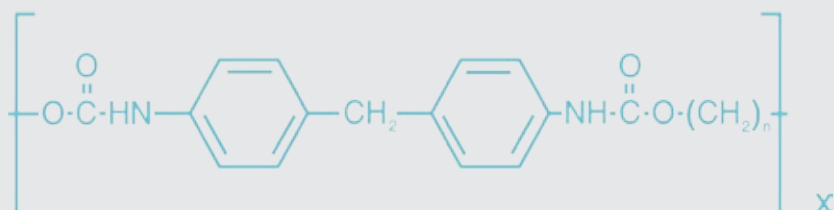
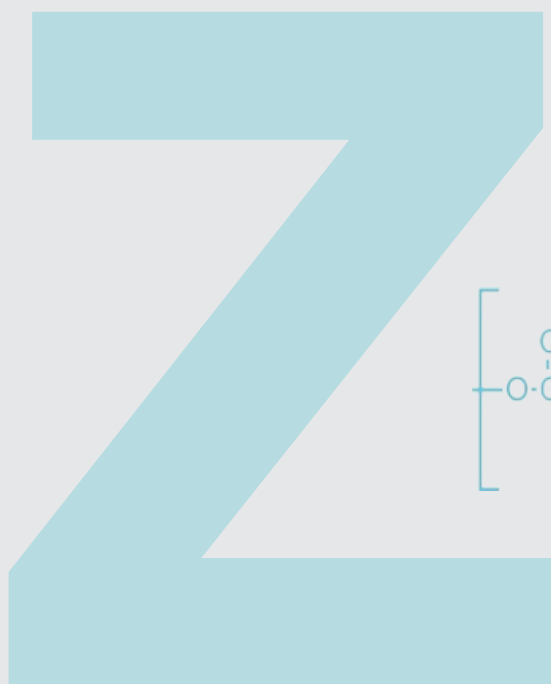


# The new Class

## ZURCON® Z20/Z22 NEW WORLDCLASS POLYURETHANE MATERIALS



## Introduction

Polyurethane seals based on old technology materials do not meet the high requirements of tomorrow's fluid power industry in many key areas:

- Leak free performance
- Life
- Life cycle cost
- Temperature range

Trelleborg Sealing Solutions has therefore invested in in-house laboratory and material production facilities to develop tailor made polyurethane materials with exceptional properties to meet the expectations of the fluid power industry.

The first of this new generation of materials are now approved and released by Trelleborg Sealing Solutions:

### Zurcon® Z20

Standard material for hydraulic applications.

### Zurcon® Z22

Premium material for hydraulic seals applications with a wide operating temperature range.

### Zurcon® Z201

Standard material for hydraulic scrapers.

### Zurcon® Z221

Premium material for hydraulic scrapers for low and high temperatures.

All Trelleborg Sealing Solutions standard hydraulic seals and scrapers will be offered in the new Zurcon® material Z20/Z201 or in the premium Zurcon® Z22/Z221.

Further Zurcon® materials for alternative application types are under development and will be released as they are approved by Trelleborg Sealing Solutions.

## Positioning

For all hydraulics applications with normal operating conditions, the standard polyurethane materials are recommended; Zurcon® Z20 for seals and Zurcon® Z201 for scrapers. For applications where an excellent low temperature behaviour is necessary, the new premium polyurethane Zurcon® Z22 for seals and Zurcon® Z221 for scrapers are recommended for improvements in cold flexibility and compression set. Pricing of seals and scrapers in Zurcon® Z22/Z221 is higher than the standard Zurcon® Z20/Z201.

## Extrusion resistance, wear resistance

Trelleborg Sealing Solutions seals (U-cup or L-cup) produced in the new Zurcon® polyurethane materials, have outstanding extrusion and wear resistance. Therefore life, life-cycle cost and leak free performance all meet the high expectations of the end user.

No additional back-up ring is necessary for applications up to 40 Mpa if Trelleborg Sealing Solutions installation recommendations are used.

## Fluid compatibility

Zurcon® Z20 and Zurcon® Z22 have been developed for use in mineral oil based hydraulic fluids. They can also be used in synthetic ester fluids within the recommended temperature range. The swell of Zurcon® Z20 in mineral oil is very low (ASTM 3 approx. 6%).

## Operating temperature

The new developed Zurcon® polyurethane materials have an extended temperature range compared to old technology polyester (AU) or polyether (EU) based materials. These excellent properties increase the life, extrusion resistance and leakage performance for seals and scrapers.

Figure 1: Operating temperature range for the new Zurcon® materials

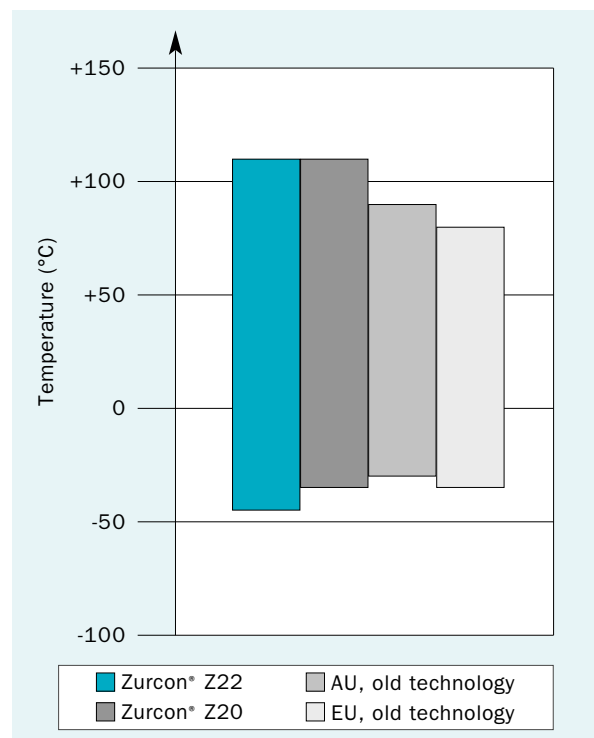


Table 1:

**Typical material properties**

Material	Units	Z20	Z22	TPU - old technology
Hardness	Shore A	93	93	93
100% modulus	MPa	12	13	10
Ultimate elongation	% (min.)	550	550	450
Tensile strength	MPa	57	55	45
<b>Compression set</b>				
24h / -20°C	%	46	25	65
72h / +70°C	%	23	21	35
72h / +100°C	%	39	36	55
3h / +130°C	%	28	25	35
Rebound resilience	%	41	44	30
TR10-point	°C	-34	-50	-27
<b>Operating Temperature</b>				
Max.	°C	+110	+110	+80
Min.	°C	-35	-45	-30
Colour	-	Turquoise	Dark turquoise	Turquoise

**Compression set**

Zurcon® Z22 and Zurcon® Z20 materials have been tailor made to have very low compression set values to meet applications under low or high temperature conditions as well as the paint drying process of hydraulic components with water based varnish paint coats.

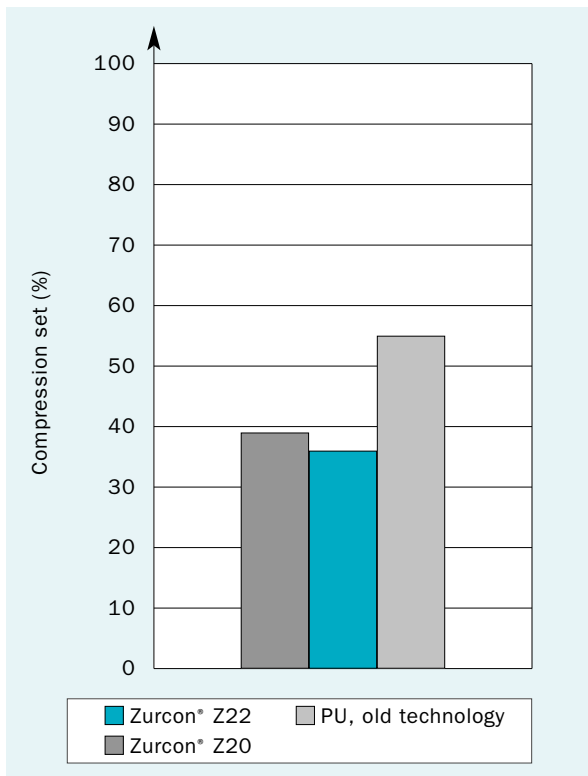
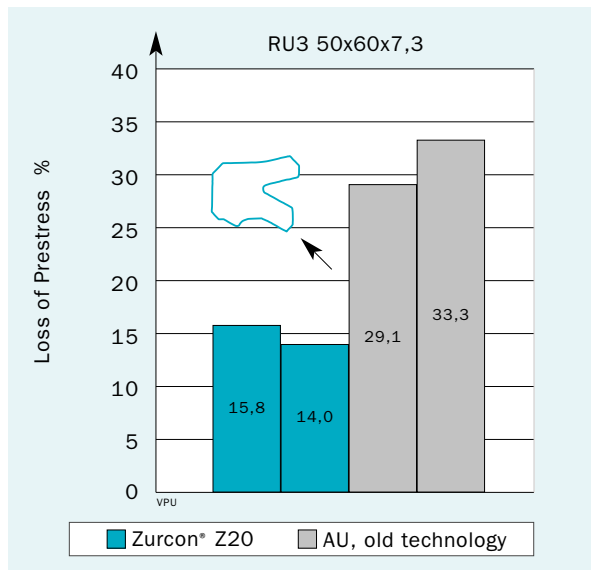


Figure 2: **Compression set 72 h / 100°C**

Figure 3: **Loss of contact stress 30min /130°C**

Short duration high temperature exposure creates severe loss of sealing stress in old technology materials.



## Wear and extrusion performance of U-Cups

U-Cup RU2100500, 50 x 60 x 11

Zurcon® Z20 (Figure 4)

versus

PU, old technology (Figure 5)

U-Cup RU3200500, 50 x 65 x 12,5

Zurcon® Z20 (Figure 6)

versus

U-Cup, old technology (Figure 7)

The performance of different U-cups in different materials has been tested under the following test conditions

(Figure 8):

Pressure (cycling)	0-30 MPa	Velocity	0.2 m/s
Cycles	200 000	Stroke	300 mm
Oil temperature	+80°C	Extrusion gap	0.2 mm

Figure 4-8:

### Test results

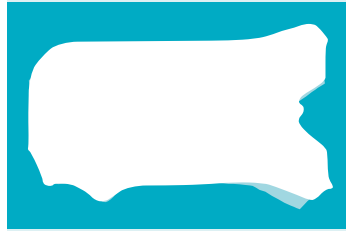


Figure 4: Zurcon® Z20



Figure 6: Zurcon® Z20



Figure 8: rod seal test rig



Figure 5: PU, old technology

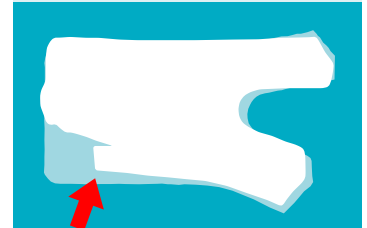


Figure 7: U-Cup, old technology

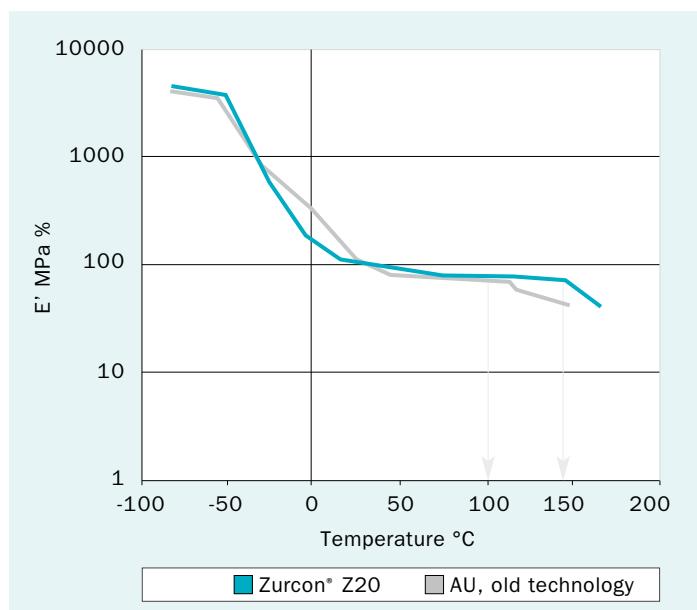


Figure 9: DMA Storage Modulus

## Viscoelastic characterisation of materials by a Dynamic Mechanical Analysis (DMA)

DMA curves show the Storage Modulus E in relation with the temperature variation. DMA analysis of Zurcon® Z20 and old technology materials shows the stable elastic modulus of Zurcon® Z20 extending to +145°C and improved flexibility to -30°C.

In the area of +15°C to -30°C a significant improvement of the Zurcon® Z20 behaviour compared to the old technology material can be noticed.

## Sealing solution with Zurcon® Z20 seals for hydraulic cylinder

The total sealing solution for a medium duty mobile hydraulic cylinder includes: static seals (Dualseal), piston and rod seals and scraper in Zurcon® Z20/Z201. This is a reliable and cost effective solution, which can meet the industry expectations in terms of leak free performance, life and installed cost.

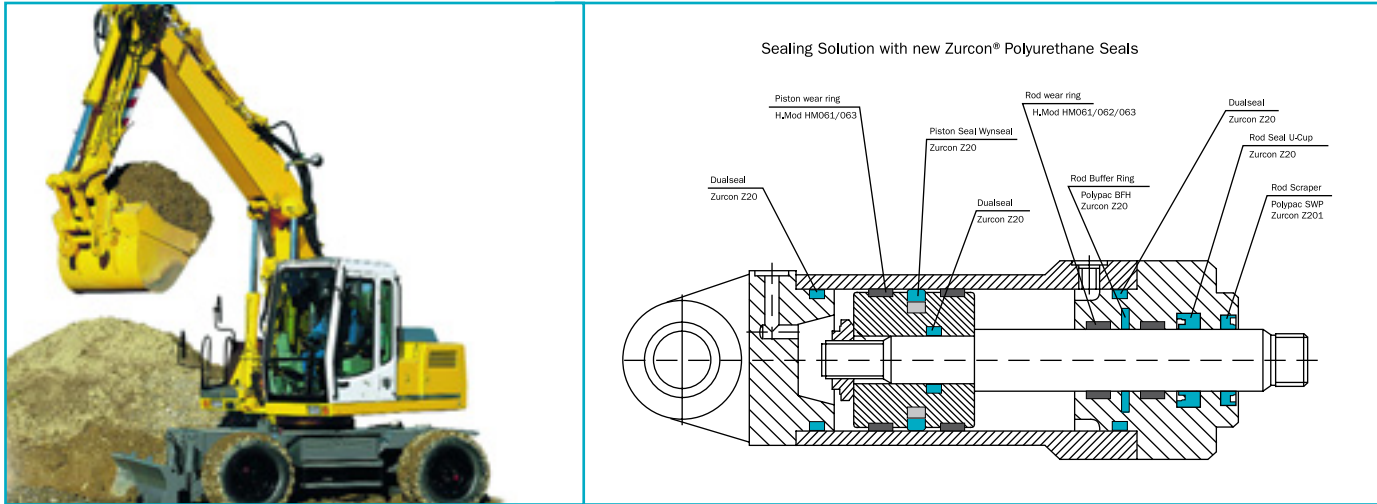


Figure 10

## Zurcon® Z20 / Z22 material performance

Zurcon® materials outperform old technology polyester and polyether materials in all critical properties.

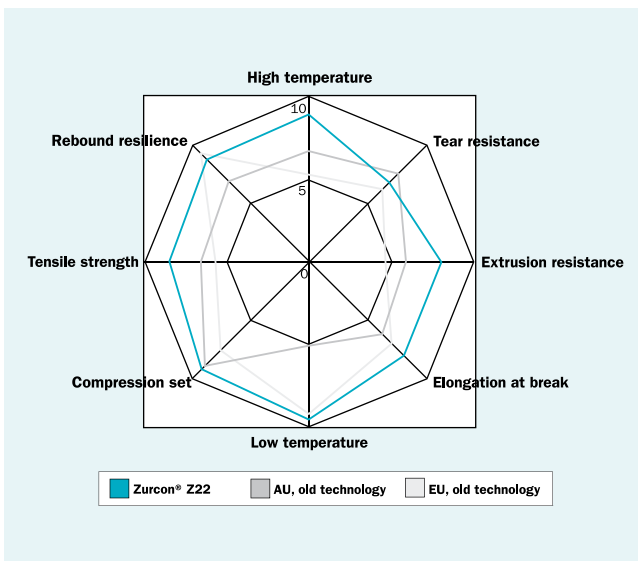


Figure 11

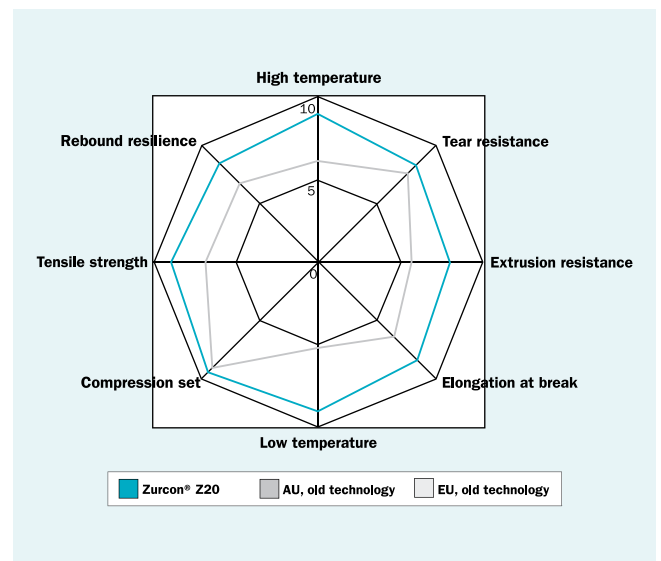


Figure 12

## LOCAL CONTACTS

### EUROPE

**Austria – Vienna** (Slovenia)

+43 (0) 1 406 47 33

**Belgium - Dion-Valmont** (Luxembourg)

+32 (0) 10 22 57 50

**Bulgaria – Sofia**

(Azerbaijan, Belarus, Greece, Romania, Ukraine)

+359 (0) 2 969 95 99

**Croatia – Zagreb** (Albania, Bosnia and Herzegovina,

Macedonia, Serbia, Montenegro)

+385 (0) 1 24 56 387

**Czech Republic - Rakovnik** (Slovakia)

+420 313 529 111

**Denmark – Copenhagen**

+45 48 22 80 80

**Finland – Vantaa** (Estonia, Latvia)

+358 (0) 207 12 13 50

**France - Maisons-Laffitte**

+33 (0) 1 30 86 56 00

**Germany - Stuttgart**

+49 (0) 711 7864 0

**Hungary – Budaörs**

+36 (06) 23 50 21 21

**Italy – Livorno**

+39 0586 22 6111

**The Netherlands - Rotterdam**

+31 (0) 10 29 22 111

**Norway – Oslo**

+47 22 64 60 80

**Poland – Warsaw** (Lithuania)

+48 (0) 22 863 30 11

**Russia – Moscow**

+7 495 627 57 22

**Spain – Madrid** (Portugal)

+34 (0) 91 71057 30

**Sweden – Jönköping**

+46 (0) 36 34 15 00

**Switzerland – Crissier**

+41 (0) 21 631 41 11

**Turkey – Istanbul**

+90 216 569 73 00

**United Kingdom - Solihull** (Eire, South Africa)

+44 (0) 121 744 1221

**Aerospace Hub Europe, North**

(UK and Nordic Countries)

+44 (0) 121 744 1221

**Aerospace Hub Europe, South & West**

(Continental Europe and Middle East)

+33 (0) 1 30 86 56 00

**Automotive Hub Europe**

+49 (0) 711 7864 0

### AMERICAS

**Americas Regional**

+1 260 749 9631

**Brazil – São José dos Campos**

+55 12 3932 7600

**Canada Central – Etobicoke, ON**

+1 416 213 9444

**Canada East – Montreal, QC**

+1 514 284 1114

**Canada West – Langley, BC**

+1 604 539 0098

**Mexico - Mexico City**

+52 55 57 19 50 05

**USA, Great Lakes - Fort Wayne, IN**

+1 260 482 4050

**USA, East - Mt. Juliet, TN**

+1 615 800 8340

**USA, Midwest - Schaumburg, IL**

+1 630 539 5500

**USA, Northern California - Fresno, CA**

+1 559 449 6070

**USA, Northwest - Portland, OR**

+1 503 595 6565

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+1 713 461 3495

**Aerospace Hub Airframe**

+1 303 469 1357

**Aerospace Hub Distribution & Engineering**

+1 260 749 9631

**Aerospace Hub East**

+1 610 828 3209

**Aerospace Hub West**

+1 310 371 1025

**Automotive Hub North America**

+1 734 354 1250

**Automotive Hub South America**

+55 12 3932 7600

### ASIA PACIFIC

**Asia Pacific Regional**

+65 6 577 1778

**China – Hong Kong**

+852 2366 9165

**China – Shanghai**

+86 (0) 21 6145 1830

**India – Bangalore**

+91 (0) 80 3372 9000

**Japan – Tokyo**

+81 (0) 3 5633 8008

**Korea – Seoul**

+82 (0) 2 761 3471

**Malaysia - Kuala Lumpur**

+60 (0) 3 90549266

**Taiwan – Taichung**

+886 4 2382 8886

**Vietnam – Ho Chi Minh City**

+84 8 6288 6407

**Singapore and all other countries in South**

**and East Asia, Australasia**

+65 6 577 1778

**Aerospace Hub China**

+86 (0) 21 6145 1830

**Aerospace Hub Singapore**

+65 6 577 1778

**Automotive Hub China**

+86 (0) 21 6145 1830

**Automotive Hub India**

+91 (0) 80 3372 9200

### AFRICA, CENTRAL ASIA AND MIDDLE EAST

**Africa & Iran** (excluding South Africa (see UK))

+41 (0) 21 631 41 11

**Central Asia** (Armenia, Georgia, Kazakhstan,

Kyrgyzstan, Tajikistan, Uzbekistan)

+7 495 627 57 22

**Middle East and Gulf Region**

+359 (0) 2 969 95 99



Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has local presence in over 40 countries around the world.



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