

TO: _____

PRODUCTS SPECIFICATION

TYPE INSULATED BULLETS/RECEPTACLES

PART NO. PC/PCE

ISSUED ON JULY 7, 1983
REVISED ON JULY 31, 2020

NICHIFU TERMINAL INDUSTRIES CO., LTD.
TECHNICAL SECTION, TECHNICAL DEPT.



APPROVED	CHECKED	CHECKED	PREPARED
<i>T. Ohba</i>	<i>M. Nakazato</i>	<i>S. Teramoto</i>	<i>A. Kawaguchi</i>
T. Ohba	M. Nakazato	S. Teramoto	A. Kawaguchi

1. SCOPE This product specification is prepared by Nichifu Terminal Industries Co., Ltd. and specifies insulated bullet/receptacle (hereafter referred to as terminal), which is intended for connection of annealed copper stranded wire principally used as internal wiring of electric apparatus, in such a manner that the terminal is connected to the end of wire by using our designated crimping tool.

2. TYPE, PART NO. AND APPLICABLE TOOLS Given in Table 1.

Table 1

TYPE	STYLE	PART NO.	WIRE RANGE		MATERIALS	APPLICABLE TOOL	
			mm ²	AWG		HAND	PNEUMATIC
INSULATED BULLET/ RECEPTACLE	FULLY INSULATED PC TYPE	PC 2005-F PC 2005-M	0.5-0.75	20-18	TERMINAL: BRASS	NH 5 NH 32 NH 60	NA 3 (N3 5) NA 10 (N10 10)
		PC 4009-F PC 4009-M	0.75-1.25	18-16	SLEEVE: OXYGEN FREE COPPER	NH 11 NH 32	NA 3 (N3 11) NA 10 (N10 11)
		PC 4020-F PC 4020-M	2.0	14		NH 12 NH 32	NA 3 (N3 12) NA 10 (N10 12)
	INSULATED PCE TYPE	PCE 4009-F PCE 4009-M	0.75-1.25	18-16	INSULATOR: NYLON	NH 11 NH 32	NA 3 (N3 11) NA 10 (N10 11)
		PCE 4020-F PCE 4020-M PCE 5020-F PCE 5020-M	2.0	14	SURFACE: TIN PLATED	NH 12 NH 32	NA 3 (N3 12) NA 10 (N10 12)

3. RATINGS Given in Table 2.

Table 2

Rated Voltage		300 V
Rated Current	0.5 mm ²	10 A
	0.75 mm ²	12 A
	1.25 mm ²	15 A
	2.0 mm ²	20 A
Rated Temperature		-40 - 105°C

4. PERFORMANCE AND TEST

4.1 TEST CONDITIONS

- (1) Unless otherwise specified, the tests shall be carried out in a room at ordinary temperature ($20 \pm 15^\circ\text{C}$) and ordinary humidity ($65 \pm 20\%$), as specified in JIS Z 8703. The tests of 4.6 and 4.7 shall be carried out by maintaining the specimens in draft free air at $15-35^\circ\text{C}$.
- (2) Tests 4.2, 4.3 and 4.4 shall be carried out with a non-crimped terminal. Tests 4.5 to 4.17 shall be carried out with a terminal crimped with vinyl insulated wires¹⁾ by the tool. The surface of conductors to be crimped shall not be polished.

NOTE ¹⁾ Stranded copper wire is without tin coating specified in JIS C 3316 or JIS C 3306.


- (3) Cross sectional area (mm²) of connected wire for tests is specified in Table 3.

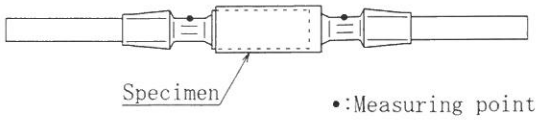
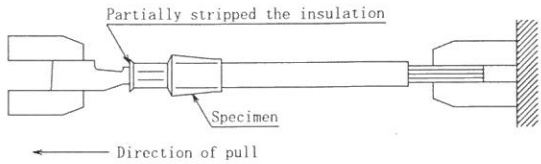
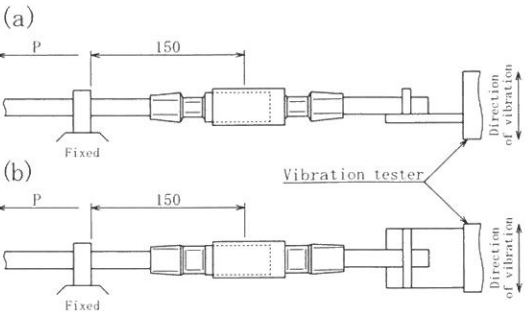
Table 3 Unit mm²

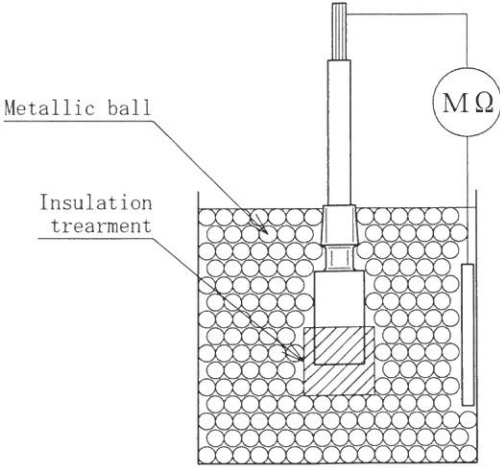
Nominal Size	Cross Sectional Area	
	Max.	Min.
05	0.75	0.5
09	1.25	0.75
20	2.0	-

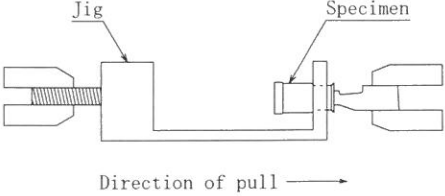
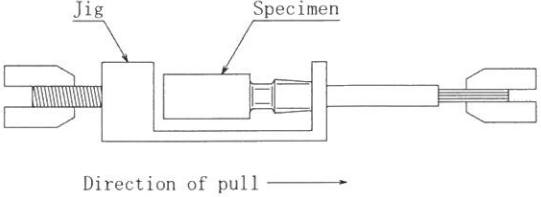
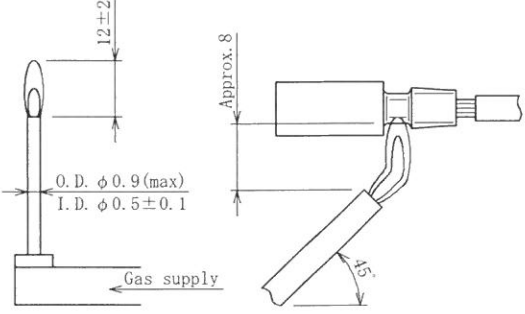
(4) Test performance and manner are given in Table 4.

Table 4

ITEM	PERFORMANCE	TEST METHOD															
4.2 APPEARANCE	The specimens must be free from scratches, rust, splits, cracks, or other defects detrimental to service.	Examined visually.															
4.3 DIMENSION	The specimens must have the appropriate dimensions given in our drawings.	Examined using vernier calipers specified in JIS B 7507 or measuring apparatus at the least equivalent in accuracy.															
4.4 METALLIC COATING	Thickness: Metallic coating of terminal shall be over 1 μm .	The test is carried out by using the electrolytic measuring method specified in JIS H 8501. Measuring position is at the engagement part.															
4.5 SECURENESS OF CRIMPED JOINT	The specimen must be free from cracks or splits. Terminal and wire shall be in close contact.	Examined visually of surface and of crimped area by cutting.															
4.6 TEMPERATURE RISE	Crimp joint shall not exceed 30 K when the specimens are tested.	<p>The specimens shall be connected as illustrated in Fig. 1. Test current specified in Table 5 is passed continuously until the temperatures of measuring points are stabilized. Temperatures shall then be measured.</p> <p style="text-align: center;">Table 5</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Wire Size mm^2</th> <th>0.5</th> <th>0.75</th> <th>1.25</th> <th>2.0</th> </tr> </thead> <tbody> <tr> <td>Test Current A</td> <td>10</td> <td>12</td> <td>14</td> <td>19</td> </tr> </tbody> </table> <p style="text-align: center;">  Specimen •: Measuring point Fig. 1 </p>	Wire Size mm^2	0.5	0.75	1.25	2.0	Test Current A	10	12	14	19					
Wire Size mm^2	0.5	0.75	1.25	2.0													
Test Current A	10	12	14	19													
4.7 CYCLIC HEATING	Temperature rise at the 25 th cycle shall not be higher than 75 K, and the temperature rise at the 125 th cycle shall not exceed the temperature rise at the 25 th cycle plus 8 K.	<p>The specimens are assembled as illustrated in Fig. 2. Test current specified in Table 6 is passed through the specimens for the duration specified in the same table and rested for the same duration as one cycle. The specimens shall be subjected to 125 cycles and the temperature in the current duration at the 25th cycle and that at the 125th cycle shall be measured.</p> <p style="text-align: center;">Table 6</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Wire Size mm^2</th> <th>0.5</th> <th>0.75</th> <th>1.25</th> <th>2.0</th> </tr> </thead> <tbody> <tr> <td>Test Current A</td> <td>15</td> <td>18</td> <td>21</td> <td>28</td> </tr> <tr> <td>Test Duration min</td> <td>30</td> <td>30</td> <td>45</td> <td>45</td> </tr> </tbody> </table>	Wire Size mm^2	0.5	0.75	1.25	2.0	Test Current A	15	18	21	28	Test Duration min	30	30	45	45
Wire Size mm^2	0.5	0.75	1.25	2.0													
Test Current A	15	18	21	28													
Test Duration min	30	30	45	45													

ITEM	PERFORMANCE	TEST METHOD										
4.7 CYCLIC HEATING		 <p>Specimen •:Measuring point</p> <p>Fig. 2</p>										
4.8 TENSILE STRENGTH	<p>The specimens must be free from wire slip off, breakage, deformation or other troubles detrimental to service at crimp joints of terminal and wire.</p>	<p>The appropriate tensile load or over, as in Table 7, is applied to the specimens for 10 s, as illustrated in Fig. 3.</p> <p>Table 7</p> <table border="1" data-bbox="938 568 1449 719"> <thead> <tr> <th>Wire Size mm²</th> <th>0.5</th> <th>0.75</th> <th>1.25</th> <th>2.0</th> </tr> </thead> <tbody> <tr> <th>Tensile Load N</th> <td>60</td> <td>90</td> <td>135</td> <td>225</td> </tr> </tbody> </table>  <p>Partially stripped the insulation Specimen ← Direction of pull</p> <p>Fig. 3</p>	Wire Size mm ²	0.5	0.75	1.25	2.0	Tensile Load N	60	90	135	225
Wire Size mm ²	0.5	0.75	1.25	2.0								
Tensile Load N	60	90	135	225								
4.9 VIBRATION FATIGUE	<p>Specimens shall show no breaks or wire slip off, cracks of the pin, or other troubles detrimental to service at the crimped joints of terminals and wire, and shall comply with the provision of 4.8, when subjected to the test.</p>	<p>The assembled specimen is applied in the two directions as illustrated in Fig. 4. Vibration is applied for 8 h continuously, at a vibration frequency of 33 Hz with single-side amplitude of 1.5 mm. The direction of vibration applied to the specimen is changed by 90 degrees as shown in (a) and (b) of Fig. 4, and such operation is carried out 2 times in each direction, for 32 h in total.</p>  <p>(a) P 150 Fixed Direction of vibration</p> <p>(b) P 150 Fixed Vibration tester Direction of vibration</p> <p>Fig. 4</p>										

ITEM	PERFORMANCE	TEST METHOD				
4.10 INSULATION RESISTANCE	The resistance measured between the surface of insulation and the charged part shall not be less than 100 M Ω .	<p>In the test, measure the insulation resistance between the electrode and the live part, by method Fig. 5.</p>  <p style="text-align: center;">Fig. 5</p>				
4.11 WITHSTAND VOLTAGE	The specimens must withstand the test voltage.	As illustrated in Fig. 5, AC 1500 V is applied between the electrode and the charged part for 1 minute.				
4.12 RESISTANCE TO THERMAL AGING	Specimen shall be free from cracks, splits, internal blisters, or other troubles detrimental to service, and shall comply with the provision of 4.11, when subjected to the test.	<p>The test shall be carried out in such a manner that the specimen connected with a wire by crimping (connected specimen) and the specimen itself (non-connected specimen) are placed in a thermostatic chamber at the temperature specified in Table 8 and allowed to stand for 7 days. The non-connected specimen is placed in a thermostatic chamber again at temperature $30 \pm 2^\circ\text{C}$ and humidity $85 \pm 5\%$ for 24 h and is allowed to stand at ordinary temperature and humidity for about 1 h, connected to a wire by crimping. Afterwards the condition of insulation is examined visually together with the connected specimen.</p> <p style="text-align: center;">Table 8 Unit $^\circ\text{C}$</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th data-bbox="986 1514 1193 1581">Non connected Specimens</th> <th data-bbox="1193 1514 1406 1581">Connected specimens</th> </tr> </thead> <tbody> <tr> <td data-bbox="986 1581 1193 1626" style="text-align: center;">100 ± 3</td> <td data-bbox="1193 1581 1406 1626" style="text-align: center;">121 ± 3</td> </tr> </tbody> </table>	Non connected Specimens	Connected specimens	100 ± 3	121 ± 3
Non connected Specimens	Connected specimens					
100 ± 3	121 ± 3					

ITEM	PERFORMANCE	TEST METHOD
4.13 SECURENESS OF INSULATION	The insulation of non-connected specimen shall not move by 1.0 mm or more toward any side in its axial direction. The insulation of connected specimen shall not fall off.	<p>(1) For non-connected specimen, axial load of 15 N or more shall be gradually applied to the insulation of specimen for 10 s in accordance with the procedure shown in Fig. 6.</p> <p>(2) For connected specimen, axial load of 80 N shall be applied gradually to the insulation of specimen for 10 s as in Fig. 7. 70 N is for PC 4020-F, -M/PCE 4020-F, -M/PCE 5020-F, -M.</p>  <p style="text-align: center;">Fig. 6</p>  <p style="text-align: center;">Fig. 7</p>
4.14 FLAME RETARDANCE	Flaming duration in each ignition cycle must not exceed 15 s and total flaming duration shall not exceed 30 s.	<p>Hold the gas burner shown in Fig. 8 (a) and the specimen as illustrated in Fig. 8 (b). Apply the tip of flame for 5 s near the center of the insulation, then remove the flame. Apply the flame to the same place for 5 s immediately after the remaining flame goes off. Carry out such operation three times.</p>  <p style="text-align: center;">(a) Gas burner (b) Flame application method Fig. 8</p>
4.15 OIL IMMERSION	The insulation shall show no cracks, splits, internal blisters or other troubles detrimental to service, and shall meet the provisions of 4.11.	In the test, immerse the specimen into the insulation oil of class 1 No. 2 specified in JIS C 2320 heated to $70 \pm 3^\circ\text{C}$ for 4 h, and visually examine conditions of the terminal when taken out from the oil.

ITEM	PERFORMANCE	TEST METHOD													
4.16 COLD CRIMP PROPERTY	Specimen shall be free from cracks, splits, internal blisters, or other troubles detrimental to service in any part, and shall comply with the provision 4.11, when subjected to the test.	The specimen, tool and wire to be assembled are left at temperature of $-20\pm 2^{\circ}\text{C}$ for over 1 h. The wire is then connected, and the assembled specimen is left at temperature of $-55\pm 2^{\circ}\text{C}$ for over 1 h. The condition is examined visually.													
4.17 INSERTION/WITHDRAWAL FORCE	<p>The 1st and 6th insertion/withdrawal force in Table 9 shall be satisfied.</p> <p style="text-align: center;">Table 9 Unit N</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Part No.</th> <th colspan="2">1st</th> <th>6th</th> </tr> <tr> <th>Insertion</th> <th>Withdrawal</th> <th>Withdrawal</th> </tr> </thead> <tbody> <tr> <td>PC 2005-*</td> <td>≤ 67</td> <td rowspan="2">≥ 13</td> <td rowspan="2">≥ 13</td> </tr> <tr> <td>The others</td> <td>≤ 67</td> </tr> </tbody> </table>	Part No.	1 st		6 th	Insertion	Withdrawal	Withdrawal	PC 2005-*	≤ 67	≥ 13	≥ 13	The others	≤ 67	<p>The test is carried out as below.</p> <p>(1) Examined using new specimens (M&F). The speed of insertion/withdrawal is approx. 25-50 mm/min. The test is carried out 6 times.</p> <p>(2) Measuring, insertion and withdrawal shall be done on the exactly same axle.</p>
Part No.	1 st		6 th												
	Insertion	Withdrawal	Withdrawal												
PC 2005-*	≤ 67	≥ 13	≥ 13												
The others	≤ 67														

5. MARKING The following items shall be marked.

5.1 PRODUCT

(1) Trade name

5.2 PACKING

(1) Part number, (2) Wire range (AWG), (3) Quantity, (4) Lot No.

6. PACKAGE 100 pcs./bag \times 10 bags or 100 pcs./bag \times 5 bags per one package box.

*** END OF THIS DOCUMENT ***