

**Test report no.** 125333/17

**Certification No.:** 1108-5913

**Customer:** Aquaform AG  
Gewerbestraße 16  
4105 Biel-Benken  
SCHWEIZ

**Order:** Tests on multi-range couplings HymaxGrip® PN16,  
(two screws), according to SVGW guideline ZW 163  
(January 2016) including DIN EN 14525:2005-02

**Summary of test results:** see item 5

**Letter of:** 2017-04-11 **Ref:** Mr. Bally

**Receipt of samples:** see item 2 **Sampling:** -

**Test period:** from 2017-04-21 to 2017-06-06

**This test report comprises 11 pages and 13 pages as annex.**

Würzburg, 2017-06-13  
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## 1 Order

By its letter of 11 April 2017 company Aquaform AG, Gewerbestraße 16, 4105 Biel-Benken, Switzerland, instructed SKZ - Testing GmbH to perform tests on multi-range couplings HymaxGrip ® PN16 (two screws) according to SVGW-guideline ZW 163 (January 2016) including DIN EN 14525:2005-02.

## 2 Test material

On 13 April 2017 SKZ - Testing GmbH received following test material:

Sample No.	Designation	Dimension	Marking [FZ = company's logo]
1.1	Multirange coupling HymaxGrip PN16	DN200	<p>HYMYX GRIP DN 175 Durchmesserbereich 190 – 240 mm            FZ KRAUSZ FZ Aquaform            CH-4105 Biel-Benken Tel+41(0)61 7266400            www.aquaform.ch            für 190-215 Einsatzbereit            inneren Dichtring entfernen für 214-240            Betriebsdruck (bar) 16            Drehmoment min. (NM) 140            Dichtung: KTW W270 EPDM            Beschichtung: EPOXY            11/16            Part No: 890-825-07190-16</p> <p>Dichtring            Keine Angabe (<i>nicht Ausbaubar</i>)            Eingegossen in Körper            FZ KRAUSZ HYMAX GRIP DN 200 GGG YS48.15 190-240            FZ KRAUSZ HYMAX GRIP 7.48"-9.45" DI YS 0204            Eingegossen in Spannbacken            FZ KRAUSZ HYMAX GRIP DN-200 190-240 GGG No 0102 DG 3316            FZ KRAUSZ HYMAX GRIP 7.48"-9.45" GGG No 0102 DG 3316            Schrauben            4 Spannschrauben M16 x 220mm (304) m. Mutter SW 24            4 Schrauben M14x50 m. Mutter (selbtsichernd)</p>
1.2	Steel pipe, turned off	DN200/AD210	---
1.3	Cast pipe	DN200/AD229	---
1.4	Pipe PE 100	AD225, SDR11	---
1.5	Pipe PE 100	AD225, SDR17	---
1.6	Sleeves made of stainless steel	DN200, SDR11 / SDR17	---

Multi-range couplings are manufactured by:

Krausz Industries Ltd  
 6 Hapatish Street  
 66559 Tel-Aviv  
 ISRAEL

Die Mehrbereichskupplungen werden vertrieben durch:

Aquaform AG  
 Gewerbestraße 16  
 4105 Biel-Benken  
 SWITZERLAND

### 3 Test procedure

Usually we carry out tests according to standards for which we have an accreditation. The list of all standards for which we are accredited is shown on the homepage at [www.skz.de](http://www.skz.de).

If not otherwise noted, all tests were performed at standard atmosphere 23/50, class 2, according to DIN EN ISO 291:2008-08 "Climates and their technical application; standard climates" and after a storage of at least 88 hours in this climate.

Tests were performed according to SVGW-guideline ZW 163 (January 2016) "Pipe couplings, transition and large range couplings including repair couplings" including DIN EN 14525:2005-02 "Ductile iron wide tolerance couplings and flange adaptors for use with pipes of different materials: Ductile iron, grey iron, steel, PVC-U, PE, fibre-cement".

Tests were performed on cast iron pipes DN200/OD229 as well as on steel pipes DN200/OD210 which had been made available by the customer as well as on pipes made of PE 100, SDR 11 (PFA 16 bar) and SDR 17 (PFA 10 bar), OD 225, which were made available by SKZ – Testing GmbH. As there were no pipes made of PE, PFA 6 bar, available on the market, appropriate pipes made of PE100, SDR17, PFA 10 bar, were used alternatively as test accessories.

Individual tests are listed in following table:

Test	Requirements according to ZW 163 (January 2016), par.	Execution according to
Hygienic non-toxicity	4.7	ZW 163 (January 2016), par. 4.7
Materials	4.3.1	DIN 86128-1
Groove and insert depth	4.3.2	DIN EN 14525
Diameter groups	4.3.3	DIN EN 14525
Movable joints	4.3.4	DIN EN 14525
Movable axial joints	4.3.5	DIN EN 14525
Tightness against positive internal pressure	4.3.6	DIN EN 14525
Tightness against negative internal pressure	4.3.7	DIN EN 14525
Tightness against dynamic internal pressure	4.3.8	DIN EN 14525
Product data	4.3.9	DIN EN 14525
Corrosion protection	4.5	ZW 163 (January 2016), par. 6.5
Assembly and operating instruction	4.6	ZW 163 (January 2016), par. 6.6
Factory production control	4.8	ZW 163 (January 2016), par. 6.7
Third-party inspection	4.9	ZW 163 (January 2016), par. 6.8

## 4 Test results

### 4.1 Hygienic non-toxicity

There are following test reports for gasket "EPDM-825-c" contacting drinking water:

- Test report according to DVGW-work sheet W 270 (11/2007) from TZW, file ref. MO 195/16 of 13.01.2017 (valid until 31.12.2021).
- Test report according to KTW-recommendations of Federal Office for Environment , from TZW, file ref. KA 0384/16 of 6.02.2017 (valid max. 5 years).

### 4.2 Materials

The customer informed that multi-range couplings consist of following materials:

Part	Material designation
Basic body	Ductile cast iron, ASTM A536 type 65-45-12
End rings	Cast iron, ASTM A216 WCB
Gasket	EPDM
Bridge for sealing	Special steel AISI 304
Bolts and nuts	Special steel AISI 304
Distance plate	Special steel AISI 304L
Coating	Epoxid resin (250 µm)

#### 4.3 Groove and insert depth

Upon consulting the customer as well as Mr. Ebner from SVGW it was agreed to calculate the joint gap. Minimum insert depth mentioned is specified in the mounting instruction.

#### 4.4 Diameter groups

Within this initial type test the functioning of the joints of diameter ranges outside diameter 190 to 240 was tested on one diameter each representing each diameter range.

#### 4.5 Movable joints

Unrelevant.

#### 4.6 Movable axial joints

Present multi-range couplings are appropriate for restrainable joints. Supporting sleeves are not required for using pipes made of steel – cast iron or PE100. Using pipes made of PE require supporting sleeves.

#### 4.7 Tightness against positive internal pressure

Sample no.	Test condition	Test pressure [bar]	Testing time [min]	Remark
1.1 / 1.2	Tightness with 3 ° deflection	29 bar	≥ 120	tight
1.1 / 1.2	Tightness with shear load	29 bar	≥ 120	tight
1.1 / 1.3	Tightness with 3 ° deflection	29 bar	≥ 120	tight
1.1 / 1.3	Tightness with shear load	29 bar	≥ 120	tight
1.1 / 1.4 / 1.6	Density	29 bar	≥ 120	tight
1.1 / 1.5 / 1.6	Density	20 bar	≥ 120	tight



#### 4.8 Tightness against negative internal pressure

Sample no.	Test condition	Test pressure [bar]	Testing time [min]	Remark
1.1 / 1.2	Tightness with shear load	- 0,8	≥ 120	Difference in pressure < 0.08 bar Without any complaint
1.1 / 1.3	Tightness with shear load	- 0,8	≥ 120	Difference in pressure < 0.08 bar Without any complaint
1.1 / 1.5 / 1.6	Density	- 0,8	≥ 120	Difference in pressure < 0.08 bar Without any complaint

#### 4.9 Tightness against dynamic internal pressure

Sample no.	Test condition	Test pressure [bar]	Testing time [min]	Remark
1.1 / 1.2	24.000 cycles Tightness with shear load	9 / 18	≥ 120	tight
1.1 / 1.3	24.000 cycles Tightness with shear load	9 / 18	≥ 120	tight
1.1 / 1.5 / 1.6	24.000 cycles Tightness with shear load	6 / 12	≥ 120	tight

#### 4.10 Product data

##### Marking (see item 2)

According to ZW 163 marking shall be cast or embossed. Parts of marking are legible and permanently fixed by labels.

According to DIN EN 14525, following information was missing in marking of presented samples:

- Standard DIN EN 14525 Maximum joint gap <sup>2)</sup>

<sup>1)</sup> The customer confirmed that standard "EN 14525" will be added on label. SVGW will be informed accordingly.

<sup>2)</sup> Upon consulting the customer as well as Mr. Ebner from SVGW it was agreed to calculate the joint gap. Minimum insert depth mentioned is specified in the mounting instruction.

#### 4.11 Corrosion protection

Epoxid resin covers metal parts contacting water thus ensuring corrosion protection. There are following test report for epoxid coating:

- Test report according to DVGW-work sheet W 270 (11/2007) including file number W-279700k-17-SI/Krü of the Hygiene-Institut des Ruhrgebiets of 21.12. 2016 (valid until 21 December 20121).
- Test report according to guideline for coating of the Federal Office for Environment including file number K-235947-13-Ko of the Hygiene-Instituts des Ruhrgebiets of 25.10.2013 (valid until 15 May 2018).

#### 4.12 Assembly

Repairing couplings were packed with a clear comprehensible mounting and operating instruction.

#### 4.13 Factory production control

There is a certificate no. 10128 (issued by QS Zürich AG) for company Aquaform AG according to ISO 9001:2008. This certificate is valid until 14 September 2018.

An inspector of SKZ – Testing GmbH performed an audit at company Krausz Industries Ltd., Hapatish Street, 66559 Tel-Aviv, Israel, on 3 April 2016, with a positive result.

There is a certificate IL-49307, valid until 15 September 2018, (issued by IQNet and SII, Israel) for company Krausz Industries Ltd..

#### 4.14 Third-party inspection

A draft of the third-party inspection contract was issued while writing this test report.

### 5 **Assessment of test results**

Within performed tests presented multi-range couplings HymaxGrip® PN16 (two screws) have met the requirements of SVGW-guideline ZW 163 (January 2016) including DIN EN 14525:2005-02.