

TYPE TEST REPORTS FOR GR-S (100A)



YOUNG NAM METAL CO., LTD



1. APPLICANT INFORMATION

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2. EQUIPMENT UNDER TEST(EUT) INFORMATION

- EUT Name : Mechanical Joint (Pipe Coupling)
- Model : GR-S (100A)
- Design Pressure : 1.6 Mpa
- Manufactrer : Young Nam Metal Co., Ltd
- Adress : 12-3 Chillye-Ro 74 Chillye-Myun, Kimhae-City,
Kyoung-Nam,,621-884 Republic of Korea



3. TEST INFORMATION

- Test Date : November 19, 2013 ~ April 04, 2014
- Report Issued : April 08, 2014
- Test Standard : IACS Req. 2001/Rev.3 2012

4. TEST RESULTS SUMMARY

ITEM	TEST STANDARD	RESULT
Tightness test	UR P2.11.5.5.1 Tightness test	Satisfactory
Vibration test	UR P2.11.5.5.2 Vibration test	Satisfactory
Pressure pulsation test	UR P2.11.5.5.3 Pressure pulsation test	Satisfactory
Burst pressure test	UR P2.11.5.5.4 Burst pressure test	Satisfactory
Pull-out test	UR P2.11.5.5.5 Pull-out test	Satisfactory
Fire endurance test	UR P2.11.5.5.6 Fire endurance test	Satisfactory
Vacuum test	UR P2.11.5.5.7 Vacuum test (Refer to the "Standard for Certification-No.2.9. Type Approval Programme 5-792.20", DNV Rule)	Satisfactory
Repeated assembly test	UR P2.11.5.5.8 Repeated assembly test	Satisfactory



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1. TIGHTNESS TEST

1.1 TEST METHOD

- UR P2.11.5.5.1 Tightness test

1.2 TEST PROCEDURE

1.2.1 TEST EQUIPMENT

No	Item	Manufacturer	Model	Serial No.	Calibration Due
1	Dial Manometer	WISE	(0~10)Mpa	1101012335	13.09.25

1.2.2 TEST SETUP



Photo 1-1. Setup of the test specimen



1.2.3 TEST PROCEDURE

- Pressure inside the joint assembly is to be slowly increased to 1.5 times of design pressure.

This test pressure is to be retained for a minimum period of 5 minutes.

: Design pressure : 1.6 MPa → Test pressure : 2.4 MPa (24.5 kg/cm²)



Photo 1-2. Test Pressure of Tightness Test

1.3 REQUIREMENTS

- In the event where there is a drop in pressure or there is visual indication of leakage, the test shall be repeated for two test specimens.



1.4 TEST RESULTS

No	Check Point	Result	Remarks
1	Actual test pressure	2.4 MPa	—
2	Tight at test pressure during Tightness Test?	Yes	—

1.5 CONCLUSION : Satisfactory

- During the tightness test, there is not a drop in pressure or visul indication of leakage.



2. PRESSURE PULSATION TEST

2.1 TEST METHOD

- UR P2.11.5.5.3 Pressure pulsation test

2.2 TEST PROCEDURE

2.2.1 TEST EQUIPMENT

No	Item	Manufacturer	Model	Serial No.	Calibration Due
1	Pressure Transmitter	WIKE	(0~16)Mpa	1104UT2V	13.10.28

2.2.2 TEST SETUP

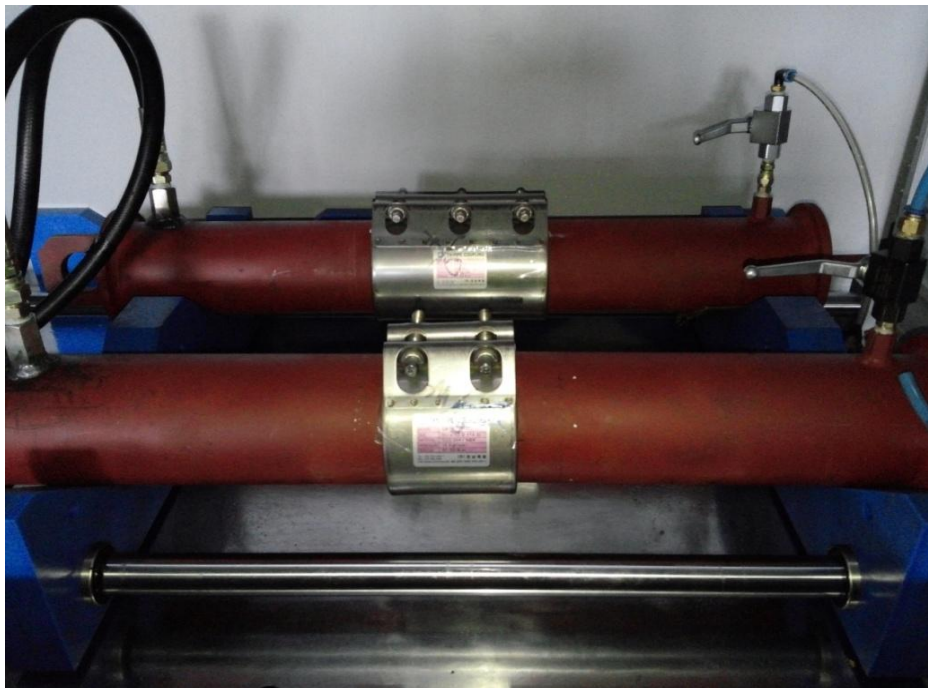


Photo 2-1. Setup of the test specimen



2.2.3 TEST PROCEDURE

- Impulse pressure is to be raised from 0 to 1.5 times the design pressure of the joint with a frequency equal to 30 ~ 100 cycles per minute.

The number of cycles is not be less than 5×10^5 .

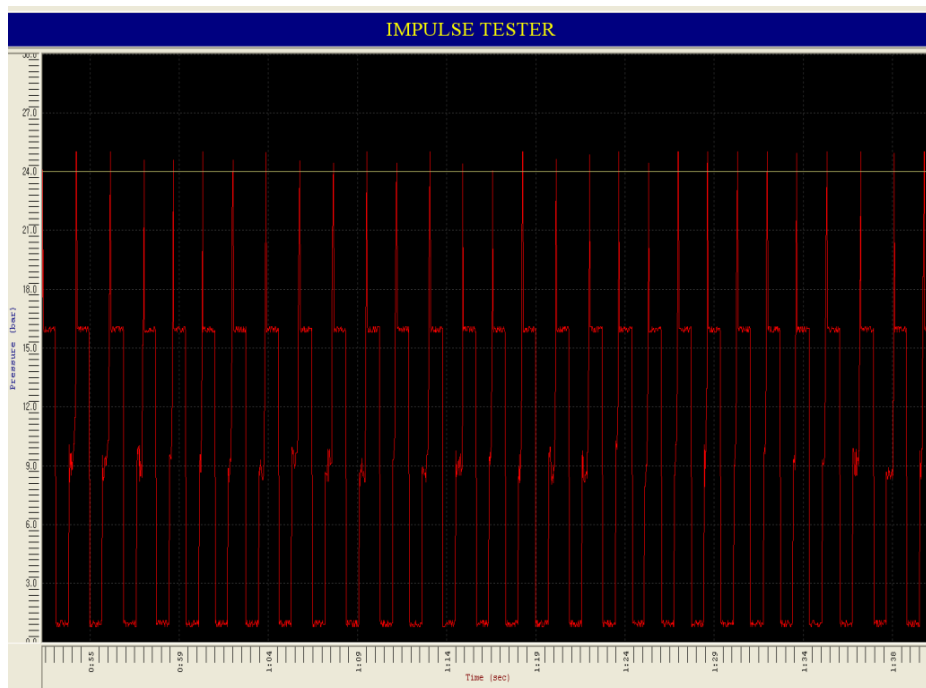


Photo 2-2. The beginning of Pressure Pulsation Test

2.3 REQUIREMENTS

- In the event where there is a drop in pressure or there is visual indication of leakage, the test shall be repeated for two test specimens.



2.4 TEST RESULTS

No	Check Point	Result	Remarks
1	Actual test pressure	2.4 MPa	—
2	Pressure Pulsation at test pressure during Tightness Test?	Yes	—

2.5 CONCLUSION : Satisfactory

- During the tightness test, there is not a drop in pressure or visul indication of leakage.



Photo 2-3. No sign of leakage or damage



3. BURST PRESSURE TEST

3.1 TEST METHOD

- UR P2.11.5.5.4 Burst pressure test

3.2 TEST PROCEDURE

3.2.1 TEST EQUIPMENT

No	Item	Manufacturer	Model	Serial No.	Calibration Due
1	Dial Manometer	WISE	(0~10)Mpa	1101012335	13.09.25

3.2.2 TEST SETUP

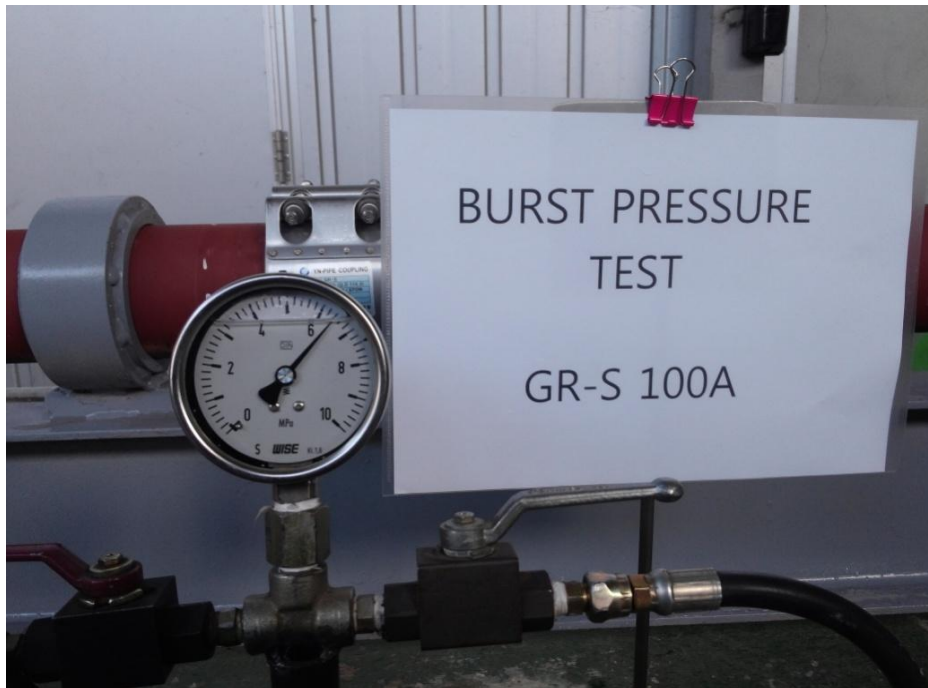


Photo 3-1. Setup of the test specimen



3.2.3 TEST PROCEDURE

- Mechanical joint test specimen is to be connected to the pipe or tubing filled with test fluid, de-aerated and pressurized to test pressure with an increasing rate of 10 % per minute of test pressure.
- Duration of this test is not to be less than 5 minutes at the maximum pressure (4 times of design pressure).
: Design pressure : 1.6 MPa → Test pressure : 6.4 MPa



Photo 3-2. The Pressure of Burst Pressure Test

3.3 REQUIREMENTS

- The specimen may have small deformation whilst under test pressure, but no leakage or visible cracks are permitted.



3.4 TEST RESULTS

No	Check Point	Result	Remarks
1	Actual test pressure	6.4 MPa	—
2	Tight at test pressure during Burst Pressure Test?	Yes	—

3.5 CONCLUSION : Satisfactory

- During the burst pressure test, there is not leakage of visible cracks.



4. PULL-OUT TEST

4.1 TEST METHOD

- UR P2.11.5.5.5 Pull out test

4.2 TEST PROCEDURE

4.2.1 TEST EQUIPMENT

No	Item	Manufacturer	Model	Serial No.	Calibration Due
1	Electrical power meter	CAS	LSU-200t	1207LSU0303001	13.08.21

4.2.2 TEST SETUP



Photo 4-1. Setup of the test specimen



4.2.3 TEST PROCEDURE

- The test assembly shall be pressurized to maximum allowable working pressure, and while under pressure it shall be subject to an axial load calculated according to the following formulae : $L = \pi/4 * D^2 * P$

D = tube outside diameter.

p = maximum allowable working pressure in N/mmf.

L = applied axial load in N

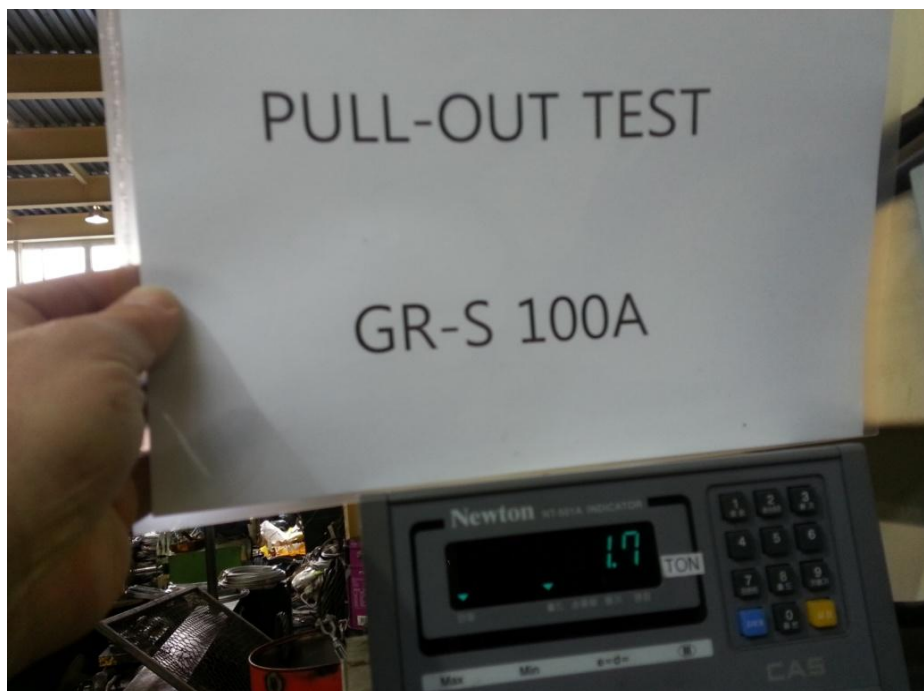


Photo 4-2. Pull-out Test

4.3 REQUIREMENTS

- No leakage, damage or relative movement between coupling and tube is permitted.



4.4 TEST RESULTS

No	Check Point	Result	Remarks
1	Actual test pressure	1.7 MPa	—
2	Tight at test pressure during Pull-out Test?	Yes	—

4.5 CONCLUSION : Satisfactory

- During the burst pressure test, there is not leakage of visible cracks.

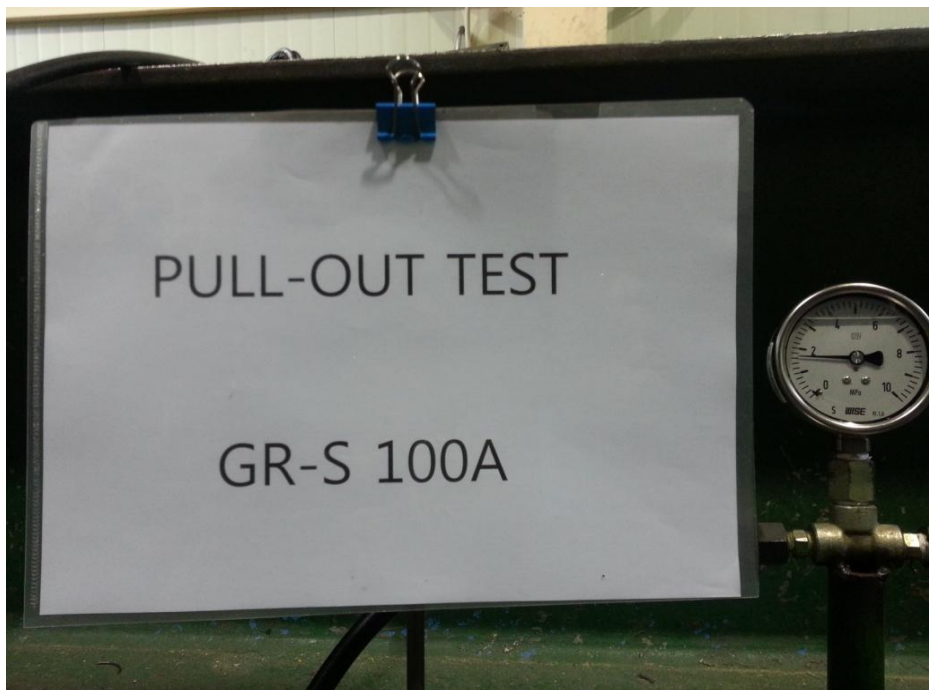


Photo 4-3. No sign of leakage or damage



5. FIRE ENDURANCE TEST

5.1 TEST METHOD

- UR P2.11.5.5.6 Fire endurance test

5.2 TEST PROCEDURE

5.2.1 TEST EQUIPMENT

No	Item	Manufacturer	Model	Serial No.	Calibration Due
1	Bimetal Thermometer	DAEWON	(0~150)°C	1	13.09.25
2	Bimetal Thermometer	DAEWON	(0~150)°C	2	13.09.25
3	Digital Thermometer	BK PRECISION	715	RS-232	13.09.25
4	Dial Manometer	WISE	(0~10)MPa	1101012335	13.09.25
5	Dial Manometer	WISE	(0~10)MPa	1101012329	13.09.25
6	Dial Manometer	WISE	(0~10)MPa	1101003722	13.09.25
7	Dial Manometer	WISE	(0~2.5)MPa	1112005303	13.09.25

5.2.2 TEST SETUP

- The test specimen shall be installed on the test bench such that the burner extends beyond the test specimen by at least 20 mm on all sides and that the test specimen is completely enclosed by the flames.

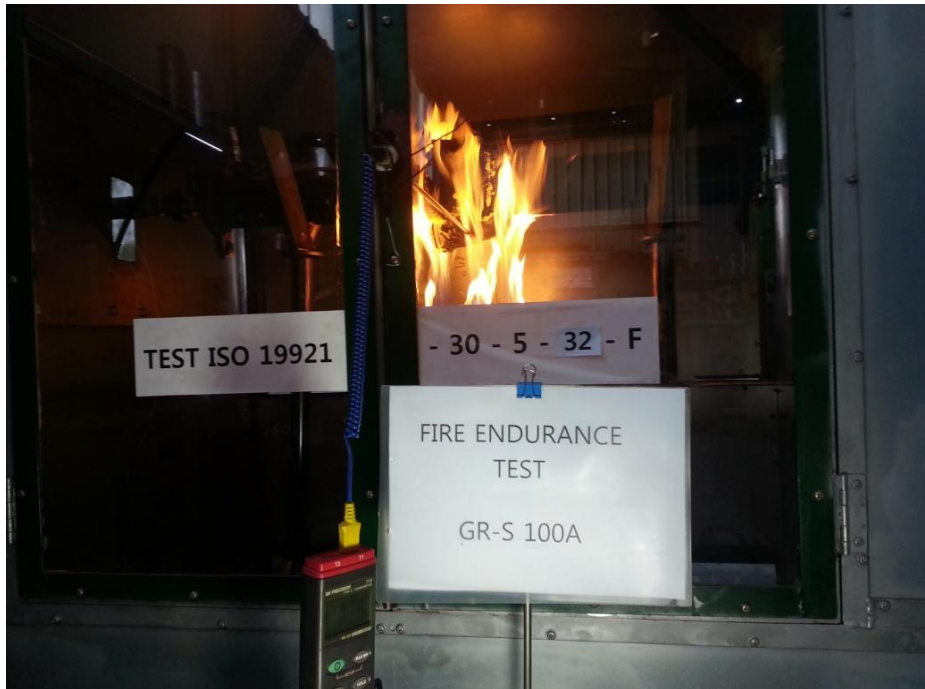


Photo 5-1. Setup for Fire Endurance Test

5.2.3 TEST PROCEDURE

- The temperatures according Table 4-1 shall be adhered to throughout the test. To ensure the water temperatures are maintained as indicated, the velocity of flow shall be controlled accordingly.
- The test specimen shall be subjected to a working pressure of at least 500 kPa \pm 20 kPa (5 bar \pm 0.2 bar) for the test.
- The duration of the test shall be 30 min.

Table 5-1. Parameter control and temperature of test

Parameter		Range	Remarks
Temperature of flowing water at	temperature measuring inlet	80 °C \pm 2 °C	-
	temperature measuring outlet	max. 85 °C	-
Temperature of flame at temperature measuring below centre of test specimen		800 °C \pm 50 °C	Temperature 15mm +5/0 mm below test specimen



Photo 5-2. Under Flame Test



Photo 5-3
Inlet Temperature



Photo 5-4
Outlet Temperature



Photo 5-5
Piping Pressure

- At the end of flame application, the test specimen shall be subjected to proof pressure at ambient temperature for 5 min. The proof pressure shall be at least 1.5 times the nominal or working pressure.

(If the fire test is conducted with circulating water at a pressure different from the design pressure of the joint (however of at least 5 bar) the subsequent pressure test is to be carried out to twice the design pressure.)

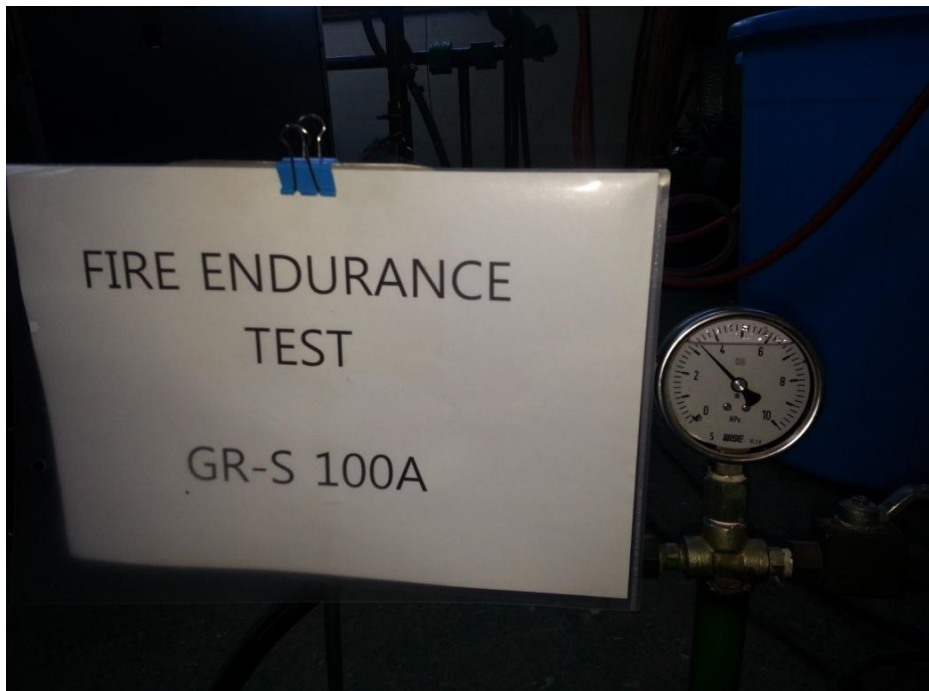


Photo 5-5. Under Pressure Test

5.3 REQUIREMENTS

- The test specimen is considered to have passed the test when it remains tight during the flame test and when subjected to proof pressure after flame application.

5.4 TEST RESULTS

No	Check Point	Result	Remarks
1	Water temperature at test specimen inlet	81 °C	—
2	Water temperature at test specimen outlet	80 °C	—
3	Flame temperature below centre of test specimen	807 °C	—
4	Actual test duration	30 min	—
5	Actual test pressure	3.3 MPa	—
6	Tight at test pressure after flame application?	Yes	—



5.5 CONCLUSION : Satisfactory

- After completing the fire test, the results of pressure test are satisfied and no leakage or visible cracks are observed.



Photo 5-6. No leakage or visible cracks



6. VACUUM TEST

6.1 TEST METHOD

- UR P2.11.5.5.7 Vacumm test

(Refer to the "Standard for Certification-No.2.9 Type Approval Programme 5-792.20", DNV Rule)

6.2 TEST PROCEDURE

6.2.1 TEST EQUIPMENT

No	Item	Manufacturer	Model	Serial No.	Calibration Due
1	Dial type vacumm gauges	WISE	(0~-0.1)Mpa	C130306832	13.09.25

6.2.2 TEST SETUP



Photo 6-1. Setup of the test specimen



6.2.3 TEST PROCEDURE

- A pressure of 0.03 MPa shall be applied and test assembly shall then be isolated from vacuum pump.



Photo 6-2. Test Pressure of Vacuum test

- This pressure is to be retained for a period of 15 minutes.
- Pressure is to be monitored during the test.

6.3 REQUIREMENTS

- No internal pressure rise is permitted.



6.4 TEST RESULTS

No	Check Point	Result	Remarks
1	Actual test pressure	0.030 Mpa	—
2	No internal pressure rise at test pressure during Vacuum Test?	Yes	—

6.5 CONCLUSION : Satisfactory

- During the vacuum test, there is not internal pressure rise.



7. REPEATED ASSEMBLY TEST

7.1 TEST METHOD

- UR P2.11.5.5.8 Repeated assembly test

7.2 TEST PROCEDURE

7.2.1 TEST EQUIPMENT

No	Item	Manufacturer	Model	Serial No.	Calibration Due
1	Dial Manometer	WISE	(0~10)Mpa	1101012335	13.09.25

7.2.2 TEST SETUP



Photo 7-1. Setup of the test specimen



7.2.3 TEST PROCEDURE

- Mechanical joint test specimen are to be dismantled and reassembled 10 times in accordance with manufacturers instructions.

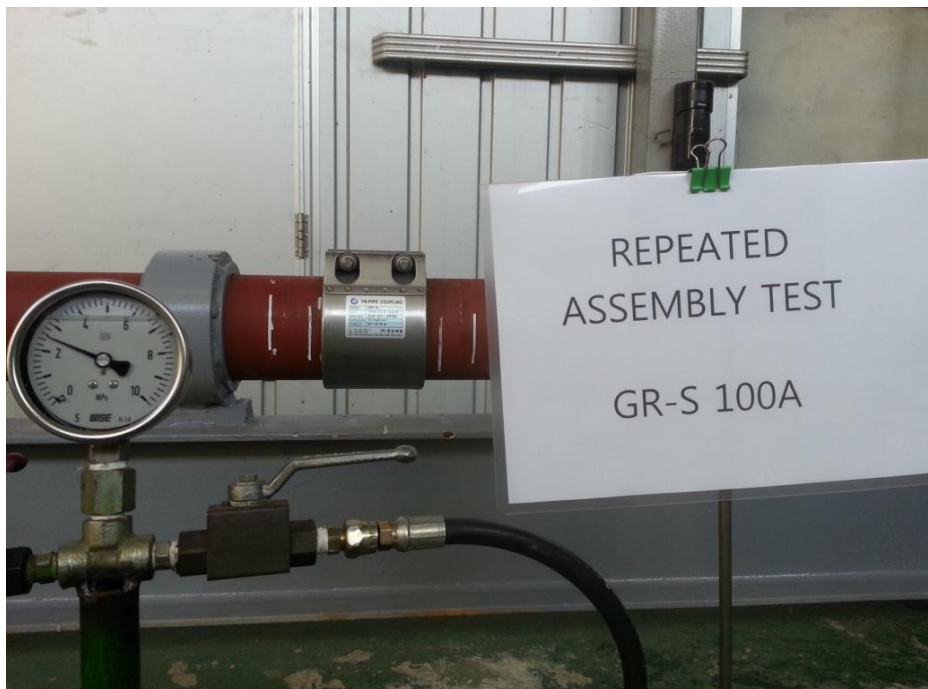


Photo 7-2. Dismantle and reassemble the test specimen

- Then subjected to a tightness test.(Refer to the "1. Tightness Test")

7.3 REQUIREMENTS

- Refer to the "1.4 REQUIREMENTS"

7.4 TEST RESULTS

- Refer to the "1.5 TEST RESULTS"

7.5 CONCLUSION : Satisfactory

- Refer to the "1.6 CONCLUSION"



APPENDIX I . DRAWING OF EQUIPMENT UNDER TEST

	GRIP RING TYPE PIPE COUPLING OUT DRAWING & DIMENSION SHEET	DATE	2013.08.19
		DWG NO	YG-5001-2

GR-S

GR-L

GR-S : GRIP RING STANDARD TYPE UNIT : mm

MODEL/N.D	D1 (OD)	D2 (RANGE)	M	φA	L	l	T	U	W.P	W	P N.m(Kgf/cm)
GR-S 20A	27.2	26-28	M6 X 40L X 2BOLTS	10	57	20	0.8	47	20	0.2	5~8 (50~80)
GR-S 25A	34.0	33-35	M6 X 40L X 2BOLTS	10	57	20	0.8	52	20	0.25	5~8 (50~80)
GR-S 32A	42.7	42-44	M8 X 45L X 2BOLTS	12	57	20	1.0	64	20	0.3	10~15 (100~150)
GR-S 40A	48.6	47-49	M8 X 45L X 2BOLTS	12	57	22	1.0	68	20	0.4	10~15 (100~150)
GR-S 50A	60.5	59-62	M10 X 65L X 2BOLTS	16	80	30	1.2	84	18	0.85	15~20 (150~200)
GR-S 65A	76.3	75-78	M10 X 65L X 2BOLTS	16	80	30	1.2	101	18	0.9	15~20 (150~200)
GR-S 80A	89.1	88-92	M12 X 75L X 2BOLTS	18	108	50	1.5	117	16	1.5	40~50 (400~500)
GR-S 100A	114.3	113-117	M12 X 75L X 2BOLTS	18	108	50	2.0	142	16	1.75	40~50 (400~500)
GR-S 125A	139.8	138-142	M14 X 90L X 2BOLTS	22	117	55	2.0	176	14	2.9	90~100 (900~1000)
GR-S 150A	165.2	163-167	M14 X 90L X 2BOLTS	22	117	55	2.0	201	14	3.1	90~100 (900~1000)
GR-S 200A	216.3	214-219	M16 X 120L X 2BOLTS	30	155	72	4.5	256	12	10.0	120~150 (1200~1500)
GR-S 250A	267.4	265-270	M16 X 120L X 2BOLTS	30	155	65	4.5	300	10	11.0	120~190 (1200~1500)
GR-S 300A	318.5	316-321	M18 X 130L X 2BOLTS	32	155	65	4.5	350	7	13.6	170~190 (1700~1900)
GR-S 350A	355.6	353-358	M18 X 130L X 2BOLTS	32	155	65	4.5	400	7	14.4	170~190 (1700~1900)

GR-L : GRIP RING LONG TYPE

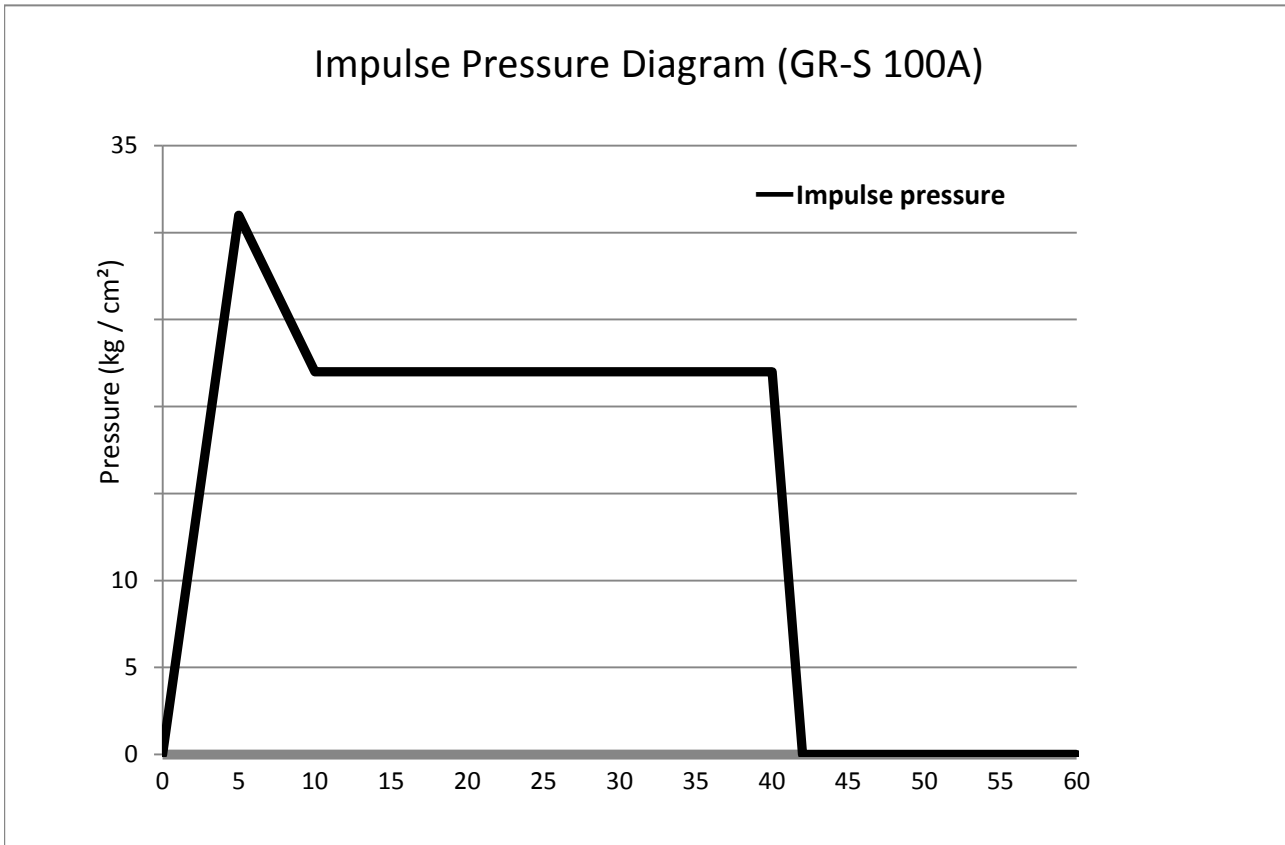
MODEL/N.D	D1 (OD)	D2 (RANGE)	M	φA	L	l	T	U	W.P	W	P N.m(Kgf/cm)
GR-L 25A	34.0	33-35	M8 X 45L X 3BOLTS	12	100	55	0.8	51	20	0.45	5~8 (50~80)
GR-L 32A	42.7	42-44	M8 X 45L X 3BOLTS	12	100	55	1.0	62	20	0.55	10~15 (100~150)
GR-L 40A	48.6	47-49	M8 X 45L X 3BOLTS	12	100	55	1.0	66	20	0.6	10~15 (100~150)
GR-L 50A	60.5	59-62	M10 X 65L X 3BOLTS	16	139	84	1.2	81	18	1.3	15~20 (150~200)
GR-L 65A	76.3	75-78	M10 X 65L X 3BOLTS	16	139	84	1.2	100	18	1.4	15~20 (150~200)
GR-L 80A	89.1	88-92	M12 X 75L X 3BOLTS	18	203	122	1.5	115	16	2.9	40~50 (400~500)
GR-L 100A	114.3	113-117	M12 X 75L X 3BOLTS	18	203	122	1.5	144	16	3.2	40~50 (400~500)
GR-L 125A	139.8	138-142	M14 X 90L X 3BOLTS	22	204	128	2.0	175	14	4.8	90~100 (900~1000)
GR-L 150A	165.2	163-167	M14 X 90L X 3BOLTS	22	204	128	2.0	196	14	5.2	90~100 (900~1000)
GR-L 200A	216.3	214-219	M16 X 120L X 3BOLTS	30	255	157	4.5	260	12	16.2	120~150 (1200~1500)
GR-L 250A	267.4	265-270	M16 X 120L X 3BOLTS	30	255	157	4.5	300	10	18.4	120~150 (1200~1500)
GR-L 300A	318.5	316-321	M18 X 140L X 3BOLTS	32	255	157	4.5	350	7	21.3	170~190 (1700~1900)

MODEL/N.D : Nominal Diameter(A)	φA : Diameter of bar washer and barnut(m/m)	P : Standard torque(N.m)
D1 : Pipe outside Diameter (m/m)	W.P : Maximum working pressure(bar)	L : Length of Coupling(m/m)
D2 : Pipe Min-Max Diameter(m/m)	l : Sealing sleeve lip's distance(mm)	W : Weight per each set(kg)
M : Tightening bolt(mm)	U : Case outside Diameter(m/m)	

NO	PART	MATERIAL	NO	PART	MATERIAL
1	CASE	SUS 304 , 316	5	BAR NUT	SUS 303 , 316
2	RUBBER	EPDM / NBR SILICON/VITON	6	BOLT	SUS 304 , 316 SCM 435
3	SLIDE PLATE	SUS 304 , 316	7	GRIP RING	SUS 301
4	BAR WASHER	SUS 303 , 316	8	INSERT WIRERING	SUS 304



APPENDIX II . IMPULSE PRESSURE DIAGRAM OF PRESSURE PULSATION TEST





APPENDIX III. TEMPERATURE CURVE OF FIRE ENDURANCE TEST

