

TEST REPORT

1. Title of the Test : The FAT of the Fiber Optic Splice Closure
2. Test Item : BS605A-A-T1-12C, 100EA
: BS605A-A-T2-24C, 500EA
: BS605A-A-T4-48C, 200EA
3. Manufacturer : VISSEM Electronics Co., Ltd.
4. Inspector : Quality Assurance Team of VISSEM Electronics Co., Ltd.
5. Test Specification : Korea Telecom Generic Requirements KT-T24007-11-03
6. Test Period : 2011.11.21~22(Type test:2011. 02.01 ~ 2011. 02.20)
7. Inspection location : At VISSEM Factory, Korea

November 23, 2011

Reviewed by **Park Kyeong-Bae**
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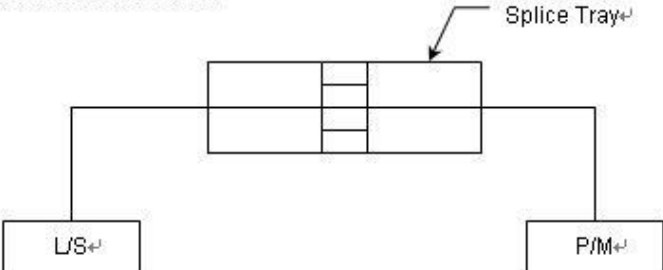
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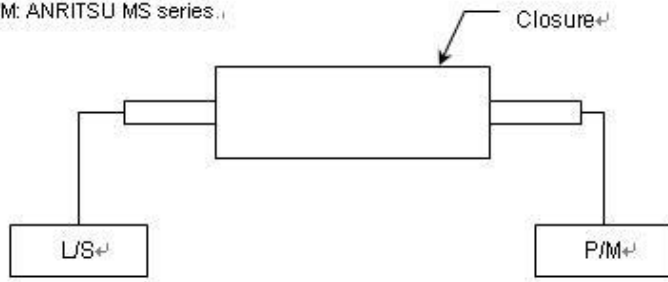
VISSEM Electronics Co., Ltd.


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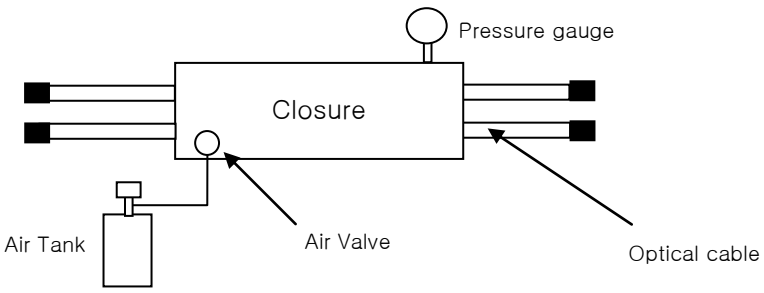
	Date	Doc No.	
	2011.02.20	TR-BS605A-111123	
Code 01	Rev	Classification	
Fiber Fixing & Assembly Test	1.0	Type Test	


Test Procedure	<ol style="list-style-type: none"> Place a cable onto a closure Splice fibers and measure the attenuation Clamp the cable and insert splice sleeves into each slit of the splice tray Store three surplus fibers in the tray and measure the attenuation loss 			
Requirements	The attenuation change should be less than ± 0.05 dB			
Test Assembly	<p>[Test Equipment], L/S: ANRITSU MS series, P/M: ANRITSU MS series.</p> 			
Test Result		Core 1	Core 2	Core 3
	Before fixing & assembly	-8.04 dBm	-8.04 dBm	-8.00 dBm
	After fixing & assembly	-8.05 dBm	-8.05 dBm	-8.01 dBm
	Optical attenuation change	0.01 dB	0.01 dB	0.01 dB
Judgment	PASS			
Remarks				

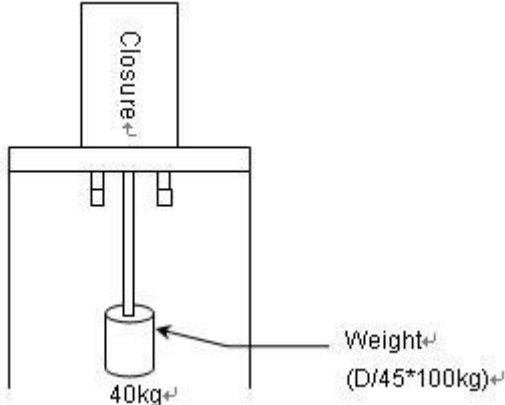
	Date	Doc No.	
	2011.02.20	TR-BS605A-111123	
Code 02	Rev	Classification	
Disassembly & Reassembly Loss Test	1.0	Type Test	


Test Procedure	1. Measure the optical loss after the fiber installation 2. Repeat assembly / reentry and the optical measurements 3 times			
Requirements	The attenuation change should be less than $\pm 0.05\text{dB}$			
Test Assembly	<p>[Test Equipment] L/S: ANRITSU MS series P/M: ANRITSU MS series</p> 			
Test Result		Core 1	Core 2	Core 3
	Before assembly	-8.11 dBm	-8.15 dBm	-8.06 dBm
	After 1 st assembly	-8.12 dBm	-8.16 dBm	-8.07 dBm
	After 2 nd assembly	-8.12 dBm	-8.15 dBm	-8.06 dBm
	After 3 rd assembly	-8.11 dBm	-8.16 dBm	-8.07 dBm
	Attenuation change	0.01 dB	0.01 dB	0.01 dB
Judgment	PASS			
Remarks				

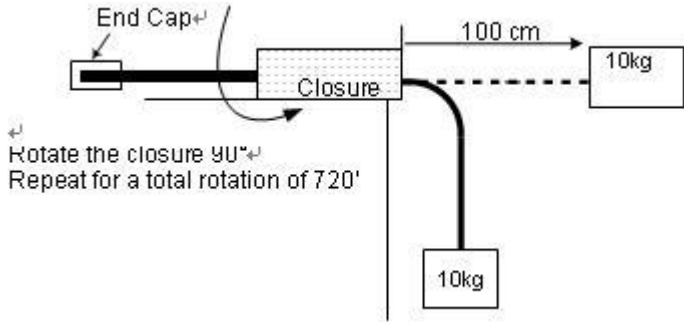
		Date 2011.11.21	Doc No. TR-BS605A-111123	
Code	03	Rev	Classification	
Air Tightness Test		1.0	Routine Test	


Test Procedure	<ol style="list-style-type: none"> 1. Pressurization of 6 psi (0.42kg/cm²) inside of the closure. 2. Maintain the conditioned closure for 30 minutes at an ambient air. 3. Check for the inner pressure of the closure. 4. Submerge the closure for 10 minutes. 5. Check the air bubbles when submerged. 		
Requirements	<ol style="list-style-type: none"> 1. No more than 1psi of pressure drop. 2. No presence of bubbles when the closure is submerged. 		
Test Assembly			
Test Result	Pressure drop	Before test	6 psi
		After test	6 psi
		Variation	0 psi
	Presence of Bubbles		None
Judgment	PASS		
Remarks			

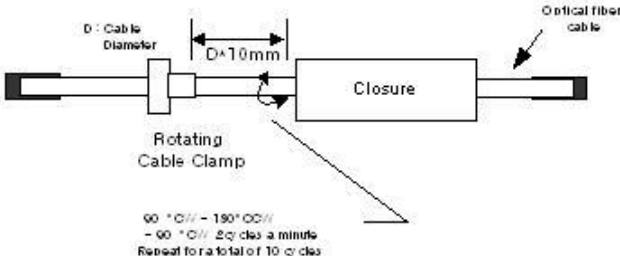
		Date 2011.11.21	Doc No. TR-BS605A-111123
Code	04	Rev	Classification
Tensile Strength Test		1.0	Routine Test


Test Procedure	<ol style="list-style-type: none"> 1. Pressurization of 6 psi (0.42kg/cm²) 2. Apply a load of D/45x100kg at 100cm point from the cable end for 8 hours (D: cable diameter in mm) 3. Check the cable pull out 4. Check the pressure drop and submerge the closure for checking the presence of bubbles 		
Requirements	<ol style="list-style-type: none"> 1. No presence of cable pullout less than 1cm 2. No more than 1PSI of pressure drop 3. No presence of bubbles when the closure is submerged 		
Test Assembly			
Test Result	Cable pullout		
	Pressure drop	Before test	6 psi
		After test	5.9 psi
		Variation	0.1 psi
Presence of Bubbles		Nonr	
Judgment	PASS		
Remarks			

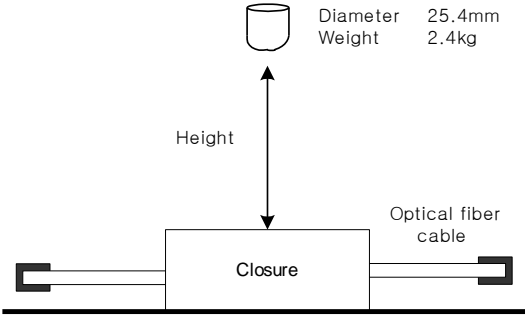
	Date	Doc No.	
	2011.11.21~22	TR-BS605A-111123	
Code 05	Rev	Classification	
Bending Test	1.0	Routine Test	


Test Procedure	<ol style="list-style-type: none"> 1. Pressurization of 6 psi (0.42kg/cm²) 2. Attach a 10kg weight to the cable 100cm from the closure end 3. Lower the weight to 90degree and maintain for 15 minutes 4. Rotate the closure 90degree and maintain for 15 minutes 5. Repeat the steps for a total closure rotation of 720degree 6. Check the pressure drop and the presence of bubbles when the closure is submerged 		
Requirements	<ol style="list-style-type: none"> 1. No presence of mechanical damage to the closure 2. No more than 1psi of pressure drop 3. No presence of bubbles when the closure is submerged 		
Test Assembly	 <p>Rotate the closure 90° Repeat for a total rotation of 720°</p>		
Test Result	Mechanical Damage		None
	Pressure drop	Before test	6 psi
		After test	5.8 psi
		Variation	0.2 psi
Presence of Bubbles		None	
Judgment	PASS		
Remarks			

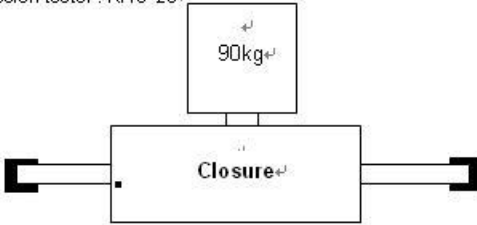
		Date 2011.11.21~22	Doc No. TR-BS605A-111123	
Code	06	Rev	Classification	
Torsion Test		1.0	Routine Test	


Test Procedure	<ol style="list-style-type: none"> 1. Condition the closure for 2 hrs at an ambient temperature of $-20\pm 2^{\circ}\text{C}$ and pressurization of 6 psi 2. Twist the cable for a total of 10cycles at a distance of D (D:cable diameter)$\times 10\text{mm}$ from the closure end 3. 1cycle=CW90°- CCW180°- CW90°, two cycles per minute 4. Check the mechanical damage on the closure end 5. Check the pressure drop 6. Submerge the closure for checking the bubbles 7. Repeat the test after aging at $40\pm 2^{\circ}\text{C}$ 			
Requirements	<ol style="list-style-type: none"> 1. No presence of mechanical damage to the closure inlet port 2. No more than 1psi of pressure drop 3. No presence of bubbles when the closure is submerged 			
Test Assembly	<p>[Test Equipment] Torsion tester :DTF-510Series</p>  <p>90° CW / - 180° CCW - 90° CW / 2 cycles a minute Repeat for a total of 10 cycles</p>			
Test Result			$-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$	$40^{\circ}\text{C}\pm 2^{\circ}\text{C}$
	Mechanical damage		None	None
	Pressure drop	Before test	6 psi	6 psi
		After test	6.4 psi	5.6 psi
		Variation	0.4 psi	0.4 psi
Presence of Bubbles		None	None	
Judgment	PASS			
Remarks				

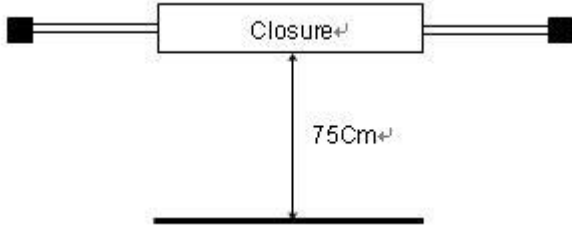
	Date	Doc No.	
	2011.11.21~22	TR-BS605A-111123	
Code 07	Rev	Classification	
Impact Test	1.0	Routine Test	


Test Procedure	<ol style="list-style-type: none"> 1. Condition the closure for 2hrs at an ambient temperature of $-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 2. Pressurize the closure with 6psi Nitrogen gas within 10minutes 3. Impact the closure from 1m height using an impact device with weight 2.4 kg, diameter 2.54cm, spherical radius at the point of contact 4. Check the mechanical damage, pressure drop and air bubbles when the closure is submerged. 			
Requirements	<ol style="list-style-type: none"> 1. No presence of mechanical damage to the closure 2. No more than 1psi of pressure drop 3. No presence of bubbles when the closure is submerged 			
Test Assembly				
Test Result			$-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$	
	Mechanical damage		None	
	Pressure drop	Before test	6 psi	
		After test	5.8 psi	
		Variation	0.2 psi	
Presence of Bubbles		None		
Judgment	PASS			
Remarks				

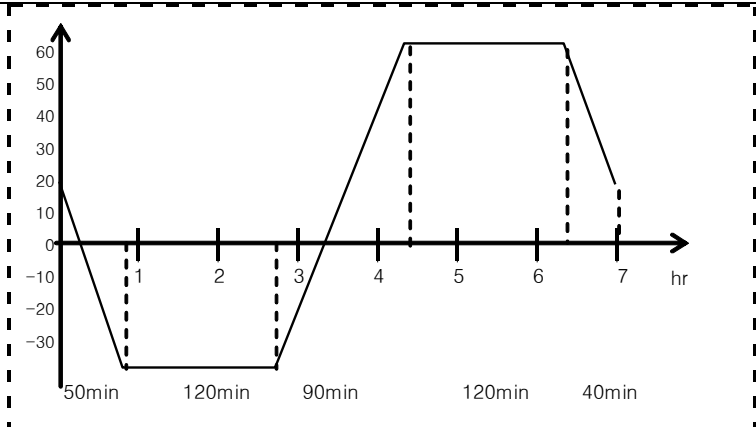
		Date 2011.11.21~22	Doc No. TR-BS605A-111123	
Code	08	Rev	Classification	
Compression Test		1.0	Routine Test	


Test Procedure	<ol style="list-style-type: none"> Condition the closure for 2 hours at an ambient temperature of $-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$ Pressurization of 6psi within 10minutes Apply a 90kg weight on 5cm^2 area of the top of the closure for 15minutes Check the mechanical damage, pressure drop and air bubbles when the closure is submerged. Repeat the procedure after aging at an ambient temperature of $40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 			
Requirements	<ol style="list-style-type: none"> No presence of mechanical damage to the closure No more than 1psi of pressure drop No presence of bubbles when the closure is submerged 			
Test Assembly	<p>[Test Equipment]↵ Tensile/compression tester : KHU-20↵</p> 			
Test Result		$-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$	$40^{\circ}\text{C}\pm 2^{\circ}\text{C}$	
	Mechanical damage	None	None	
	Mechanical deformation	None	None	
	Pressure drop	Before test	6 psi	6 psi
		After test	6.4 psi	5.7 psi
		Variation	0.4 psi	0.3 psi
Presence of bubbles	None	None		
Judgment	PASS			
Remarks				

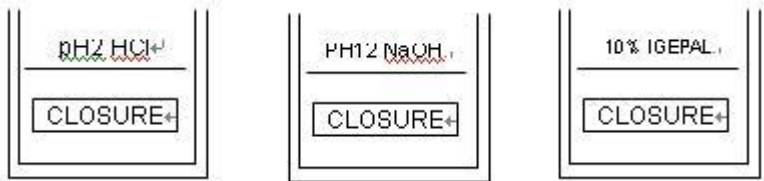
	Date	Doc No.	
	2011.11.21~22	TR-BS605A-111123	
Code 09	Rev	Classification	
Drop Test		1.0	Routine Test


Test Procedure	<ol style="list-style-type: none"> 1. Condition the closure for 2hours at $-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 2. Raise the closure to a height of 75cm 3. Drop the closure onto a concrete floor within 1minute 4. Check the mechanical damage, pressure drop and air bubbles when the closure is submerged. 		
Requirements	<ol style="list-style-type: none"> 1. No mechanical damage such as cracks or fractures 2. No more than 1psi of pressure drop 3. No presence of bubbles when the closure is submerged 		
Test Assembly			
Test Result			$-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$
	Mechanical damage		None
	Pressure drop	Before test	6 psi
		After test	6 psi
		Variation	0 psi
Presence of Bubbles		None	
Judgment	PASS		
Remarks			

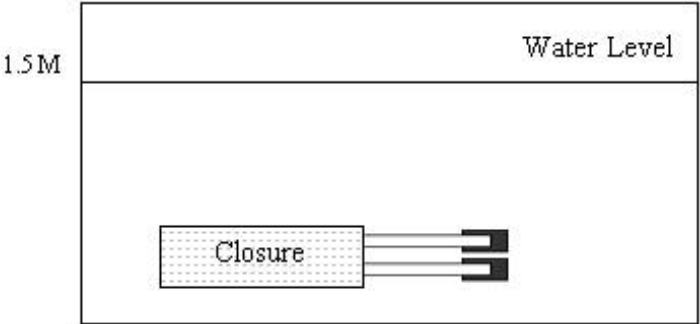
	Date	Doc No.	
	2011.02.01~07	TR-BS605A-111123	
Code 10	Rev	Classification	
Thermal Cycling Test	1.0	Type Test	


Test Procedure	<ol style="list-style-type: none"> 1. Splice 3cores and measure the optical loss after closure assembly 2. Place the spliced closure in a chamber 3. Operate the chamber using the cycle shown in test assembly figure for a total of 20 cycles: 7hrs per cycle 4. Check the fiber attenuation change 5. Perform the air tightness test 				
Requirements	<ol style="list-style-type: none"> 1. No greater than ± 0.1 dB of attenuation change 2. No presence of bubbles when the closure is submerged 				
Test Assembly					
Test Result	Attenuation Change		Before	After	Variation
		Core 1	-8.09dBm	-8.11dBm	0.02 dB
		Core 2	-8.12dBm	-8.15dBm	0.03 dB
	Core 3	-8.12dBm	-8.15dBm	0.03 dB	
Presence of Bubbles	None				
Judgment	PASS				
Remarks					

	Date	Doc No.	
	2011.02.10~15	TR-BS605A-111123	
Code 11	Rev	Classification	
Chemical Resistance Test	1.0	Type Test	

Test Procedure	<ol style="list-style-type: none"> 1. Pressurization of 6psi inside of the closure 2. Solution: pH2 HCl, pH12 NaOH, 10% IGEPAL 3. Immerse each closure in each of the three fluids for 120 hrs 4. Check the pressure loss and air bubbles when the closure is submerged 5. Perform the impact test and compression test 				
Requirements	<ol style="list-style-type: none"> 1. No presence of corrosion and deformation 2. Pressure loss should be less than 1psi 3. No presence of air bubbles when the closure is submerged 4. No mechanical damage (deformation, fracture, breakage) 				
Test Assembly					
Test Result		pH2 HCl	pH12 NaOH	IGEPAL	
	Deformation & Corrosion		None	None	None
	Pressure drop	Before	6.0 psi	6.0 psi	6.0 psi
		After	5.7 psi	5.6 psi	5.8 psi
		Variation	0.3 psi	0.4 psi	0.2 psi
	Presence of Bubbles		None	None	None
Mechanical Damage		None	None	None	
Judgment	PASS				
Remarks					

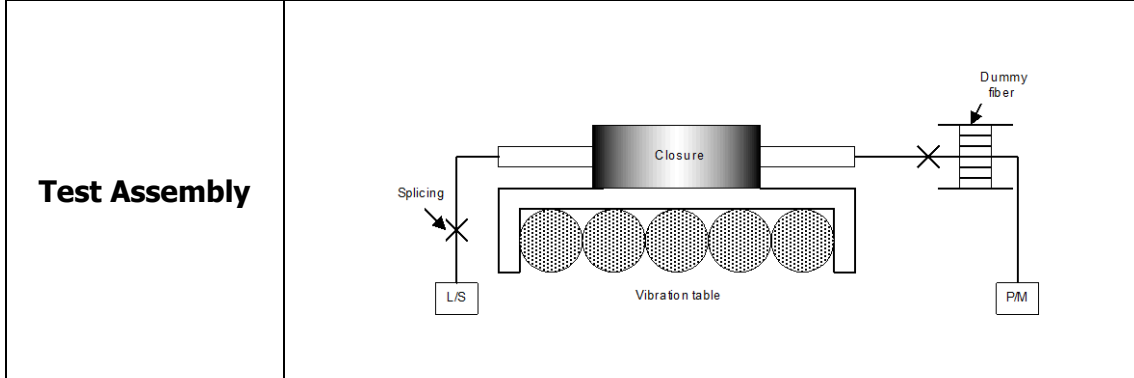
	Date	Doc No.	
	2011.02.01~20	TR-BS605A-111123	
Code 12	Rev	Classification	
Water Immersion Test	1.0	Type Test	

Test Procedure	<ol style="list-style-type: none"> 1. Place the assembled closure to be tested into the 1.5m water tank 2. The closure doesn't need to be pressurized. 3. Maintain the closure for 20days 4. After 20days, remove the closure and rinse with clean water 5. Dry the outside of the closure 6. Open the closure and check for the presence of water intrusion 	
Requirements	No presence of water intrusion	
Test Assembly	 <p>The diagram shows a rectangular container representing a water tank. A horizontal line near the top is labeled 'Water Level'. On the left side, a vertical dimension line indicates a height of '1.5M'. Inside the tank, at the bottom, is a rectangular component labeled 'Closure' with a dotted texture. Three horizontal lines extend from the right side of the closure to a vertical bar, representing a connection or support structure.</p>	
Test Result	Presence of Water Intrusion	None
Judgment	PASS	
Remarks		

		Date 2011.02.20	Doc No. TR-BS605A-111123
Code 13		Rev	Classification
Vibration Test		1.0	Type Test

Test Procedure	<ol style="list-style-type: none"> 1. Prepare two closure samples (for air tightness & optical loss check) 2. Pressurization of 6psil inside of the closure for air tightness test 3. Measure the optical loss of three fibers after splicing and closure assembly 4. After fixing the closure on to the tester and vibrate the closure for 2hours with amplitude 1mm, frequency 5-55-5Hz/2min and measure the optical loss in every 30minutes 5. After vibration, check the pressure drop and bubbles when the closure is submerged
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Requirements	<ol style="list-style-type: none"> 1. Optical loss: less than $\pm 0.5\text{dB}$ (during vibration), less than $\pm 0.1\text{dB}$(after vibration) 2. Pressure loss should be less than 1psi 3. No presence of air bubbles when the closure is submerged
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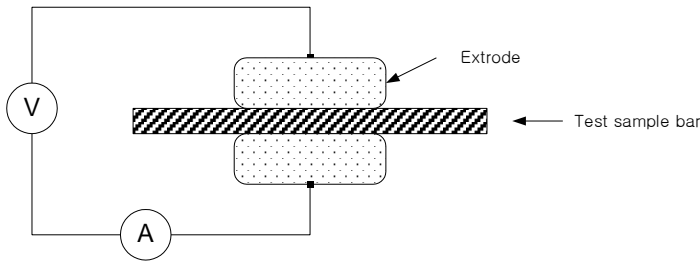


Test Result	Optical Loss		Before	30min	60min	90min	After	Variation
		Core 1	-8.01dBm	-8.02dBm	-8.03dBm	-8.03dBm	-8.03dBm	0.02 dB
		Core 2	-8.01dBm	-8.03dBm	-8.02dBm	-8.01dBm	-8.013Bm	0.02 dB
		Core 3	-8.03dBm	-8.01dBm	-8.03dBm	-8.01dBm	-8.02dBm	0.02dB
	Pressure loss	Before	6 psi					
	After	5.7 psi						
	Variation	0.3 psi						
	Presence of Bubble	None						

Judgment	PASS
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Remarks	
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		Date 2011.11.21	Doc No. TR-BS605A-111123	
Code	14	Rev	Classification	
Insulation Resistance Test		1.0	Routine Test	

Test Procedure	<ol style="list-style-type: none"> 1. Apply 10 kV DC for a minute to the closure sample bars 2. Check the insulation break 		
Requirements	No presence of insulation break		
Test Assembly			
Test Result	Presence of insulation break	None	
Judgment	PASS		
Remarks			

Test Equipment

Technology Status
Testing Equipment Status

UV resistance	Fire resistance	Torsion	Impact
			
Vibration	Temperature	Water Spray	Compression
			


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Technology Status
Testing Equipment Status

Vending	Immersion	Temperature	Fusion Splicer
			
Electrical	Insulation	Optical switch	Power meter
			


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