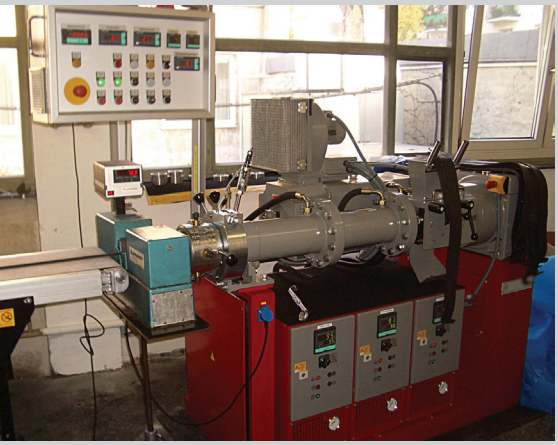
Cord rings made from high performance elastomers

ZRUNEK
GUMMITECHNIK

Zrunek, the Competence Centre for cord rings

- LONG-TIME KNOW-HOW
- IN-HOUSE MIXING PLANT FOR NEW COMPOUNDS
- STATE-OF-THE-ART EXTRUDERS
- PROVEN FORMULATIONS
- IN-HOUSE VULCANISATION
- IN-HOUSE RESEARCH DEPARTMENT
- QUALITY CERTIFICATION ACCORDING TO ISO 9001



Cord extrusion

For the production of cord rings cords made from appropriate materials are needed, which are manufactured by extrusion. This requires long-time know-how, in particular when using modern high performance elastomers. Contrary to standard mixing formulations, there exists only a very limited number of additives for these materials for extrusion of a cord with a smooth surface and sufficient tolerances.

Vulcanisation joint

Together with the elastomer quality of the cord material the vulcanisation joint is the crucial factor in each and every cord ring. The sealing function of the ring fully depends on the condition and the quality of the vulcanisation joint. Our ZruElast® cord rings are usually produced by hot vulcanisation, connecting the ends of the cord with a 45° scarf joint. A good-quality vulcanisation joint can be tested by means of a tensile test where the break shall take place within the cord and the joint remains intact.

Materials

With our range of available standard materials and the corresponding cords in stock we are in the position to quickly manufacture endlessly vulcanised cord rings for a wide area of applications. In addition, there are a lot of other proven formulations whose compounds can be mixed in our own in-house mixing plant. If then still no suitable material has been found, a lab for the development of a customer-specific solution is available.

The appropriate material is selected in line with certain factors, such as

- chemical resistance
- exposition to peak temperature
- continuous operating temperature
- exposition to lowest temperature
- pressure resistance
- compression set

Special requirements
call for special solutions

Transformer Siemens

Low temperature flexibility + transformer oil resistance

To achieve good oil resistance, in particular for hot transformer oils, polar elastomers, such as NBR or FPM, are needed. Higher polarity is attained at the expense of correspondingly poorer low-temperature flexibility. For example, for use in transformers at a continuous temperature of 120°C we developed the ZruElast® NBR 3360 compound, which shows low-temperature flexibility of -25°C. This is sufficient for most transformer applications but e.g. not in arctic zones in Canada.
For this kind of application, more advanced fluoroelastomer types are used. ZruElast® FPM 70189 is not only hot-oil resistant up to 200°C but also shows low-temperature resistance of up to -40°C (TR10).
ZruElast® FMQ 9006 on fluorosilicone basis provides even better low-temperature behaviour in connection with good transformer oil resistance. Such seals remain flexible up to -55°C. The problem with this material is its extremely difficult adhesion. Zrunek succeeded in developing a specific technique for hot vulcanisation of cords into cord rings.

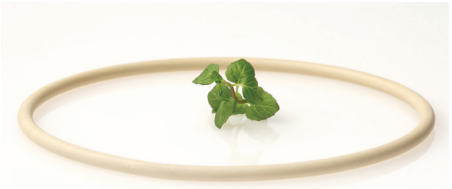
Low Shore hardness

The typical hardness range for fluoroelastomers is 60 to 90 Shore A, which is sufficient for many applications. Nevertheless, some special conditions of use require markedly softer FPM seals, e.g. seals with low compression ratios. Lower hardness is usually achieved by means of plasticizers. However, since plasticizers are not available for fluoroelastomers and good compression set values can be achieved only with sufficient cross-linking density, it was a great challenge for Zrunek to develop easily extrudable compounds that are soft up to 40 Shore while they still have excellent sealing force. Today, ZruElast® FPM 70157, 7245 and 7555 with 42, 45 and 57 Shore are available for this purpose.

For even softer applications of up to 30 Shore FPM sponge rubber (ZruMoos® FPM 7530M) is available. Such hot vulcanised cord rings are perfectly suited to seal large, irregular gap widths. For example, in all applications where the use of silicone foam causes failures due to limited chemical resistance ZruMoos® FPM offers an interesting alternative.

Use in the food industry

The use of rubber products in the food industry once more clearly limits the number of usable compound chemicals. The formulation of easily extrudable compounds presents a huge challenge. With ZruElast® FPM 7023, 70146, 70160 Zrunek offers you white or black qualities that are either certified according to FDA CRF-177.2600 or EC 1935/2004 or conform to BfR XXI/FDA.



Chemical resistance

To achieve highest chemical resistance higher-fluoridated, peroxide cross-linked fluoro rubbers are used. For this purpose, too, the manufacturing processes need to be modified to obtain a high-class cord ring (ZruElast® FPM 7009).

Use in vacuum

Fluoroelastomers are perfectly suited for use in vacuum because in FPM compounds no plasticizers can be used and therefore evaporation rates under vacuum are extremely low. Such applications, however, require a particularly well-manufactured vulcanisation joint in ring form. To meet these requirements we have developed special machinery in our company.

Narrow tolerances

Extruded rubber profiles comply with the ISO 3302-1 E2 standard for tolerances. As a standard feature our FPM 75 cords are manufactured in E1 quality. Nevertheless, there are customer requests for further reduction of the tolerances. Using special compounds and optimisation processes, Zrunek has succeeded in manufacturing also cords featuring only half the E1 class tolerances. This almost equals the production quality of O-rings.

cord-thickness	O-Rings according DIN 3771 tolerances mm	Cords according Zrunek special tolerances tolerances mm	Cords according ISO 3302-1 E1 tolerances mm
1,8	± 0,08	± 0,10	± 0,20
2,65	± 0,09	± 0,13	± 0,25
3,55	± 0,10	± 0,13	± 0,25
5,3	± 0,13	± 0,18	± 0,35
7	± 0,15	± 0,20	± 0,40

More than 1 million Cord rings

... that many customers cannot be wrong!

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