



Test report – ISO 14903: 2017

Date of test: Jan. 17, 2019 – Feb. 19, 2019 Jan. 7, 2014 – Jan. 22, 2014 (7.11)		Test report No.: K-4105918-Z
MANUFACTURER DAIKIN INDUSTRIES, LTD Umeda Center Bldg., 2-4-12 Nakazaki-Nishi, Kita-ku, Osaka 530-8323, JAPAN.		
MANUFACTURING PLANT HIGASHIO MECH CO., LTD 8-22, Kikusui-cho, Kawachinagano-shi, Osaka 586-0012, JAPAN.		
TEST LOCATION HIGASHIO MECH CO., LTD 8-22, Kikusui-cho, Kawachinagano-shi, Osaka 586-0012, JAPAN. Osaka Research Institute of Industrial Science and Technology, Izumi center. 1-7-2, Ayumino, Izumi-city, Osaka 594-1157, Japan (for 7.6.5.4 Vibration) Chemical Evaluation and Research Institute, Japan (CERI) Osaka Laboratory 1-5-55 Aramoto-Kita, Higashiosaka City, Osaka 577-0011, Japan (for 7.11 measurement)		
REQUIREMENT ISO 14903:2017, Table 2 Other permanent piping joints: Product Family 1, 2, 3 ²⁾ Non-permanent piping joints : Product Family 4		
TECHNICAL DATA		
Product name:	Gas Tight Joint	
Sealing method:	O-ring and V-packing sealing	
Max. allowable pressure [MPa]:	4.3	
Max./Min. Allowable Temperature [deg.C]:	130 / -45	
Max./Min. Torque:	-- *1)	
Fluid:	R32, R410A	
Material:	Joint Body:	C37700 (forged)
	Nut:	C37700 (forged)
	O-ring:	EPDM
	V-packing and O-ring:	IIR
Dwg. No.:	BDGTA-1 rev.0 (Ø 6.35, Ø 9.52)	
	BDGTA-2 rev.0 (Ø 12.7 - Ø 34.92)	
	BDGTA-3 rev.0 (different size on both side)	
Sample ID	See attachment-1	
Size and group ²⁾	Product Family 1:	Ø 6.35
	Product Family 2:	Ø 9.52
	Product Family 3:	Ø 12.7, Ø 15.88
	Product Family 4:	Smallest Ø 19.05, largest Ø 34.92
PRODUCT FAMILY		
²⁾ These joints are classified into 4 product families by size according to the difference in sealing structure. (see page 2). The result of this test is applied to product family of this joint in between the range of size according to ISO 14903. (Product Family: group of products that have the same function, same technology, and same material for each functional part and sealing materials, produced according to the same specification but of a different size)		
DEFINITIONS		
Type of joints	Non- Permanent Piping Joints : Ø 6.35, Ø 9.52, Ø 12.7, Ø 15.88 Permanent joints : Ø 19.05 - Ø 34.92 Hermetically sealed joints / Closed joints	
Tightness control level	A1 / A2 / B1 / B2	
Tightening method ^{*1)}	Nuts are fastened until touch to the body and green marking on the body become invisible.	

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TESTS ISO 14903:2017, Table 2: "Non-permanent piping joints"						
(A) Product family 1: Ø 6.35 (B) Product family 2: Ø 9.52 (C) Product family 3: Ø 12.7, Ø 15.88	Tested	Not tested	Number of samples			Total (A, B, C)
			(A)	(B)	(C)	
7.4 Tightness test, before/after test below	✓		14	14	14	42
7.6 Pressure temperature vibration test	✓		3	3	3	9
7.7 Operation simulation	✓		3	3	3	9
7.8 Freezing test	✓		3	3	3	9
7.9 Pressure		✓	--	--	--	--
7.10 Vacuum test	✓		2	2	2	6
7.11 Chemical compatibility test	with R410A	✓	3	3	3	9
	with R32	✓	3	3	3	9
7.12 Fatigue test		✓	--	--	--	--
TESTS ISO 14903:2017, Table 2: "Other permanent piping joints: e.g. glue, permanent compression fittings, expansion joints"						
(D) Product family 4: Ø 19.05 - Ø 34.92	Tested	Not tested	Number of samples			Note
7.4 Tightness test, before/after test below	✓		22			
7.6 Pressure temperature vibration test	✓		3			
7.7 Operation simulation		✓	--			
7.8 Freezing test	✓		3			
7.9 Pressure	✓		3			
7.10 Vacuum test	✓		2			
7.11 Chemical compatibility test	with R410A	✓	3			
	with R32	✓	3			
7.12 Fatigue test	✓		5			
TESTS ISO 14903:2017, Table 2: "Gaskets and sealing"						
(E) Sealing materials	Tested	Not tested	Number of samples		Note	
			EPDM	IIR		
7.11 Chemical compatibility test	with R410A	✓	5	5		
	with R32	✓	5	5		
<p>Note:</p> <p>Sealing materials' evaluation to Table 16 of ISO14903 was performed in 2014 for different joint and cited in this test since rubber materials and test fluids for these joints are same.</p> <p>The detail of rubber materials and test fluids are as follows.</p> <p>Rubbers: EPDM: (Ethylene Propylene Rubber): NOK Corporation.: E116 (JIS B2401 EPDM-70) IIR: (Butyl Rubber) : NOK Corporation.: B383 (original brand of NOK)</p> <p>Test Fluids: R410A : refrigerant Daikin R410A, with 5% of IDEMITSU Daphne Hermetic Oil FVC68D R32 : refrigerant Daikin HFC32, with 5% of IDEMITSU Daphne Hermetic Oil FWC68DC</p>						

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7.4 Tightness test	7.4.2.1 / 7.4.2.2 (Alternative method)	
Test parameters / Requirement	P=4.3 MPa, No bubbles observed for more than 60 seconds	
Result / Observations	No leakage observed more than the level mentioned above before and after each 7.6, 7.8, 7.9, 7.10, 7.11, 7.12 tests.	
7.6 Pressure temperature vibration test (PTV)		
Method 1 / Method 2		
Pressure-Temperature test	n1 = 50 cycles, n2 = 200 cycles, Tmin = -45°C, Tmax = 140°C, Pmin = atm., Pmax = 4.3 MPa	
Vibration test	n3 = 2 x 10 ⁶ cycles, L=200 mm, Ø 6.35, Ø 9.52:120Hz, s = 0.3 mm (sample 6-3 tested 200Hz s=0.3mm), Ø12.7, Ø15.88, Ø19.05: 120Hz, s=0.25mm, Ø 22.22:120Hz, s=0.2mm, Ø 34.92:120Hz, s=0.15mm	
7.7 Operation simulation		
Result / Observations	Operation simulation performed in PTV test, for both side of joints. 10 times before n1, 10 times before n2, and 5 times before n3. (O-ring, V-packing changed)	
7.8 Freezing test		
Test parameters / Requirement	Initial water filling 10min. at -500mbar. Freezing cycle: -15deg.C for 30 min then 5min. in water for 30 times	
7.9 Pressure test		
Test parameters / Requirement	P = 21.5 MPa, T = 22 deg.C, Hold time = 1min. test medium: water	
Result / Observations	No leakage or deformation of joints observed.	
7.10 Vacuum test		
Test parameters / Requirement	Vacuum pressure: 6.5 kPa in absolute.	
Result / Observations	Less than 0.2kPa of pressure rise observed	
7.11 Chemical compatibility test		
Test parameters / Requirement	Material samples of EPDM and IIR for 14 days in 50 deg.C of refrigerant R410A with 5% FVC68D and separately R32 with 5% FW68DA. Joint sample's O-rings and V-packing are removed and tested in same condition above, then re-assembled and tested for 7.4.tightness test.	
Result / Observations	Changes of Hardness, volume and weight was less than maximum acceptable limit at both wet and dry condition.	
7.12 Fatigue test		
Test parameters / Requirement	n = 250,000 cycles, T = 22 deg.C, Pmin = atm, P max = 4.3 MPa, test medium: water	
Result / Observations	No leakage observed.	
NOTE: Tightening and loosening was performed for reusable joints according to 7.5.3.		
Result / Observations	The above-mentioned tests were carried out and fulfilled the requirement in ISO14903:2017 based on provisions of the stated product definition by the manufacturer.	
Manufacturer's test Report No.: GTJ-ISO14903, Sample ID No.: Attachment-1		
Place: Osaka	Date: Feb. 20, 2019	TUV Rheinland Japan Ltd. Inspector
We hereby confirmed the evaluation of performance of tightness and leakage for joints in accordance with the requirement of ISO 14903:2017 was completed based upon the definition.		  Y. Yamaguchi

The test results relate exclusively to the described test object. Partial copies of the test report without a written authorization by the test laboratory are not permitted. For the order processing we have stored essential object data and the address. The protection of the data is guaranteed.



ID No. of fittings that is used at tests are shown as below.

Sampling pcs and the ID No. for each test												
Product family	Size, Item	3.1	3.2	3.3	3.4	3.5	3.6		3.7	3.8	3.9	
		Tightness test (All test samples except 3.8 n=40)	Operation simulation (Family1, 2, 3: n=3)	PTV test (pressure temperature vibration) (Each family: n=3)	Freezing test (Each family: n=3)	Vacuum test (Each family: n=2)	Additional hemetically sealid Pressure test (Family4: n=3)		Fatigue test (Family4: n=5)	Chemical compatibility with materials (Each family: n=3) with R410A with R32		Tightness test (All test samples n=64)
Family 1	φ 6.35 socket	8	3	3	3	2	-		-	3	3	14
		6-1~10	6-1,2,3	6-1,2,3	6-4,5,6	6-7,8	-		-	6-9,10,11	6-12,13,14	6-1~14
Family 2	φ 9.52 socket	8	3	3	3	2	-		-	3	3	14
		9-1~10	9-1,2,3	9-1,2,3	9-4,5,6	9-7,8	-		-	9-9,10,11	9-12,13,14	9-1~14
Family 3	φ 12.7 socket	5	2	2	2	1	-		-	2	2	9
		12-1~6	12-1,2	12-1,2	12-3,4	12-5	-		-	12-6,7	12-8,9	12-1~9
Family 3	φ 15.88 socket	3	1	1	1	1	-		-	1	1	5
		15-1~4	15-1	15-1	15-2	15-3	-		-	15-4	15-5	15-1~5
Family 4	φ 19.05 socket	6	-	1	1	1	1		2	1	1	8
		19-1~7	-	19-1	19-2	19-3	19-4		19-5,6	19-7	19-8	19-1~8
Family 4	φ 22.22 socket	4	-	1	1	0	1		1	1	1	6
		22-1~4	-	22-1	22-2	-	22-3		22-4	22-5	22-6	22-1~6
Family 4	φ 34.92 socket	6	-	1	1	1	1		2	1	1	8
		34-1~7	-	34-1	34-2	34-3	34-4		34-5,6	34-7	34-8	34-1~8
		40	9	12	12	8	3		5	12	12	64