

PRODUCT SPECIFICATION

		No. T-1-1330-1 (R-1-1330-1)	Date Issued: November 25, 1997
Customer:	GENERAL	Revised: C	Date Revised: August 5, 2010
Title Subject:	Insulated Closed-end Solderless Splices (CE type, V-0 grade)		Issued by: Osaka Engineering Center

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This product specification contains the results of performance tests for the insulated closed-end solderless splices [JIS C 2807 standard (CE type), V-0 grade].

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1. PART NAME & PART NUMBER

Part Name		Part Number (Note ₁)
Insulated closed-end solderless splices	V-0 grade	CE1 (CE-100V)
		CE2 (CE-230V)
		CE5 (CE-550V)

Note₁: The part numbers in parenthesis indicate JST part numbers by which UL94V-0 materials are identified.

2. CONSTRUCTION, DIMENSIONS, MATERIAL & SURFACE FINISH

Construction and dimensions shall be in accordance with the referenced drawing. Material and surface finish shall be as specified below.

Part Name	Material	Surface Finish, etc.
Cap (Insulator)	PA 6	V-0 grade [Color: Natural (White)]
Sleeve	Oxygen-free copper	Tin-plated: 1μ m min.

3. APPLICABLE WIRE

Part Number	Core wire part (Total cross-sectional area)
CE1	0.5 to 1.75mm ²
CE2	1.0 to 3.0mm ²
CE5	2.5 to 6.0mm ²

Note₂: When inserting wires into a splice, each wire shall be slightly twisted.

Note₃: As a rule, applicable wires shall be strands wires or complex wires.

Note₄: When crimping wires that have different conductor diameters each, as a rule, the smaller conductor diameter shall be bigger than half size of the bigger one.

Note₅: Crimping tools specified by JST shall be used and applicable to the splice.

4. TEMPERATURE RANGE

Temperature range	-25 to 90°C (Including temperature rise in applying current)
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5. SPECIMEN

Part Number	Pneumatic hand tool	Dies Part Number
CE1 (CE-100V)	YA-2	AD801
CE2 (CE-230V)	YA-2	AD802
CE5 (CE-550V)	YA-2	AD803

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6. TEST CONDITIONS

- 1) When tested in accordance with the test condition and method specified in JIS C 2807, each requirement specified in each item shall be met.
- 2) Unless otherwise specified, tests shall be conducted at a temperature of 5 to 35°C and relative humidity of 45 to 85% specified in JIS Z 8703 (Standard Atmospheric Conditions for Testing). However, temperature rise and overcurrent cycle tests shall be conducted in a draft free air at 15 to 35 °C.
- 3) The test shall be conducted using the specimens prepared in accordance with the combination given in Table-1. The wires used (Note₆) shall be of new ones, the covering on necessary part for connection is removed, the combined wires are slightly twisted together, and then connected by crimping with an applicable tool. If 3 or more wires are connected in this procedure, 2 wires are left and the other(s) are cut off (Note₇) at a place where no effect on the test is anticipated.

Note₆: The wires shall be non-metal-coated wires specified in JIS C 3306 [P.V.C. insulated cords for electrical appliances] or JIS C 3316 [P.V.C. insulated wires for electrical apparatus (KIV)].

Note₇: After crimp-style connection, 2 wires of the same size are left and the other(s) are cut off at a place about 10 mm from the opening end of insulation.

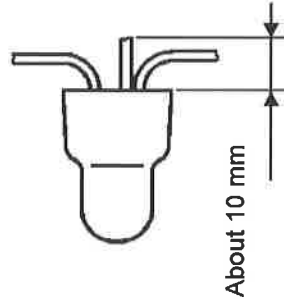


Fig. 1

Table-1: The combination of specimens and testing wires

UNIT: mm² x number of wires

Part Number	Combination of testing wires	
	Maximum	Minimum
CE1 (CE-100V)	VSF 0.75 x 2	KV 0.3 x 2
CE2 (CE-230V)	VSF 1.25 x 2	VSF 0.5 x 2
CE5 (CE-550V)	VSF 2.0 x 3	VSF 1.25 x 2

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7 REQUIREMENTS, TEST METHODS & TEST RESULTS

7.1 Appearance

Requirement: There shall be no scratch, rust, crack, or other trouble detrimental to service.

Test method: Visual inspection.

Test result: Good.

7.2 Mechanical Performance Test

7.2.1 Tensile strength

Requirement: There shall be no slip or escape of the wire at the crimping section with splice.

Test method: Pulling load given in Table-2 shall be applied to the specimen for 10 seconds, in accordance with the method shown in Fig. 2. After the test, slip, breakdown and escape of the wires at the crimp-style joint between the specimen and wires which may affect the performance shall be checked. The assembly shall be so arranged that the tension will be applied to the center of wire as possible. (Testing speed: 25 mm/min.)

Table-2

Wire	Pulling load
0.3 mm ²	40 N
0.5 mm ²	70 N
0.75 mm ²	100 N
1.25 mm ²	170 N
2.0 mm ²	250 N

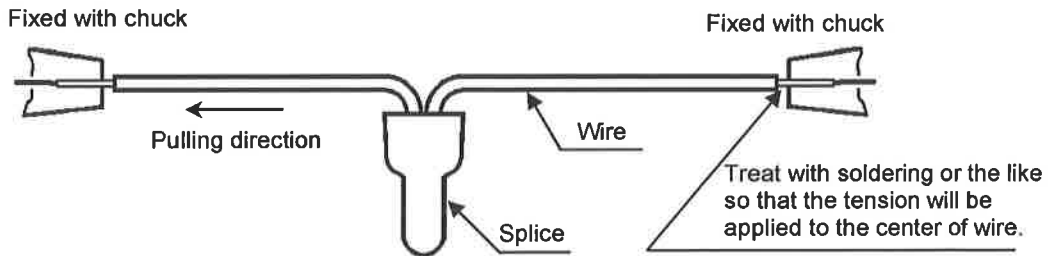


Fig. 2

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Test result:

Part Number	Combination of testing wire	Test results
CE1 (CE-100V)	VSF 0.75 x 2	Good
	KV 0.3 x 2	Good
CE2 (CE-230V)	VSF 1.25 x 2	Good
	VSF 0.5 x 2	Good
CE5 (CE-550V)	VSF 2.0 x 3	Good
	VSF 1.25 x 2	Good

n=6

7.2.2 Firmness of Insulation

Requirement: The insulation shall not be come off.

Test method: Pulling load of 50N shall be applied to the specimen for 10 seconds in the axis direction, in accordance with the method shown in Fig. 3. After the test, it shall be checked if the insulation comes off. The assembly shall be so arranged that the tension will be applied to the center of wire as possible.
(Testing speed: 25 mm/min.)

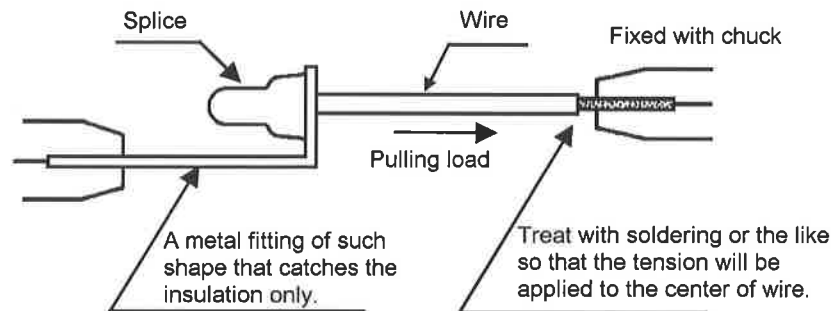


Fig. 3

Test result:

Part Number	Combination of testing wire	Test results
CE1 (CE-100V)	VSF 0.75 x 2	Good
	KV 0.3 x 2	Good
CE2 (CE-230V)	VSF 1.25 x 2	Good
	VSF 0.5 x 2	Good
CE5 (CE-550V)	VSF 2.0 x 3	Good
	VSF 1.25 x 2	Good

n=10

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7.2.3 Temperature rise

Requirement: Temperature rise at the crimping section shall not exceed 20°C.

Test method: Test current given in Table-3 shall be applied to the specimen, in accordance with the method shown in Fig. 4. After temperature becomes stable, temperature rise at crimping section shall be measured.

The length of wire to be connected shall be about 1 m.

Table-3

Wire (mm ²)	Test current (AC)
KV 0.3	3 A
VSF 0.5	5 A
VSF 0.75	7 A
VSF 1.25	12 A
VSF 2.0	17 A

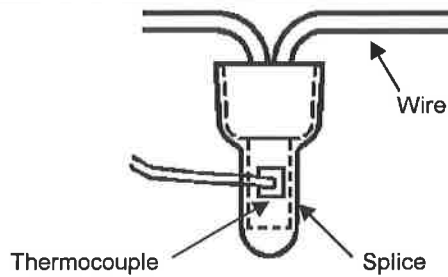


Fig. 4

Test result:

Part Number	Combination of testing wire	Ave.	Max.	Min.
CE1 (CE-100V)	VSF 0.75 x 2	7.72	9.9	6.9
	KV 0.3 x 2	4.84	6.7	3.5
CE2 (CE-230V)	VSF 1.25 x 2	12.72	13.2	11.7
	VSF 0.5 x 2	8.60	10.2	6.7
CE5 (CE-550V)	VSF 2.0 x 3	15.50	16.7	12.8
	VSF 1.25 x 2	11.44	12.7	10.6

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7.2.4 Overcurrent cycle

Requirement: Temperature rise at the crimping section shall not exceed 30°C.

Test method: Test current given in the table-4 shall be applied to the specimen connected as shown in Fig. 4 for 1 second and rested for 19 seconds. This operation counted as 1 cycle, and after repeated 100,000 cycles, temperature rise at crimping section shall be measured in the same method as a temperature rise test.

Table-4

Wire (mm ²)	Test current (AC)
KV 0.3	10 A
VSF 0.5	17 A
VSF 0.75	24 A
VSF 1.25	42 A
VSF 2.0	60 A

Test result:

Part Number	Combination of testing wire	Ave.	Max.	Min.
CE1 (CE-100V)	VSF 0.75 x 2	9.58	11.0	8.1
	KV 0.3 x 2	5.38	7.8	4.6
CE2 (CE-230V)	VSF 1.25 x 2	15.70	16.9	13.8
	VSF 0.5 x 2	11.18	13.6	8.0
CE5 (CE-550V)	VSF 2.0 x 3	17.62	19.3	15.2
	VSF 1.25 x 2	13.90	15.2	12.9

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7.2.5 Insulation Resistance

Requirement: 50 MΩ min.

Test method: The insulation resistance between the live part (positive electrode) and the negative electrode shall be measured with 500V insulation resistance tester specified in JIS C 1302 or the one having equivalent accuracy, in accordance with the method shown in Fig. 5.

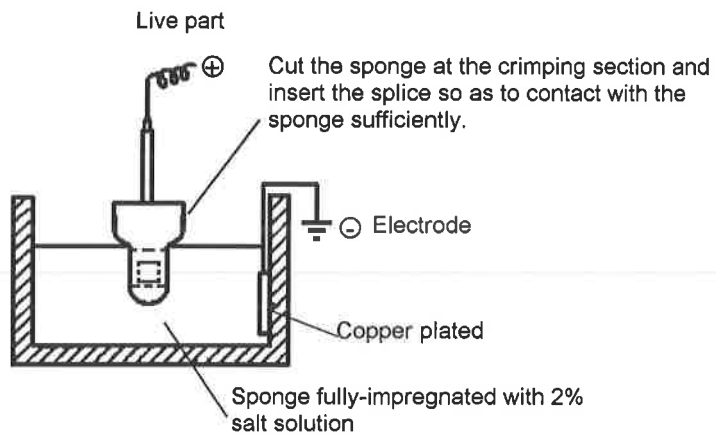


Fig. 5

Test result:

UNIT: MΩ

Part Number	Combination of testing wire	Measured values
CE1 (CE-100V)	VSF 0.75 x 2	50 min.
	KV 0.3 x 2	50 min.
CE2 (CE-230V)	VSF 1.25 x 2	50 min.
	VSF 0.5 x 2	50 min.
CE5 (CE-550V)	VSF 2.0 x 3	50 min.
	VSF 1.25 x 2	50 min.

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7.2.6 Dielectric Withstanding Voltage

Requirement: There shall be no breakdown or flashover.

Test method: 1,500 VAC shall be applied between the live part and the negative electrode for 1 minute, in accordance with the method shown in Fig. 5. After that, breakdown and flashover shall be checked.

Test result:

Part Number	Combination of testing wire	Test results
CE1 (CE-100V)	VSF 0.75 x 2	Good
	KV 0.3 x 2	Good
CE2 (CE-230V)	VSF 1.25 x 2	Good
	VSF 0.5 x 2	Good
CE5 (CE-550V)	VSF 2.0 x 3	Good
	VSF 1.25 x 2	Good

n=6

7.3 Environmental Test

7.3.1 Resistance to Accelerated Aging

Requirement:

Appearance: The insulation shall show no harmful change such as generation of fissure, crack and blister.

Dielectric withstanding voltage: There shall be no breakdown or flashover.

Test method: The test shall be conducted in such a manner, that crimped splice and non-crimped splice are placed in a heat oven, the test specimens are allowed to stand for 7 days at a temperature of $90 \pm 3^\circ\text{C}$ and then taken out from oven, the non-crimped test specimen is allowed to stand at ordinary temperature of $20 \pm 15^\circ\text{C}$ and ordinary humidity of $65 \pm 20\%$ for 1 hours and then crimped, the test specimen together with the test specimen already crimped are visually examined on the insulations and then subjected to the dielectric withstanding voltage test. The splice shall be refined under the conditions that temperature and relative humidity should be $40 \pm 3^\circ\text{C}$ and $90 \pm 2\%$ for 24 hours before letting it stand in ordinary temperature and humidity for 1 hour.

Test result:

Part Number	Combination of testing wire	Appearance	Dielectric withstanding voltage
CE1 (CE-100V)	VSF 0.75 x 2	Good	Good
	KV 0.3 x 2	Good	Good
CE2 (CE-230V)	VSF 1.25 x 2	Good	Good
	VSF 0.5 x 2	Good	Good
CE5 (CE-550V)	VSF 2.0 x 3	Good	Good
	VSF 1.25 x 2	Good	Good

n=6

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7.3.2 Resistance to Oil

Requirement:

Appearance: The insulation shall show no harmful change such as generation of fissure, crack and blister.

Dielectric withstanding voltage: There shall be no breakdown or flashover.

Test method: The crimped specimen is immersed into the Class 1 No.2 insulating oil concentration specified in JIS C 2320 previously heated to $70 \pm 3^\circ\text{C}$ for 4 hours, taken out and the condition of splice is visually examined, and then dielectric withstanding voltage test shall be conducted.

Test result:

Part Number	Combination of testing wire	Appearance	Dielectric withstanding voltage
CE1	VSF 0.75 x 2	Good	Good
(CE-100V)	KV 0.3 x 2	Good	Good
CE2	VSF 1.25 x 2	Good	Good
(CE-230V)	VSF 0.5 x 2	Good	Good
CE5	VSF 2.0 x 3	Good	Good
(CE-550V)	VSF 1.25 x 2	Good	Good

n=20

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7.3.3 Thermal Shock

Requirement:

Appearance: The insulation shall show no harmful change such as generation of fissure, crack and blister.

Dielectric withstanding voltage: There shall be no breakdown or flashover.

Test method: The crimped specimen shall be subjected to the thermal shock test of the conditions specified in Table-5. After repeated 5 cycles, dielectric withstanding voltage test shall be conducted.

Table-5 Thermal shock test conditions

Step		Test conditions	
		Temperature (°C)	Time (min.)
Cycle	1	-25 ± 3	30
	2	20 ± 15	3
	3	85 ± 2	30
	4	20 ± 15	3

Test result:

Part Number	Combination of testing wire	Appearance	Dielectric withstanding voltage
CE1 (CE-100V)	VSF 0.75 x 2	Good	Good
	KV 0.3 x 2	Good	Good
CE2 (CE-230V)	VSF 1.25 x 2	Good	Good
	VSF 0.5 x 2	Good	Good
CE5 (CE-550V)	VSF 2.0 x 3	Good	Good
	VSF 1.25 x 2	Good	Good

n=20

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7.3.4 Flammability

Requirement:

The flame remaining time at each operation: 15 seconds max.
 The total sum of flame remaining times: 30 seconds max.

Test method: The specimen is held in a place where it is not influenced by draft air with as shown in (b) or (c) of Fig. 6, the tip of flame by burning a gas burner shown in (a) of Fig. 6 and with its air intake closed is applied to the almost center of the insulation for 5 seconds, when the residual flame on the insulation goes out immediately the flame of burner is applied to the same place of insulation, and this operation is repeated 3 times.

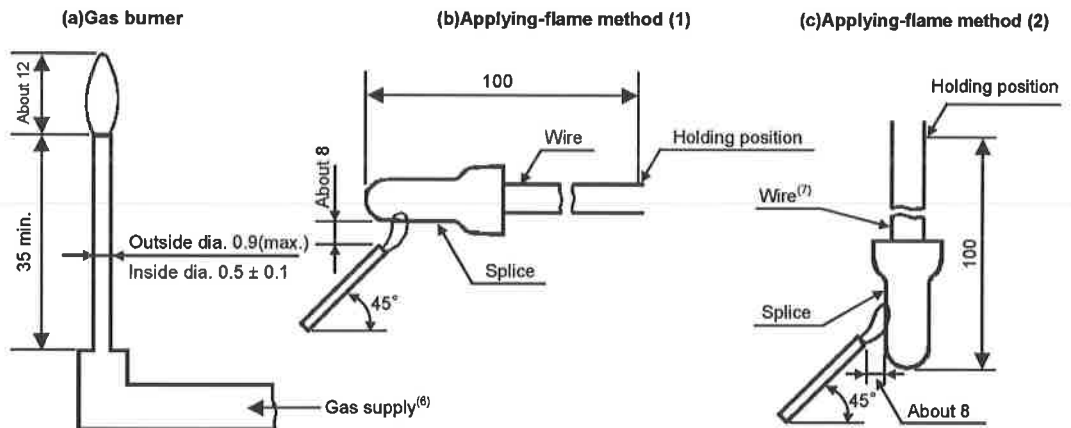


Fig. 6

Test result:

Part Number	Combination of testing wire	UNIT: sec.			
		Each time			Total
CE1 (CE-100V)	VSF 0.75 x 2	0	0	0	0
	KV 0.3 x 2	0	0	0	0
CE2 (CE-230V)	VSF 1.25 x 2	0	0	0	0
	VSF 0.5 x 2	0	0	0	0
CE5 (CE-550V)	VSF 2.0 x 3	0	0	0	0
	VSF 1.25 x 2	0	0	0	0

n=10

8. NOTE FOR HANDLING

Be sure to read through the handling manual before using insulated closed-end solderless splices, because the necessary items of handling method are described in handling manual.

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