

# insight

MAGAZIN

SPECIAL

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## ► **Game changer: The compression set**

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Head of R&D

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Ideal for general industrial  
applications

## **Cellular rubber**

An expert check on qualities





Dear readers,

as your Experts in Foam, we always like to know where we stand. Do our cellular rubber qualities cover all the market needs? How is the quality of our semi-finished products compared to our competitors?

To get a precise picture, we have been taking a closer look at 14 EPDM qualities traded in Europe. The trade, and our competitors, believe they are all in the running as alternatives to our EPDM-L. Is the customer really getting a comparable product? After checking the data sheets and carrying out a comparison with our in-house test results, we can say that this is very rarely the case! From the density it is clear that the qualities compared are often closer to our EPDM-W, but rather harder. Clearly, the general impression is that they meet the requirements that clients have for cellular rubber for general industrial applications. At this point we will not go into the quality deficiencies that we observed, such as poor utilisation of the blocks, extrusion marks, smell issues etc. You can learn more about that in the rest of this issue of insight. Special cellular rubber.

As a manufacturer, it is in our DNA for the needs of the market to be our incentive and driving force. We have used our skills in development to react to the findings of the comparison with our competitors, and developed the new **EPDM-i**: a tailor-made, cost-effective solution for general industrial applications.

Visit us at the **Foam Expo Europe in Stuttgart at stand 412** and find out more about this and all the other qualities of cellular materials from W. KÖPP or contact our team any time. Look forward to talking to you.

Warm regards,

Achim Raab, Managing Director

# LOOK CLOSELY

## Cellular rubber blocks reveal a lot ...

Do you pay attention to the "internal values", the material properties in the data sheets about the cellular rubber quality you have selected? Glad to hear it! But, especially if you work to make savings on material use, it is worth taking a close look at the cellular rubber blocks and sheets from your suppliers. We have brought together a couple of typical occurrences that you should certainly pay close attention to when carrying out a visual inspection.

### 1. How is the moulding?

If the moulding of the block is not good, and there is damage to the corners, for example, you can only use the material in limited ways, as the usable thickness is significantly reduced. The same applies if the surface has dents, for example. Imagine a 1 x 2m sheet. Even a small dent impairs the utilisation of the sheet. You should also bear in mind the dimensions of the moulded blocks.

### 2. Does the material have imperfections?

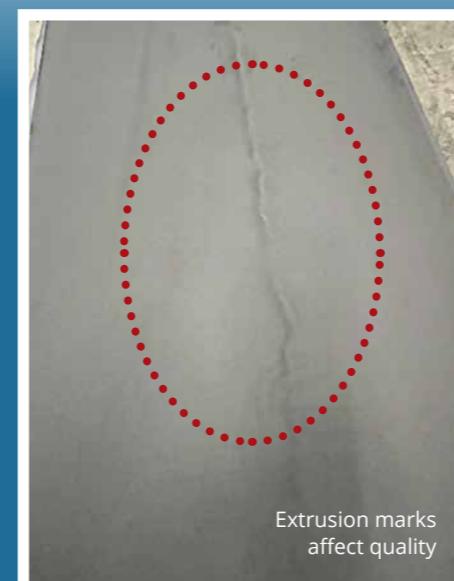
Imperfections, sometimes called "cavities" (>1-2mm) or larger defects, are produced during foaming, due to non-homogeneity in the mixture or impurities during production. They generally become visible after the splitting of the block, as the example images show. If you stamp seals from a foam of this type with even very small flaws, you will definitely end up with breaks in the seal. This increases the reject rate, so it is definitely undesirable.



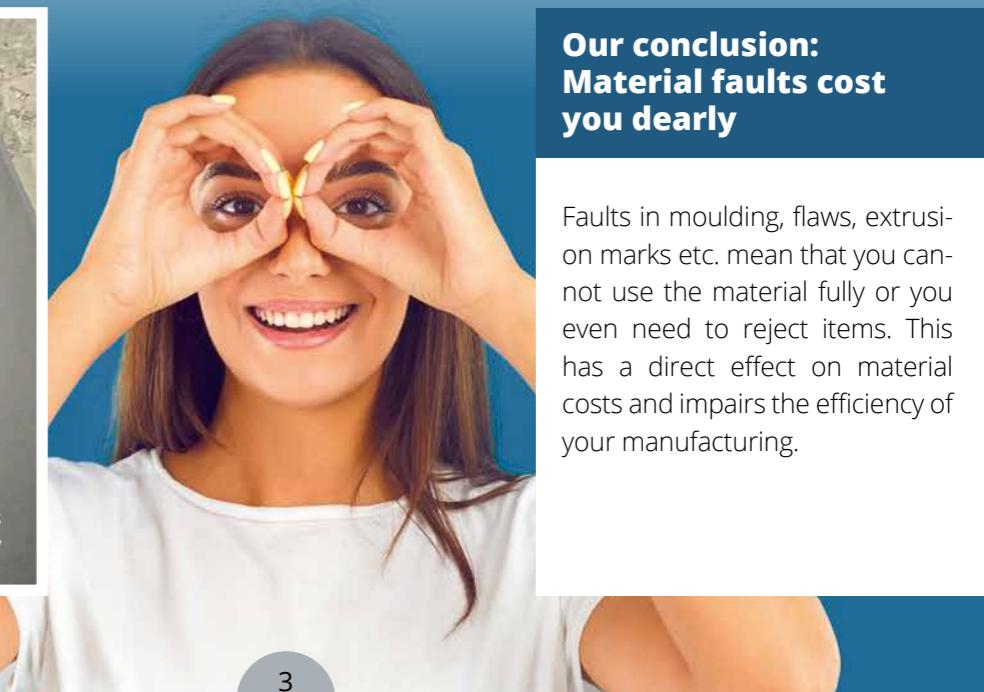
Flaws due to non-homogeneity in the mixture.

### 3. What is the structure within the block?

The structure within a cellular rubber block should always be even. Extrusion marks are "ugly" visual flaws that can also mean deviations in the mechanical parameters.



Extrusion marks affect quality



**Our conclusion:  
Material faults cost  
you dearly**

Faults in moulding, flaws, extrusion marks etc. mean that you cannot use the material fully or you even need to reject items. This has a direct effect on material costs and impairs the efficiency of your manufacturing.

# PAPER IS PATIENT ...

## Read between the lines in data sheet!

At KÖPP we know: Our cellular rubber qualities are among the best on the market. All materials comply with their data sheets. Of course, the same applies for our EPDM-L. It sets a benchmark for our current competitors. Now read on, to find out if you can also trust the data sheets of 14 comparison materials, how you can interpret them correctly, and whether you need to question them.

**We should say at this point: Some data sheets did not provide reliable answers, but rather raised many questions. We have listed a few examples below of sometimes misleading information – with tips about what you should particularly focus on when reading data sheets, and where you should definitely ask follow-up questions.**

### Density

Don't compare apples and oranges. If you are looking for a cheaper alternative, pay attention to the density of the cellular rubber qualities that you are offered. Sometimes, as seen in the example, it is lower than our EPDM-L. The

lower price becomes almost self-explanatory. Lower density means less material use, or a lower elastomer proportion. A cellular rubber quality with a lower density is however theoretically softer, unless filler materials ensure a higher hardness. We have observed this in various materials from our competitors. However, all the other material properties are affected by this, often negatively. You should be puzzled if cellular rubber in different colours supposedly has the same data sheet. A white quality, on which all coloured versions must be based, is significantly softer. Added colour pigments make the foam softer.

### Extract from a competitor's data sheet

Colour	Black – White – Grey – Red	
Density (ISO 845-88 – ASTM D 3575)	100 +/- 15 kg/m <sup>3</sup>	

**DON'T COMPARE APPLES AND ORANGES!**

### OUR TIP:

If you are looking for a more inexpensive material, consider KÖPP EPDM-W as well. It is competitively priced, and it can often provide you with the same effect, as with a lighter but harder material that you can get from our competitors. You could also consider our new EPDM-i, which could be the optimum solution for your application.

*More about this later!*



### Classification

In a data sheet from an Asian manufacturer there are several confusing and apparently arbitrary statements. We will focus here on the statements on "Classification" as per VW TL 52065 (see below). Actually this is not a classification, but rather a test according to an OEM standard. The statement "Depends on drawing requirements" is meaningless. There are many tests in the standard quoted, in which the test piece geometry is precisely specified. However, nowhere in the data sheet does it actually state that tests as per VW TL 52065 were carried out. One should also note, that the statements on classification overall are limited, because the tearing resistance is excluded. Our tip: Ask about the results of relevant tests at an externally accredited body. If your supplier has these results, they will certainly be happy to share them.



### Extract from a competitor's data sheet

Classification (except Tearing resistance)	VW TL 52065	Depends on drawing requirements

### Flame resistance

#### Excerpts from competitors' data sheets

Fire resistance	FMVSS 302 to be confirmed according to final configuration	 Pass <100 mm/min
Fire resistance	UL94 to be confirmed according to final configuration	HBF ≥ 5 mm
Combustion Characteristics 100 mm/min. max, 4 inches/min	FMVSS 302	 PASS

The American standard FMVSS 302 was developed to test the non-flammability of materials used inside vehicles. The burning rate per minute is established. It must not exceed a maximum of 100mm/min, and tests are carried out to check how thick the sample must be, for this value not to be exceeded. The smaller the value, the more flame-resistant the material. Our EPDM-L passes the test in accordance with FMVSS 302 from a thickness of 3mm.

Statements like in the examples above, such as "to be confirmed acc. to final configuration" are literally worthless. Of course, "PASS" sounds great, but we do not know which thickness was used to pass the test.

## Hardness

### Extract from a competitor's data sheet

Density	ISO 845		105 ± 20 kg/m³	7.8 ± 1.2 lb/ft³
Hardness (1)	ASTM D 2240		33 Shore 00	

(1) Indicative information value only

KÖPP determines its Shore hardness as per DIN EN ISO 868 and has these and many other results verified by an accredited external test facility. You can rely on that. We have seen examples where the stated test conditions were in accordance with ASTM D 2440, for example. This is an unusual standard to use for determining the hardness of

foams. Nonetheless, the statement becomes meaningless because of the additional statement "indicative information value". This is merely a non-binding value. You should always watch out for additional statements like this in the "small print".

## Compression set

### Excerpts from competitors' data sheets

Compression Set 50 %, 24 h, 23 °C	ISO 815-1	< 30 %	
Compression set 23 °C	ASTM D1056 50 %, 22 h, 23 °C	≤ 35 % (average 25)	
Compression set 40 °C	ASTM D1056 50 %, 22 h, 40 °C	≤ 80 % (average 50)	

The compression set is one of the most important material properties, particularly if you use the cellular rubber as a sealing material. Also read the interview with Dr Andreas Peine, our Head of R&D, on pages 12-13. In some data sheets from other cellular rubber manufacturers or distributors, it is striking that this value is only measured after 22 hours of storage of the compressed sample and only at room temperature, but not after storage at 40°C. Of course, this makes the values and the material look better, as the values measured by us at 40°C are sometimes extremely bad for sealing materials. This also implies that filling materials have been used, which have no business being in an EPDM. Other manufacturers (see examples) also put an

average value in the small print, which is significantly lower, so it looks better than the actual limit value that the manufacturer could state.

KÖPP is also transparent on this point, and also states the values over time, once for the measurement after half an hour, and once for the measurement 24 hours after relief. This is both at room temperature and also at 40°C. This is as stipulated in the standards of almost all leading OEMs in the automotive sector.

## Linear shrinkage

### Extract from a competitor's data sheet

Linear shrinkage	INS LAB 10 003 After 7 days at 70 °C		≤ 5 mm
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Outgassing of the material leads to a linear shrinkage with cellular rubber. KÖPP measures it according to the standard WSK-M2D419-A provided for this purpose, to ensure comparability. In individual cases, in data sheets for materials from other manufacturers, we have observed that the

test was carried out according to a self-defined standard. This means customers do not have the opportunity to compare the values, and in-house standards generally carry no weight.

# WHAT'S THAT SMELL?

Our team needed a strong nose to examine the EPDM qualities from other manufacturers. Some of the 14 materials examined stood out for their extremely unpleasant smell, sometimes with a stench of fish. This particularly applied to materials from Asia.

This much is clear: Such a penetrating smell is certainly not desirable for most applications or for further processing. During fire tests, we noticed some very unusual fire residues. This indicates that additives were present, which KÖPP believes do not belong in an EPDM. Ultimately, we cannot say whether these could even be damaging to health.

For all EPDM qualities from KÖPP, we can assure you that you need not expect any odour beyond the normal distinctive smell of cellular rubber.

**Fire tests**



# ON PAPER AND IN REAL LIFE: KÖPP is in the lead

Our cellular rubber qualities and the related data sheets speak for themselves. Among the 14 materials compared, we only found one that was generally comparable to our EPDM-L in terms of its material properties. However, KÖPP scored highly with its superior moulding and thus the better utilisation of the blocks.

So did we get everything right? When it comes to our data sheets and the underlying measurements, we can certainly say yes. Our data sheets offer our customers all the relevant information, with reliable values, with clear presentation. If you have questions, we will always be glad to hear from you. We are grateful for suggestions for improvements, and we are always happy to hear your ideas.

Our comparison with our competitors has really opened our eyes: Some customers want a simpler or more inexpensive solution than we can offer with our all-rounder EPDM-L. This certainly applies in the automotive sector. High importance is set by sealing solutions in this context, which extend the life of cars. However, for some industrial applications, a material with a lower density may be precisely the right solution. We have taken this customer need into account, and we now present our new EPDM-i (also see page 16) – naturally with the related data sheet, which you can download from our website now:



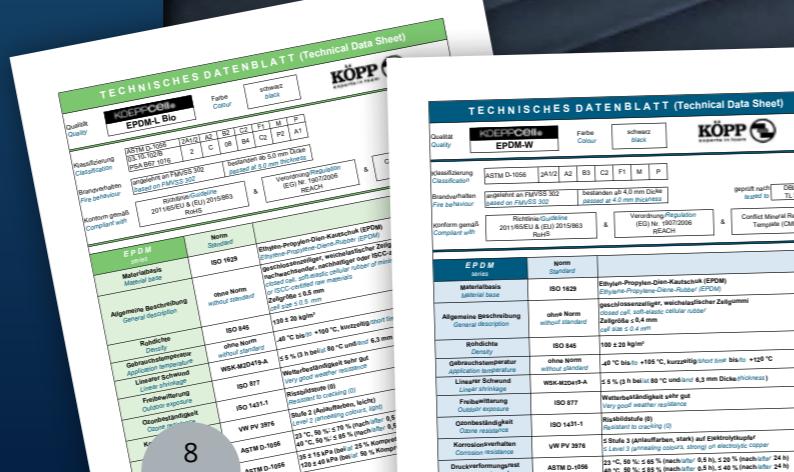
Compare our data sheet ...

## TECHNISCHES DATENBLATT (Technical Data Sheet)

Qualität Quality	KOEPPcell® <b>EPDM-L</b>	Farbe Colour	schwarz black	KÖPP experts in foam
Klassifizierung Classification	ASTM D-1056 03-10-102/B PSA B67 1016	2A1/2 C B2 C2 F1 M P		GM zugelassen nach GM approved according to GMW1173 DBL 5574 TL 52065 WSK-M2D419-A 03-10-102/B PSA B67 1016
Brandverhalten Fire behaviour	angelehnt an FMVSS 302 based on FMVSS 302	bestanden ab 3,0 mm Dicke passed at 3.0 mm thickness		geprüft nach tested to geprüft nach tested to Conflict Mineral Reporting Template (CMRT)
Konform gemäß Compliant with	Richtlinie/Guideline 2011/65/EU & (EU) 2015/863 RoHS	&	Verordnung/Regulation (EG) Nr. 1907/2006 REACH	
<b>EPDM series</b>	<b>Norm Standard</b>			
Materialbasis Material base	ISO 1629	Ethylen-Propylen-Dien-Kautschuk (EPDM) Ethylen-Propylene-Diene-Rubber (EPDM)		
Allgemeine Beschreibung General description	ohne Norm without standard	geschlossenzelliger, weichelastischer Zellgummi closed cell, soft-elastic cellular rubber Zellgröße ≤ 0,5 mm cell size ≤ 0.5 mm		
Rohdichte Density	ISO 845	$130 \pm 20 \text{ kg/m}^3$		
Gebrauchstemperatur Application temperature	ohne Norm without standard	-40 °C bis/to +100 °C, kurzzeitig/short time bis/to +120 °C		
Linearer Schwund Linear shrinkage	WSK-M2D419-A	≤ 5 % (3 h bei/at 80 °C und/and 6,3 mm Dicke/thickness)		
Freibewitterung Outdoor exposure	ISO 877	Wetterbeständigkeit sehr gut Very good weather resistance		
Ozonbeständigkeit Ozone resistance	ISO 1431-1	Rissbildungstufe (0) Resistant to cracking (0)		
Korrosionsverhalten Corrosion resistance	VW PV 3976	≤ Stufe 3 (Anlauffarben, stark) auf Elektrolytkupfer ≤ Level 3 (annealing colours, strong) on electrolytic copper		
Druckverformungsrest Compression set	ASTM D-1056	23 °C, 50 %: ≤ 65 % (nach/after 0,5 h), ≤ 25 % (nach/after 24 h) 40 °C, 50 %: ≤ 80 % (nach/after 0,5 h), ≤ 50 % (nach/after 24 h)		
Druckspannung Compression deflection	ASTM D-1056	35 ± 15 kPa (bei/at 25 % Kompression/compression) 120 ± 40 kPa (bei/at 50 % Kompression/compression)		
Wasseraufnahme Water absorption	ASTM D-1056	≤ 5 %		
Zugfestigkeit Tensile strength	ISO 1798	≥ 350 kPa		
Bruchdehnung Elongation at break	ISO 1798	≥ 150 %		
Elastizitätsmodul Young's Modulus	ohne Norm without standard	≥ 1,5 kPa		
Weiterreißfestigkeit Tear resistance	ISO 34-1	≥ 1,1 kN/m		
Rückprallelastizität Rebound resilience	ISO 4662	50 ± 5 % (bei/at 0,5 J Pendel/pendulum)		
Shorehärtе Shore hardness	ISO 868	35 ± 6 Shore 00		
Elektrischer Leitwert Electrical conductance	EN 61340	> 1,0 TΩ		
Wärmeleitfähigkeit Thermal conductivity	ISO 8302	≤ 0,045 W/mK		

All information refers to the normal standards and is internally and externally monitored and tested.

solutions  
in foam



WE DOUBLE-CHECK TO BE SURE

## Accredited testing institutions ensure reliable results

We develop our cellular rubber qualities at our company headquarters in Aachen. They are painstakingly tested there at our QA laboratory. The manufacture and tests accompanying production are carried out under technically excellent production conditions by our 100% subsidiary, SC KOEPP Romania. Our production location in Romania also has its own, superbly equipped QA laboratory. Every batch that leaves the factory fulfils the technical properties listed in the data sheet. We promise!

TESTED  
QUALITY

### Credible quality

To ensure your safety, we are not content with the quality tests that we carefully carry out in house. We know: Trust in conformity assessments stands and falls on the credibility of the testing facility that carries out the inspection. For this reason, at KÖPP, in addition to our own analyses, we also have tests of the material properties carried out by accredited testing facilities, such as IMAT. Their specialist competence, reliability, and independence are regularly checked by national accreditation institutions. In Germany, the German accreditation (DAkkS) is responsible for this.

### Internationally renowned

The German accreditation body works as an authority contracted by the state. An international accreditation system ensures that corresponding proof of quality is accepted practically worldwide.

**An advantage for customers:** You can always rely on the performance and quality of KÖPP products for all your applications.



Examples of markings to identify cellular rubber qualities

### UNMISTAKABLE -

## Unequivocally marked by character codes

They are all black, and at first glance it is difficult to distinguish the different cellular rubber qualities that you, the customer, can get from KÖPP or other suppliers. Every manufacturer has their own system for clearly marking blocks. KÖPP uses a combination of letters and numbers.

### Colour codes can lead to mistakes

Colour coding is increasingly popular. There are some manufacturers that mark each cellular rubber type from its range with a particular colour combination. Five different colours for five types, for example. A green vertical stripe at the edge might mean a product that can be used in the same way as our EPDM-L. That is easy to remember. But what about if the manufacturer offers many more cellular rubber types, like KÖPP, which currently offers more than 30 qualities? Then the situation is different, and colour codes are less effective. Yellow, red, green, blue or red, red, green, green – what was that again? What might work in-house

for the manufacturer, is difficult for staff at a processing company to remember, and really not very clear. It is very easy to get confused, as we know from experience.

### Sequences of characters are unmistakable

KÖPP marks its qualities with letters and numbers for this reason. This makes it possible to identify each material simply and unequivocally. EL, as shown in the image, stands for an EPDM-L, for example. The first character names the material, the second names the softness class (SUW, W, L or S). Other properties are specified, such as high temperature resistance (HT), sulphur-free (perox), halogen-free (HFFR). The numbers on the left and right of the figures have only one purpose: They give an unmistakable code for each batch, which is noted in the delivery papers, and guarantees 100% standard-compliant traceability.

Quality	Marking
EPDM-L	EL
EPDM-L US	ELUS
EPDM-L Perox	ELP
EPDM-L HT	ELHT
EPDM-L Bio	ELBIO
EPDM-S	ES
EPDM-S 1250	ES
EPDM-S US	ESUS
EPDM-S Perox	ESP
EPDM-S HT	ESHT
EPDM-S-F	ESF
EPDM-SC-W	SCW
EPDM-SUW	SUW
EPDM-SUW Perox	SUWP
EPDM-SUW HT	SUWHT
EPDM-W	W
EPDM-W Perox	WP
EPDM-W-F	WF
EPDM-W HFFR	WHFFR
EPDM-CR L	ELCR
EPDM-CR S	ESCR
EPDM-PE	B
EPDM-SBR-S	SBRS
CR-F fest	CRF
CR-H	CRH
CR-L	CRL
CR-M	CRM
CR-S fest	CRS
NR-L mittel	NRL
NR-S fest (43)	NRS43
NR-S extrafest (44)	NRS44
NR-S_45	NRS45
NBR-L	NBRL

## GAME CHANGER: THE COMPRESSION SET

Insight. talks to Dr Andreas Peine, Head of R&D

**One material property of a cellular rubber quality is particularly important for anyone who uses it as a sealing material: the compression set. It determines how long a seal can reliably do its job. Insight. asked Dr Andreas Peine, Head of R&D, why this is the case.**

**In data sheets for cellular rubber qualities, the compression set is one value among many. Why is it so important?**

The elasticity of elastomers like cellular rubber does not remain constant. What makes a good seal is that it exerts counterpressure, like a tensed spring, for a long period, to keep everything out – be it air, dust, or water. It should do this as long and as consistently as possible. The compression set is the material property that provides most information about the conditions required for a seal to maintain its sealing properties in the medium and long term. Density and hardness do not help with predicting the service life of the seal.

**In KÖPP data sheets for EPDM-L, for example, the compression set is: 23°C, 50%: ≤ 25% (after 24h). How should I read and understand these values?**

With a compression set as per ASTM D-1056, the way we carry it out or have it carried out externally in accredited laboratories, the samples are compressed, for example at 23°C for 22 hours to 50% of their height. After another 24 hours, the thickness is measured after relief. As cellular rubber is not a perfectly typical spring, a difference in thickness in the test piece is almost always observed. With our EPDM-L, the value after 24h in this test configuration is well below 25%. When a seal has been compressed too much once, it becomes "weak". It no longer applies sufficient force for the counterpressure. If the compression set is too high, the seal fails.

**How hard can you compress a seal for it to keep functioning perfectly over a long period?**

As a rule of thumb, you could say that you should never compress a seal by more than 35 to 40%, to avoid impairing its seal quality prematurely. In the automotive industry, for example, seals are not a classical wear material. They should last as long as the cars are on the road. It is common for that to be around 15 years. According to another rule of thumb, the lower the compression set, the better the seal effect. The opposite also applies.

**Here's an example. In cars, seals in our scope are exposed to high temperatures in summer. Temperatures of 40°C are not rare. Is it worth considering this when selecting a seal material?**

Most definitely. Let's get back to the example of EPDM-L. If you carry out the compression set test at 40°C, after pressure relief after 24 hours, you observe that the test piece has lost up to a third of its height. You have to

take this into account when designing the seal, so that even under these conditions it can still provide enough pressure to continue to make a seal.

**Some suppliers of cellular rubber qualities only state the compression set at room temperature. Is that a viable way to work?**

I think that really is whitewashing. You are giving a value that makes the product look better. At the same time, the values are not even determined by accredited test institutions. It would certainly not be a bad idea for the customer to take a closer look. A compression set at room temperature of 20-25%, for example, still fits within the stipulations of the standards, but at 40°C it would be considerably higher. Failure would certainly occur earlier.

**What recommendations would you give to potential customers/users of cellular rubber seals?**

We recommend that you always look at both values for the compression set, at room temperature and at 40°C. Foams with a Shore hardness >45 in particular have higher compression set values at higher temperatures. Alternatively, you can be guided by the tensile strength and ultimate elongation. High tensile strengths with low ultimate elongation indicate more strongly networked/vulcanised systems. These tend to have higher compression set values. If the customer is unsure about which material to select for an application, of course, we are always happy to offer some friendly advice.

### GREAT TO HEAR!

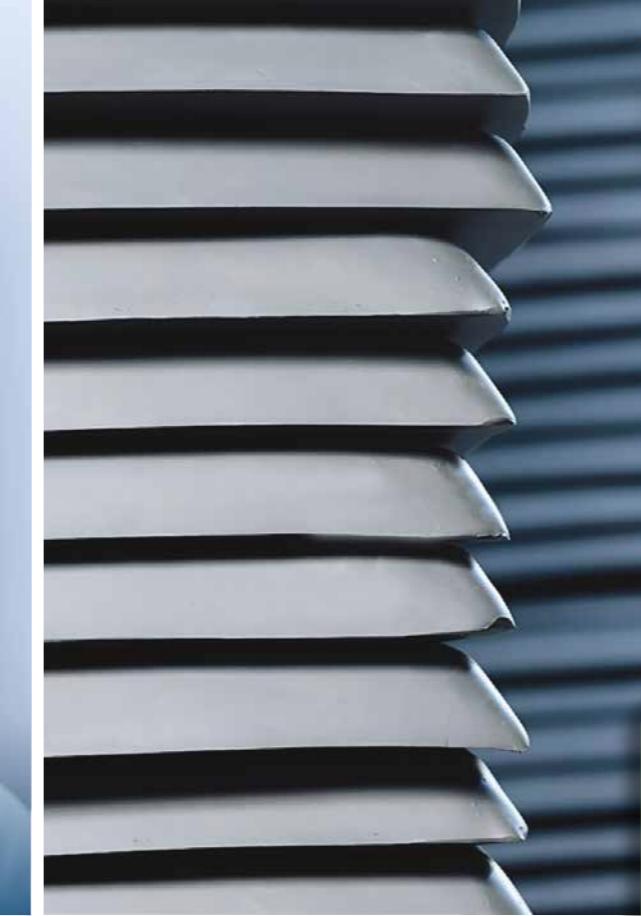
During an audit with a customer in North Rhine-Westphalia, Michael Decker, Head of Quality Management, found out why a leading TIER 1 supplier is glad to work with KÖPP:

- A German focus on quality
- Many certifications
- Straightforward and flexible processes
- Excellent service
- Consistent availability – even at difficult times like in 2022

Thank you for this positive feedback. This is very encouraging, and it motivates us to keep satisfying our customers with our quality, reliability, and service.



**Michael Decker,  
Head of Quality Management**





## THE RELIABLE OPTION

The German and Dutch armed forces trust KÖPP

The German and Dutch armies now buy EPDM special qualities for personal protective equipment for their ground troops from KÖPP.

**Germany and the Netherlands are close partners within the EU – also militarily. The mutual integration of their armed forces is even unique within Europe. This involves coming to agreements on procurement, to ensure interoperability between the two armies. This is happening now for the personal protective equipment (PPE) issued to soldiers.**

### A supply chain with no gaps

Bad experiences with a manufacturer outside Europe, leading to repeated supply bottlenecks, led to a new approach. When choosing a new supplier for PPE foamed padding, we focused on excellent quality, and also effective supply chains. Materials made in Europe or made in Germany came to centre stage.

### Material development in record time

In just four months our experts in foam developed an appropriate special quality. Customers reacted very positively to KÖPP's ability to react so quickly and flexibly to the request. Large quantities of the material are already being used. The supply chain is always secure because manufacturing is carried out in Europe, and sufficient stocks are kept.



NOW AT KÖPP:

## Up to 100% closed loop production

With the additional option of upcycling of production surplus, we have now fully closed the production loop for manufacturing of semi-finished products/foams. This means that cellular rubber and cellular polyethylene are not just manufactured as sustainably as possible at KÖPP, but also fully utilised.

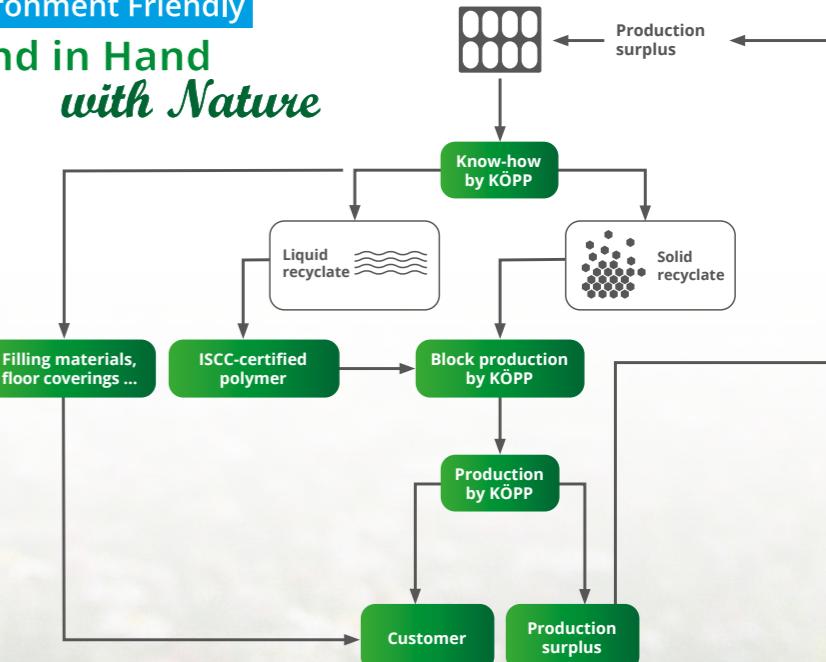
### Focusing on the circular economy

In the "Hand-in-Hand with Nature" project, as "Experts in foam", we have been focusing for several years now on sustainable processes and the circular economy. Since 2021, our range has included a cellular rubber made principally from renewable raw materials and ISCC-certified EPDM. The organic EPDM-L was followed by an organic PE based on a polymer that is also sustainably produced and ISCC-certified. The investment in new plant technology makes it possible to compact production surplus and make recyclates out of it. These are added to mixtures as solid recyclates or they are used as liquid recyclates in polymer manufacture. For several years now, we have been processing some of the die-cut skeletons, edges of cellular rubber and rubber workpieces into floor coverings such as athletics tracks and playground mats.

### New life for production surplus

We have now taken the last step in the framework of an asset deal, in which we took over the machines from a recycling company. "We now breathe new life into production surpluses, which could not previously be brought back into the production cycle," says Axel Wynands, Head of Sales and Marketing.

### Environment Friendly Hand in Hand with Nature



With this upcycling solution for production surplus, we kill two birds with one stone: We keep our products in the plastic cycle, and we offer another worthwhile product, which helps us to save resources. This solution fits our goals, and means we are now able to make full use of all materials.

- They do not absorb any moisture
- Anti-static, clean & dust-free
- Durable elasticity and shape
- No wear, so they are reusable

To guarantee safe transportation, our filling materials are an inexpensive but effective alternative to expensive designer packaging.

# CELLULAR RUBBER

direct from the manufacturer

NEW NOW!



## EPDM-i

- ▶ Bulk density
  - 100 kg/m<sup>3</sup>
- ▶ Hardness
  - 40 Shore 00
- ▶ Compression set
  - 23°C, 50%: ≤ 65% (after 0.5h),  
≤ 30% (after 24h)
  - 40°C, 50%: ≤ 80% (after 0.5h),  
≤ 50% (after 24h)

Perfect for general  
industrial applications

Discover the difference!

**KÖPP**  
experts in foam

[www.koepp.de](http://www.koepp.de)

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**solutions**



**in foam**

