43.0	61	5.5	0.98		excellent resistance to oils; should be used instead of Therban® A 4307 in case improved dynamic and bonding properties are required
Therban® C 4369	43.0	97	5.5	0.98		similar to Therban® A 4307 with capacity for higher filler loads
Therban® VP KA 8837*	34.0	55	18.0	0.95		optimal compromise between low temperature compression set and oil swell resistance; especially suited for rolls and dynamic oil field components

[1] unmassed (DIN 53523; ASTM D 1646)
[2] see Therban® AT VP KA 8966 for maximum flow
* = trial product, please see information given on page 11

Product range and typical properties

Product	Acrylonitrile content (%)	Mooney viscosity [1] ML (1+ 4) 100°C	Residual double bond content (%)	Density (g/cm³)	Physical form	Standard packaging	Remarks
Specialty grades							
Low Temperature Technology							
Therban® LT 2157	21.0	70	5.5	0.96	bales	bulk box with 20 bales of 25 kg each wrapped in polyethylene film or 25 kg bales individually packed in boxes	optimal low temperature flexibility balanced with good oil resistance for use in low temperature belts, seals, O-rings and gaskets
Therban® LT VP KA 8886*	21.0	67	5.5	0.96	bales		similar to Therban® LT 2157 with outstanding low mold fouling properties (sulfur and peroxide curable)
Therban® LT VP KA 8882*	21.0	74	max. 0.9	0.96	bales		similar to Therban® KA 8886 with optimal combination of heat and low temperature resistance, designed for extreme service conditions (peroxide curable)
Heat Resistant Technology							
Therban® HT VP KA 8805*	34.0 [2]	45	max. 0.9 [2]	1.15	slabs		masterbatch providing maximum heat resistance
Carboxylated Technology							
Therban® XT VP KA 8889*	33.0	77	3.5	0.97	bales		maximum wear resistance and adhesive properties; in combination with Therban® ART strong synergies observed; use for belts, rolls, oil field applications and as adhesive promoter for fabrics and cords (sulfur and peroxide curable)
Advanced Technology – Low Mooney							
Therban® AT VP KA 8966* (anticipated trade name: Therban® AT A 3404)	34.0	39	max. 0.9	0.95	bales		similar to Therban® A 3406 with extra low Mooney viscosity for outstanding processing properties for use in in O-rings, seals, spread compounds or as viscosity modifier for high viscosity compounds (peroxide curable)
Therban® AT C 3443 VP*	34.0	39	4.0	0.95	bales		similar to Therban® C 3446 combined with processing advantages of new Advanced Technology (sulfur and peroxide curable)
Therban® AT A 3904 VP*	39.0	39	max. 0.9	0.96	bales		similar to Therban® A 3907 combined with processing advantages of new Advanced Technology (peroxide curable)
Acrylate Reinforced Technology							
Therban® VP KA 8796*	34.0 [2]	22	5.5 [2]	1.14	granules	20 kg boxes on pallets contents: 800 kg on pallets	Enhanced stiffness, abrasion and load bearing properties, excellent adhesion to metal; use where extreme dynamic performance is warranted e.g. life-time belts, paper and steel rolls (peroxide curable)

[1] unmassed (DIN 53523; ASTM D 1646)
[2] base polymer
* = trial product, please see information given on page 11
As the THERBAN® AT family is constantly being extended,
please contact your local representative for latest information about new grades.

Your direct contact to Therban®

For further information please contact your regional expert

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63639_Therban_KA013_0306.qxd 05.04.2006 8:34 Uhr Seite 11

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Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. For materials mentioned which are not LANXESS products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be followed. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper use and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets and product labels. Consult your LANXESS representative in Germany or contact the Health, Safety, Environment and Quality Department (HSEQ) of LANXESS Germany or – for business in the USA – the LANXESS Product Safety and Regulatory Affairs Department in Pittsburgh, PA.

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* Trial product
(VP = Versuchsprodukt = trial product). The information contained herein is merely preliminary data. Testing as to properties and applications is not final. Further information, including data which could change or add hazards with use, may be developed. Such information may be needed to properly evaluate or use this product. Use is undertaken at the sole risk of the user.

Note: The information contained in this publication is current as of March, 2006. Please contact your LANXESS representative to determine if this publication has been revised.

63639_Therban_KA013_0306.qxd 05.04.2006 8:34 Uhr Seite 12

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