

**TEST REPORT**

**EN 681-1:1996+A3: 2005**

Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications. Vulcanized rubber

Report Reference No.....: 151116066GZU-002

Tested by (name and signature) .....: Jesse Deng



Approved by (name and signature) ..: Jones Zhong



Date of issue.....: April 29, 2016

Contents .....: Total test report 7 pages including:  
 Report text: 6 pages  
 Appendix A for Product photos: 1 page  
 Appendix B for Revision page: 1 page

**Testing Laboratory name** .....: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

**Address**.....: Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China

**Testing location** .....: Same as above

**Applicant's name**.....: Rong Sheng Long Rubber Sealing Article Company Limited of Foshan City


**Address**.....: Beihua Road, Tandong Industrial Area, Longjiang Town, Shunde District, Foshan City, Guangdong Province , the PR. China

**Test specification:**

Standard .....: Table 2 of EN681-1:1996+ A3: 2005, Type WA

Non-standard test method.....: N/A

**Test item description** .....: EPDM rubber

Trade Mark .....: 

Model and/or type reference.....: D0012

Manufacturer .....: Rong Sheng Long Rubber Sealing Article Company Limited of Foshan City

Rating(s) .....: —

**CONCLUSION:**

The submitted samples were tested and results were listed in text.

<b>Test item particulars</b>	
Classification of installation and use .....	: —
Supply Connection .....	: —
<b>Possible test case verdicts</b>	
- Test case does not apply to the test object.....	: N/A
- Test object does meet the requirement .....	: P (Pass)
- Test object does not meet the requirement .....	: F (Fail)
<b>Testing</b>	
Date of receipt of test item .....	: November 16, 2015
Date (s) of performance of tests .....	: November16, 2015 to April 29, 2016
<b>General remarks:</b>	
<p>This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.</p> <p>“(see remark #)” refers to a remark appended to the report. “(see Appendix #)” refers to an appendix appended to the report.</p> <p>Throughout this report a comma (point) is used as the decimal separator.</p> <p>When determining the test result, measurement uncertainty has been considered.</p> <p>The clause which indicated with * is the subcontract test item.</p>	

<b>General product information:</b>
<p>Submitted samples are EPDM rubber pieces, model No.: D0012, type of application: WA (Cold potable water supply (up to 50°C)). Samples were cut into specimen size by client.</p> <p>Refer to Appendix A for samples' appearance.</p>

EN681-1:1996+ A3: 2005			
No.	Requirement - Test	Result - Remark	Verdict
1	<p>Hardness</p> <p>According to Clause 4.2.3 of EN681-1:1996+ A3: 2005.</p> <p>When determined by the micro-test method specified in ISO 48, the hardness shall comply with the requirements given in Table 2.</p> <p>For the same seal, or along the greatest length of an extruded profile cut to make the seal, the difference between the minimum and maximum hardness values shall not be more than 5 IRHD. Each value shall be within the specified tolerances.</p> <p>Requirement: Hardness 70: IRHD70±5</p>	<p>The result of hardness: 72 IRHD</p>	P
2	<p>Tensile strength</p> <p>According to Clause 4.2.4 of EN681-1:1996+ A3: 2005.</p> <p>The tensile strength and elongation at break shall be determined by the method specified in ISO 37.</p> <p>Dumb-bell shaped test pieces of types 1, 2, 3 or 4 shall be used. Type 2 is the preferred type. The test report shall state the dumb-bell type whenever type 2 is not used.</p> <p>The tensile strength and the elongation at break shall comply with the requirements given in Table 2.</p> <p>Requirement: Hardness 70: 9MPa minimum.</p>	<p>Type 1 test piece was used. The result of tensile strength : 10MPa</p>	P
3	<p>Elongation at break</p> <p>According to Clause 4.2.4 of EN681-1:1996+ A3: 2005.</p> <p>The tensile strength and elongation at break shall be determined by the method specified in ISO 37.</p> <p>Dumb-bell shaped test pieces of types 1, 2, 3 or 4 shall be used. Type 2 is the preferred type. The test report shall state the dumb-bell type whenever type 2 is not used.</p> <p>The tensile strength and the elongation at break shall comply with the requirements given in Table 2.</p> <p>Requirement: Hardness 70: 200% minimum.</p>	<p>Type 1 test piece was used. The result of elongation at break: 325%</p>	P

**Intertek Testing Services Shenzhen Ltd. Guangzhou Branch**

Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China  
Tel: 86 20 8213 9688 Fax: 86 20 3205 7538 [www.intertek.com](http://www.intertek.com)

EN681-1:1996+ A3: 2005																									
No.	Requirement - Test	Result - Remark	Verdict																						
4	<p>Compression set</p> <p>According to Clause 4.2.5.2 and 4.2.5.3 of EN681-1:1996+ A3: 2005.</p> <p>4.2.5.2 Compression set at 23°C,70°C When determined by the method specified in ISO 815, at 23°C, 70°C and 125°C, using the small type B test piece, the compression set shall comply with the requirements given in Table 2.</p> <p>4.2.5.3 Low temperature compression set at (-10°C) When determined by the method specified in ISO 815 at -10°C using the small type B test piece and the (30 ± 3) min recovery measurement, the compression set of seals used in cold water supply, drainage and sewerage applications shall comply with the requirements given in Table 2.</p> <p>Requirement:</p> <table border="1"> <thead> <tr> <th>Model</th> <th>Hardness 70</th> </tr> </thead> <tbody> <tr> <td>72h at 23°C, Max</td> <td>15%</td> </tr> <tr> <td>24h at 70°C, Max</td> <td>20%</td> </tr> <tr> <td>72h at -10°C, Max</td> <td>50%</td> </tr> </tbody> </table>	Model	Hardness 70	72h at 23°C, Max	15%	24h at 70°C, Max	20%	72h at -10°C, Max	50%	<p>Compression strain of 25% for the sample.</p> <p>The result of compression set as below:</p> <table border="1"> <thead> <tr> <th></th> <th>Result (%)</th> </tr> </thead> <tbody> <tr> <td>72h at 23°C</td> <td>7%</td> </tr> <tr> <td>24h at 70°C</td> <td>17%</td> </tr> <tr> <td>72h at -10°C</td> <td>4%</td> </tr> </tbody> </table>		Result (%)	72h at 23°C	7%	24h at 70°C	17%	72h at -10°C	4%	P						
Model	Hardness 70																								
72h at 23°C, Max	15%																								
24h at 70°C, Max	20%																								
72h at -10°C, Max	50%																								
	Result (%)																								
72h at 23°C	7%																								
24h at 70°C	17%																								
72h at -10°C	4%																								
5	<p>Accelerated ageing in air</p> <p>According to Clause 4.2.6 of EN681-1:1996+ A3: 2005.</p> <p>Test pieces prepared for the determination of hardness according to 4.2.3 and for the determination of tensile strength and elongation at break (see 4.2.4) shall be aged in air by the normal oven method specified in ISO 188, for the following temperatures and times: — joint seals for cold water supply, drainage and sewerage, 7 days at 70°C; The changes in hardness, tensile strength and elongation at break shall comply with the requirements given in Table 2.</p> <p>Requirement:</p> <table border="1"> <thead> <tr> <th>Model</th> <th>Hardness 70</th> </tr> </thead> <tbody> <tr> <td>Hardness change, IRHD, Max</td> <td>+8/ -5</td> </tr> <tr> <td>Tensile strength change, Max</td> <td>-20%</td> </tr> <tr> <td>Elongation change, Max</td> <td>+10%/ -30%</td> </tr> </tbody> </table>	Model	Hardness 70	Hardness change, IRHD, Max	+8/ -5	Tensile strength change, Max	-20%	Elongation change, Max	+10%/ -30%	<p>Type 1 test piece for tensile strength and elongation at break was used.</p> <p>The result of compression set as below:</p> <table border="1"> <thead> <tr> <th></th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Hardness (IRHD)</td> <td>72</td> </tr> <tr> <td>Hardness change(IRHD)</td> <td>0</td> </tr> <tr> <td>Tensile strength, MPa</td> <td>11</td> </tr> <tr> <td>Tensile strength change, %</td> <td>10%</td> </tr> <tr> <td>Elongation, %</td> <td>294%</td> </tr> <tr> <td>Elongation change, %</td> <td>-9.5%</td> </tr> </tbody> </table>		Result	Hardness (IRHD)	72	Hardness change(IRHD)	0	Tensile strength, MPa	11	Tensile strength change, %	10%	Elongation, %	294%	Elongation change, %	-9.5%	P
Model	Hardness 70																								
Hardness change, IRHD, Max	+8/ -5																								
Tensile strength change, Max	-20%																								
Elongation change, Max	+10%/ -30%																								
	Result																								
Hardness (IRHD)	72																								
Hardness change(IRHD)	0																								
Tensile strength, MPa	11																								
Tensile strength change, %	10%																								
Elongation, %	294%																								
Elongation change, %	-9.5%																								

**Intertek Testing Services Shenzhen Ltd. Guangzhou Branch**

Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China  
Tel: 86 20 8213 9688 Fax: 86 20 3205 7538 [www.intertek.com](http://www.intertek.com)

EN681-1:1996+ A3: 2005															
No.	Requirement - Test	Result - Remark	Verdict												
6	<p>Volume change in water</p> <p>According to Clause 4.2.8 of EN681-1:1996+ A3: 2005.</p> <p>When determined by the method specified in ISO 1817 after 7 days immersion in distilled or deionized water at the temperatures specified below: Joint seals for cold water supply, drainage, sewerage and rainwater systems 70°C The change in volume shall comply with the requirements given in Table 2. For seals manufactured from isoprene–isobutylene copolymers see 4.2.1.1 for an alternative test. Requirement:</p> <table border="1"> <thead> <tr> <th>Model</th> <th>Hardness 70</th> </tr> </thead> <tbody> <tr> <td>7 days at 70°C, Max</td> <td>+8%/ -1%</td> </tr> </tbody> </table>	Model	Hardness 70	7 days at 70°C, Max	+8%/ -1%	<p>The result of volume change: 0.7%</p>	P								
Model	Hardness 70														
7 days at 70°C, Max	+8%/ -1%														
7	<p>Stress relaxation</p> <p>According to Clause 4.2.7 of EN681-1:1996+ A3: 2005.</p> <p>The stress relaxation shall be determined by method A of ISO 3384 using the small cylindrical test piece after applying mechanical and thermal conditioning. Measurements shall be taken after 7 days and 100 days for the 100 days test. The stress relaxation in compression shall comply with the requirements given in Table 2 at the following temperatures and times: Joint seals for cold water supply, drainage, sewerage and rainwater systems: 7 days at 23°C± 2°C and 100 days at 23°C± 2°C Requirement:</p> <table border="1"> <thead> <tr> <th>Model</th> <th>Hardness 70</th> </tr> </thead> <tbody> <tr> <td>7 days at 23°C, Max</td> <td>16%</td> </tr> <tr> <td>100 days at 23°C, Max</td> <td>23%</td> </tr> </tbody> </table>	Model	Hardness 70	7 days at 23°C, Max	16%	100 days at 23°C, Max	23%	<p>Compression strain of 25% for the sample. The result of Stress relaxation as below:</p> <table border="1"> <thead> <tr> <th></th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>7 days at 23°C</td> <td>15.9%</td> </tr> <tr> <td>100 days at 23°C</td> <td>22.6%</td> </tr> </tbody> </table>		Result	7 days at 23°C	15.9%	100 days at 23°C	22.6%	P
Model	Hardness 70														
7 days at 23°C, Max	16%														
100 days at 23°C, Max	23%														
	Result														
7 days at 23°C	15.9%														
100 days at 23°C	22.6%														

**Intertek Testing Services Shenzhen Ltd. Guangzhou Branch**

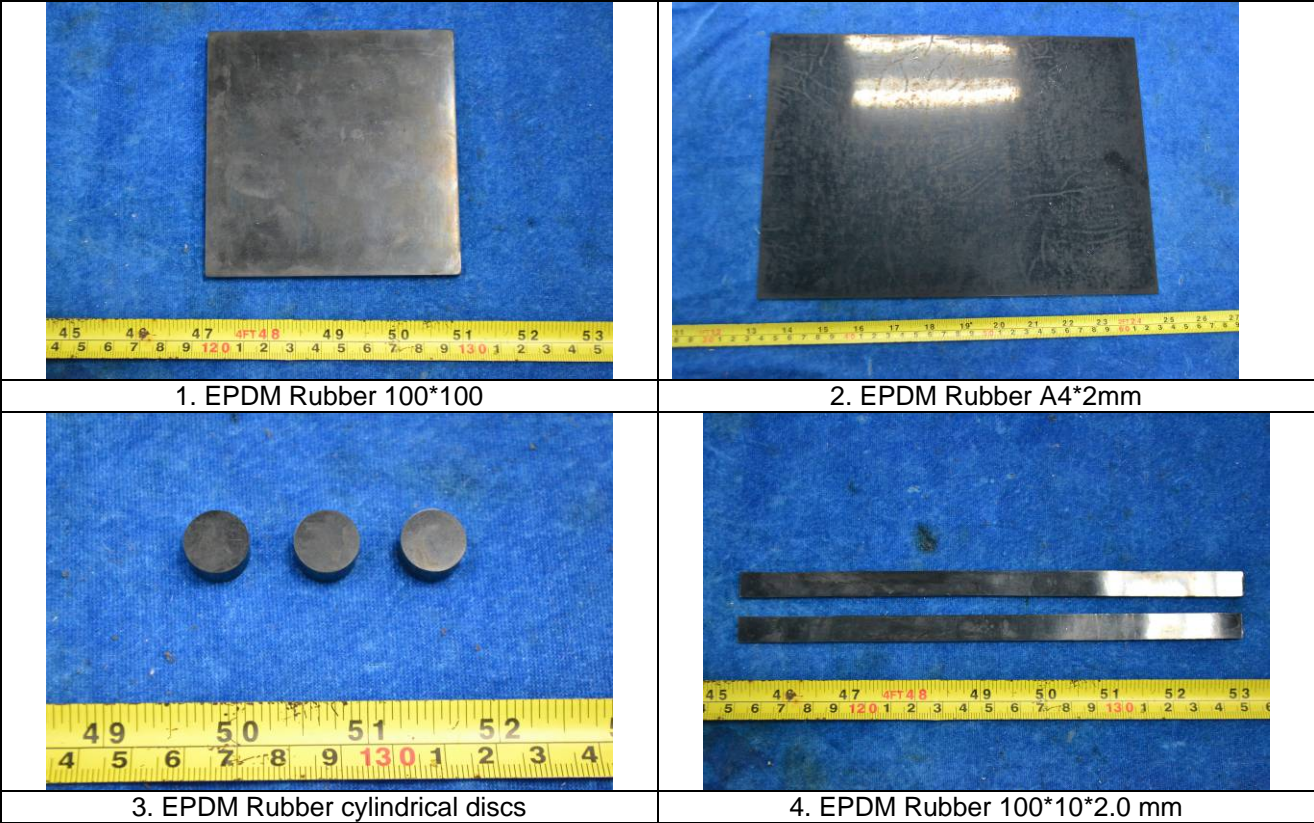
Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China  
Tel: 86 20 8213 9688 Fax: 86 20 3205 7538 [www.intertek.com](http://www.intertek.com)

EN681-1:1996+ A3: 2005			
No.	Requirement - Test	Result - Remark	Verdict
8	<p>Ozone resistance</p> <p>According to Clause 4.2.9 of EN681-1:1996+ A3: 2005.</p> <p>When determined by the method specified in ISO 1431-1 under the conditions set out below:</p> <p>Ozone concentration (50 ± 5) p.p.h.m  Temperature (40 ± 2) °C  Pretension time (72<sup>0</sup><sub>-2</sub>)h  Exposure time (48<sup>0</sup><sub>-2</sub>)h  Elongation (20 ± 2) %  Relative humidity (55 ± 10) %</p> <p>The ozone resistance of vulcanized rubber sealing elements which are attached to the pipe or fittings shall comply with the requirements given in Table 2.</p> <p>Requirement:  No cracking when viewed without magnification.</p>	<p>The Number Of Test Pieces Tested: 2</p> <p>No cracking when viewed without magnification.</p>	P

\*\*\*\*\*End of Page\*\*\*\*\*



**Appendix A**  
**Product photos**



\*\*\*\*\*End of Page\*\*\*\*\*

**Appendix B**  
**Revision page**

<b>Revision No.</b>	<b>Date</b>	<b>Changes</b>	<b>Author</b>	<b>Reviewer</b>
0	April 29, 2016	First issue	Jesse Deng	Jones Zhong

\*\*\*\*\*End of Report\*\*\*\*\*