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This handling manual describes operation points of crimping, assembling and mounting on PC boards for enhancing reliability and exerting the connector features.

C O N T E N T S

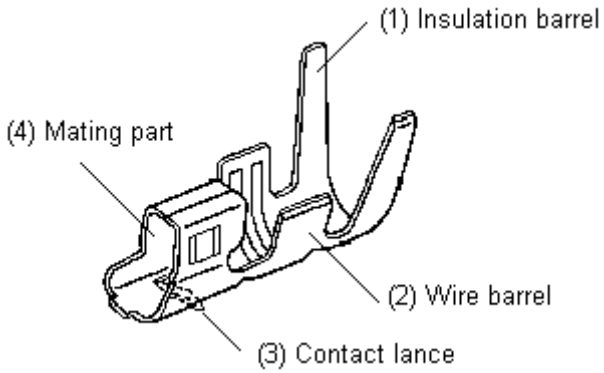
Page

1. Part Name and Parts Identification 2
2. Model Number 3
3. Storage 3
   3-1 Storing the connector 3
   3-2 Storage of the crimped contact 3
4. Applicable Wire 3
   4-1 Applicable wire 3
   4-2 Precautions 3
5. Crimping Tool 4
6. Applicable PC Board 4
   6-1 Applicable PC board thickness 4
   6-2 PC board layout and assembly layout 4
7. Crimping Operation 5
   7-1 Wire strip length 5
   7-2 Crimping 5
   7-3 Precautions for the storage and the handling of the crimped contact 8
8. Harness Assembly Operation 9
   8-1 Before inserting the crimped contact into the housing 9
   8-2 Inserting the contact in the housing 9
   8-3 Check after inserting the crimped contact into the housing 10
   8-4 How to extract the crimped contact from the housing in case of mis-insertion 10
9. Inspection of Finished Product (Continuity Check) 11
   9-1 Simple wiring inspection using a tester 11
   9-2 Wiring inspection using an inspection jig 12
10. Header 12
11. Control Points of Crimping Operation and Harness Assembly 13
12. Handling Precautions 13

1. Part Name and Parts Identification

ZH connector consists of the contact, the housing and the header.
On processing and assembling, understand each structure and name.

Contact



Function of each part

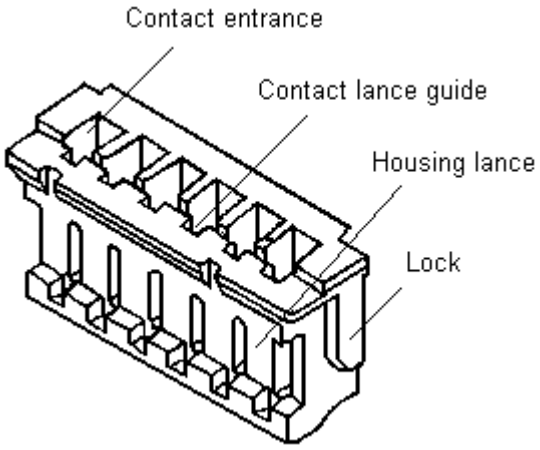
(1) It holds wire insulation.

(2) It crimps wire conductors.

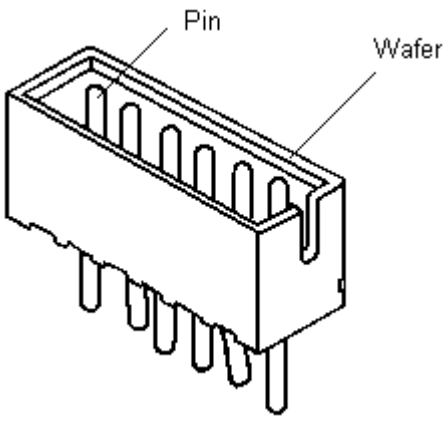
(3) It holds the housing and the contact.

(4) It contacts with the header post.

Housing



Header (Top entry type)



2. Model Number

Product name		Model No.
Contact		SZH-002T-P0.5 SZH-003T-P0.5
Housing		ZHR-※
Header	Top entry type	B※B-ZR
	Side entry type	S※B-ZR

Note$_1$: 2-digit figures in (※) denote the circuit number. ※: 2 ~ 13

Note$_2$: Identification marking “(LF)(SN)” for lead-free product is shown on the label.

3. Storage

3-1 Connector storage

Recommended storage condition: Temperature: 5 – 35 ˚C, Relative humidity 60 % or less
(Under packaging like the state of JST shipment)

Keep off direct sunlight, places exposing to such corrosive gas as industrial gas (generate from a stove and whatnot) and ammonia gas (generate from a toilet and whatnot), dusty place and condensation.

3-2 Storage of the crimped contacts

Not leaving the crimped contact to stand in a place exposed to high humidity and direct sunshine, and not placing them directly on the ground, keep them in a clean storage room.

4. Applicable Wire

4-1 Applicable wire

Wire size and wire insulation outer diameter for SZH-002T-P0.5 and SZH-003T-P0.5 are as below.

	SZH-002T-P0.5	SZH-003T-P0.5
Wire size	AWG #28 ~ #26 (0.08 ~ 0.13 mm^2)	AWG #32 ~#28 (0.032 ~ 0.08 mm^2)
Insulation outer dia.	ϕ0.8 ~ ϕ1.1 mm	ϕ0.5 ~ ϕ0.9 mm

UL1571 (annealed copper stranded wire with tin plating) and its equivalent stranded wire can be used.

4-2 Precautions

Special wires such as solid ones, tin-coated ones, shielded ones and other than the above wires cannot be used in principle. When using such special wires, contact JST.
Regarding shielded wires, refer to item 7-2-4 “Handling method of special wires.”

5. Crimping Tool

Model No.	Applicable crimping tool model number			
	Crimping press	Applicator	Die	Applicator with die
SZH-002T-P0.5	AP-K2N	MKS-L	MK/SZH-002-05	APLMK SZH002-05
SZH-003T-P0.5			MK/SZH-003-05	APLMK SZH003-05

Note$_3$: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the performance of the connector.

6. Applicable PC Board

6-1 Applicable PC board thickness

0.6 ~ 1.2 mm

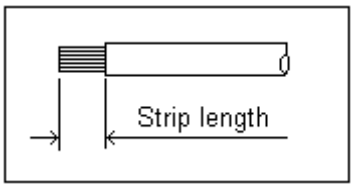
6-2 PC board layout and assembly layout

Note$_4$: Tolerances for PC board size are non-cumulative ±0.05 mm for all centers.
Note$_5$: The dimensions above should serve as a reference value for drilling holes.
The hole diameters differ according to piercing method (drill hole, punching hole, etc.) and PC board material (paper-based epoxy resin, glass-based epoxy resin, etc.). Depending on the usage, set it.

7. Crimping Operation

7-1 Wire strip length

When a wire is stripped, do not damage or cut off the wire conductors.
As the wire strip length differs depending on wire type and crimping method, decide the best wire strip length considering the processing condition.



Reference value of wire strip length: 2.0 mm

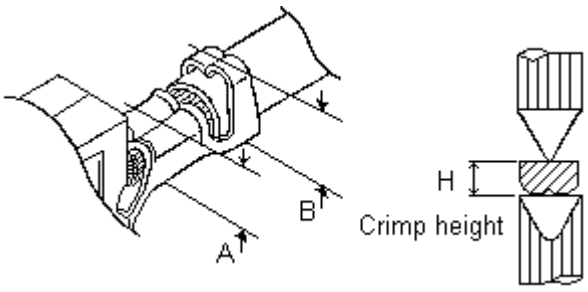
7-2 Crimping

Check the below points for correct crimping at the beginning, the middle and the end of crimping operation.

7-2-1 Crimp height

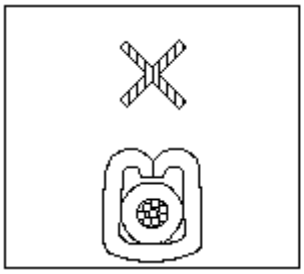
According to a wire to be used, adjust the dials of the applicator at the wire conductor part and the wire insulation part to a proper crimp height.

Measurement of crimp height

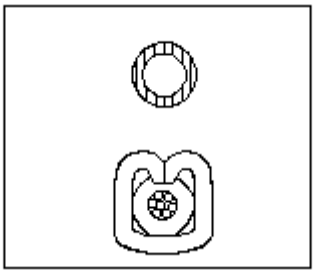


A: The crimp height at the wire barrel should be set to the pre-determined dimensions.
B: Adjust and set the crimp height at the wire insulation barrel as per finished outer diameter and a kind of a wire so that the wire insulation does not come off the contact easily and is not crimped excessively.
H: Measure the crimp height at the center of the barrel using the specified micrometer.

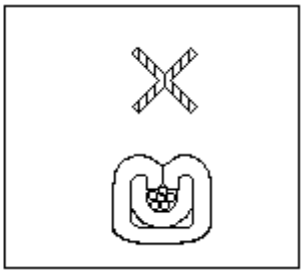
Crimping condition at insulation barrel



Insufficient crimping
(pressed weak)
When tension is applied to a wire, the wire insulation easily comes off the contact.



Good



Excessive crimping
(pressed excessively)
The barrel bites a wire too much and may damage wire conductors.

Check of crimping condition at wire insulation barrel

Cut only the wire insulation barrel, remove the wire insulation and check if the wire conductors are not damaged as below.

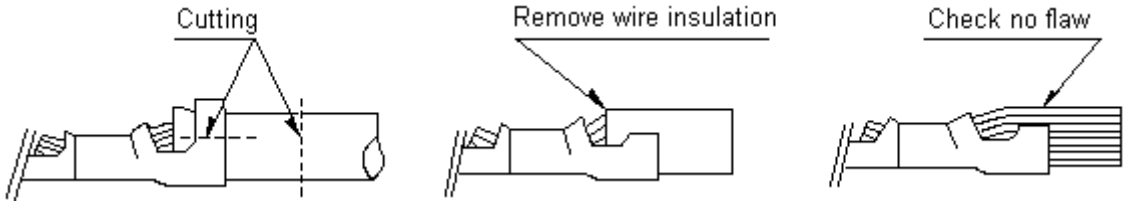


Table of crimp height

SZH-002T-P0.5				SZH-003T-P0.5			
Wire [UL 1571]		Crimp height [mm]		Wire [UL 1571]		Crimp height [mm]	
Wire size	Insulation O.D.[mm]	Conductor part	Insulation part [Ref.]	Wire size	Insulation O.D.[mm]	Conductor part	Insulation part [Ref.]
AWG#28	(0.9)	0.50 - 0.55	1.30	AWG#32	(0.6)	0.42 - 0.47	1.00
AWG#26	(1.0)	0.55 - 0.60	1.35	AWG#30	(0.7)	0.47 - 0.52	1.05
				AWG#28	(0.9)	0.52 - 0.57	1.15

Note$_6$: The crimp height value at the insulation part on the above table is a reference value because the crimping condition depends on wire outer diameter and material.
Set the crimp height at the insulation part according to the confirmation method in crimping.

7-2-2 Tensile strength at crimped part

After adjusting the crimp height, check the tensile strength using the test samples.
In case that the tensile strength greatly differs from the normal tensile strength (actual value), check if there is a defect. The tensile strength may be different even in the same wire size due to the difference in strength of wire itself.

Table of tensile strength at crimped part

UNIT: N

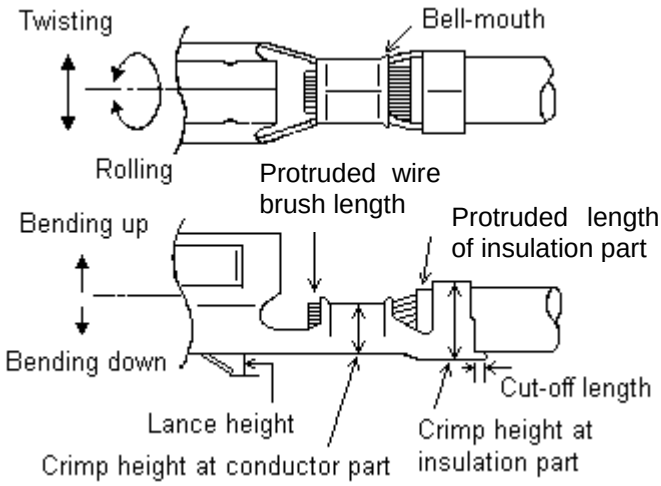
SZH-002T-P0.5			SZH-003T-P0.5		
Wire size	Req.	Actual value (Ref.)	Wire size	Req.	Actual value (Ref.)
AWG#28	9.8 min.	23.5 - 24.5	AWG#32	2.9 min.	8.8 - 10.8
AWG#26	19.6 min.	30.4 - 39.2	AWG#30	4.9 min.	11.8 - 14.7
			AWG#28	9.8 min.	21.6 - 24.5

Note$_7$: The actual value of the tensile strength shows that of the samples with the conductor part only crimped.

7-2-3 Crimping appearance

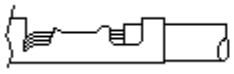
Check the crimping appearance visually for correct crimping with such an equipment as loupe.

Part name of crimped contact

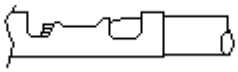


Item	Reference value
Bending up	6° max.
Bending down	4° max.
Twisting	4° max.
Rolling	5° max.
Bell-mouth	0.1 ~ 0.3 mm
Cut-off length	0 ~ 0.3 mm
Protruded wire brush length	0.2 ~ 0.5 mm
Lance height	approx. 0.3 mm

Examples of defective crimping

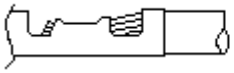


Protruded wire brush

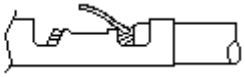


Bitten wire insulation with wire barrel

Short protruded wire brush

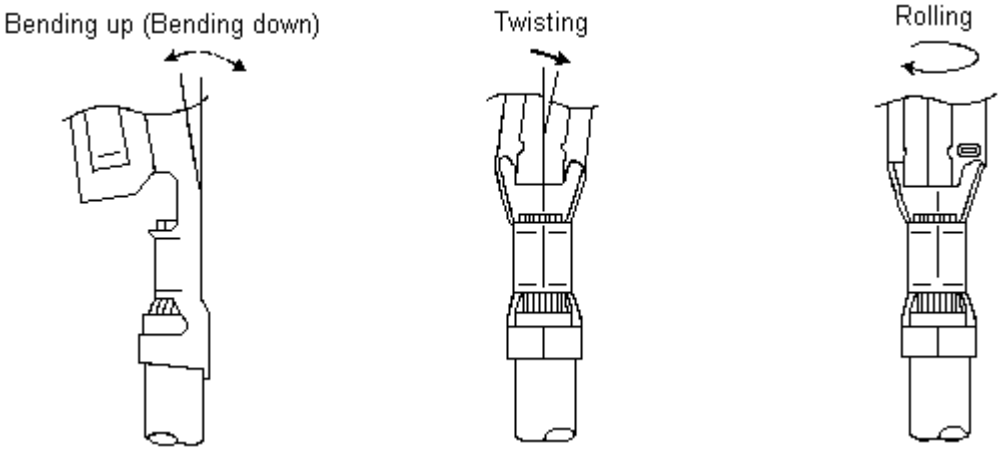


Poorly crimped wire insulation



Stray wire conductors

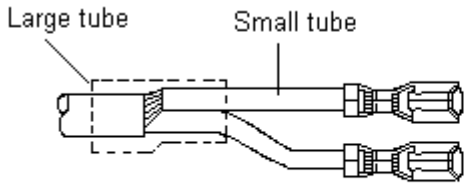
Bending up, bending down, twisting and rolling



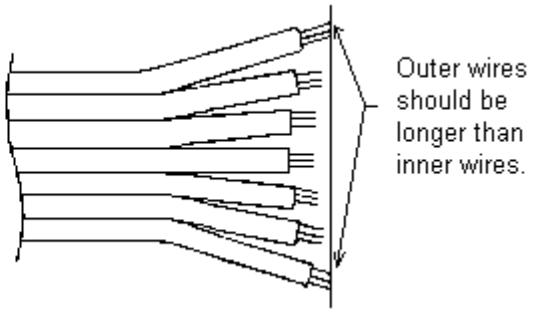
Bending up/down, twisting and rolling
Note that bending up/down, twisting and rolling may lead to deteriorating the contact insertion in the housing, lowering the contact retention force or poor mating.

7-2-4 Handling method of special wires

Split length of core wire and braided shielded wire

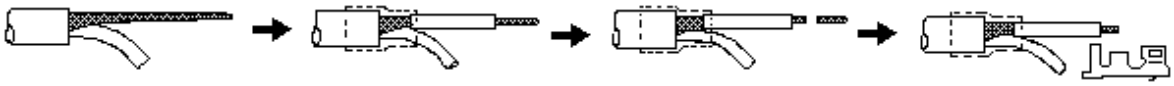


Split length of flat-ribbon cable



Some special wires need the processing as shown in above figures to ensure easy insertion of the contact into the housing, and to prevent from contact deformation and wire cutting during the insertion operation.
Adjust the split length of braided shielded wires and flat-ribbon cables so that tension is not applied to smaller size ones of braided shielded wires, and so that tension is uniformly applied to each of split wires for flat-ribbon cable (lengthen the both ends).

Crimping of braided shielded wires
After twisting braided shielded wires slightly, trim the tip with a nipper to alight the tip, and crimp. Not aligning the tip may cause improper crimping. When the conductor cross sectional area of braided shielded wire is over that of the applicable wire range, adjust the cross-sectional area to meet the one specified by applicable crimp height, and conduct crimping operation.
Use the tube insulation which outer diameter applicable to the contact.



7-3 Precautions for the storage and the handling of the crimped contact

As the crimped contact before inserting into the housing is subject to deformation, etc. by external force, pay careful attention to the following 3 points for the storage and the handling:

① The number of the crimped contacts for one bundle should be 300 pcs. max. Protect the contacts by wrapping with paper to prevent from deformation of the contact and adhesion of foreign matters, and keep them in an adequate box.

② Do not place the contacts in humid area, under direct sunshine and directly on the floor.
Store them in a clean room with ordinary temperature and humidity.

③ Do not stack too much quantity of the crimped contacts nor place anything on them, because the weight of themselves may deform the contact and troubles such as defective contacting.

8. Harness Assembly Operation

Harness assembly operation is a very important process to decide the connector performance and the harness quality. Careful operation is required for the harness assembly as well as the said crimping operation.

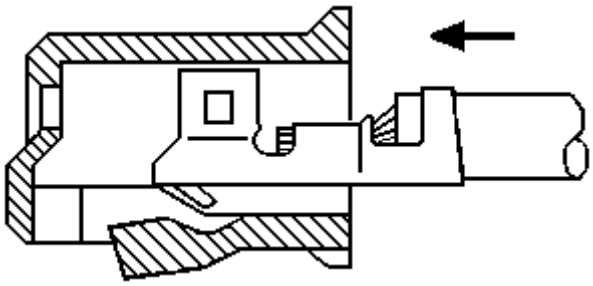
8-1 Before inserting the crimped contact into the housing
Before inserting the contact into the housing, check the below points:

① Do not place other things on or near working table and do not conduct any other works on the same working table to prevent from operation mistakes.

② Do not use the contact (such as the contact lance and the mating part) poorly crimped and deformed.

8-2 Inserting the contact in the housing

① Hold the contact with the lance part up, and align the contact lance guide of the housing with the contact lance, and then, insert the contact parallel to the insertion axis.



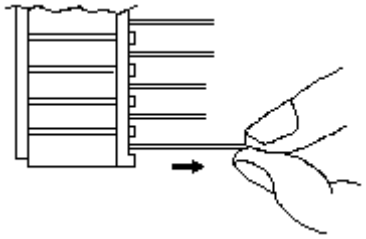
- Note for inserting the contact
  Do not lean the contact to the direction that the lance is pressed or insert the contact prying up and down or right and left, because such handling may deform the contact lance and the mating part.

② Insert the contact into the housing without stopping to the innermost.
When the contact is fully inserted into the housing, the housing lance clicks and there is a fit.

8-3 Check after inserting the crimped contact into the housing

Check backlash before and after the insertion direction and secure locking per each insertion by pulling a wire softly with force of approx.5N.

Note$_8$: When a wire is pulled with too much force, the contact lance may be deformed and the contact may come off the housing.



8-4 How to extract the crimped contact from the housing in case of mis-insertion

When the contact is inserted into an improper circuit hole, conduct the following points:

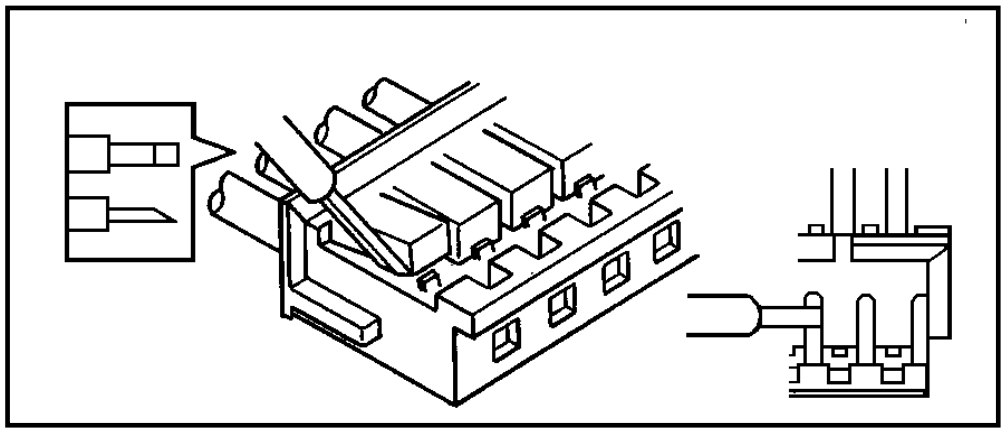
① Do not reuse the housing where the contact was extracted but use the new one.
(The method of extracting the contact from the housing is as below.)

② When an improperly inserted contact is extracted from the housing and the housing is reused.

- Only a specified person conducts the operation.
- The housing reuse should be once.
- The housing lance should be pushed down to its original position.

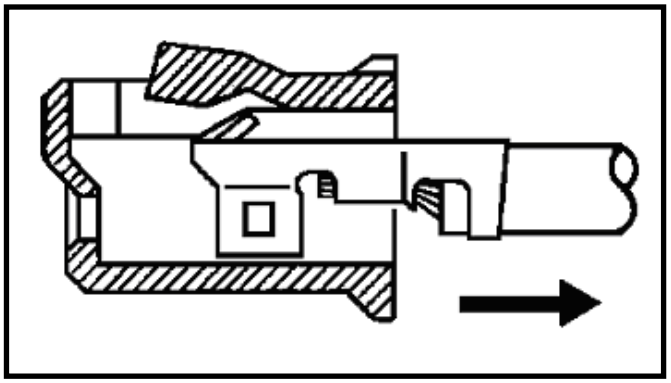
③ As the size of ZH connector is quite small, it is difficult to extract the contact. Therefore, operate with care not to extract the contact as much as possible.

<u>How to extract the crimped contact from the housing</u>

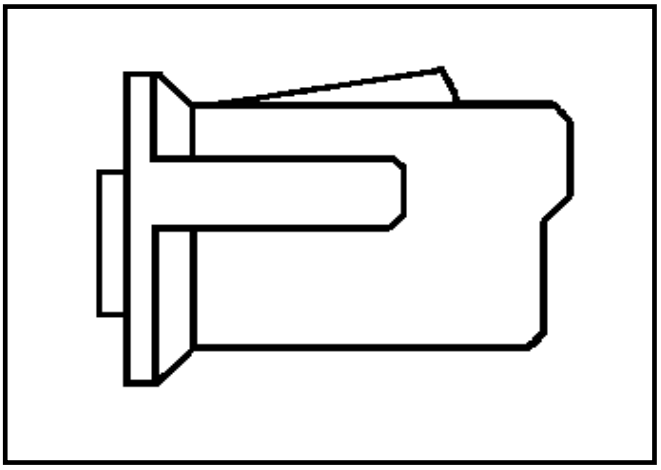


(1) Push a wire to extrude the contact forward and lift the housing lance by using a jig which has the shape like the above figure not to become higher than necessity.

(2) Pull a wire diagonally downward in a condition of lifting the housing lance, and the contact can be extracted from the housing.



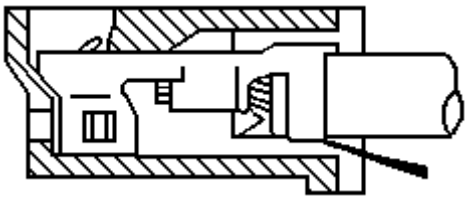
(3) After extracting the contact from the housing, check that the housing lance does not float or break. If it floats or breaks, replace it with a new one.
Reuse the contact after checking that the contact lance does not come down.



9. Inspection of Finished Product (Continuity Check)

9-1 Simple wiring inspection using a tester

Do not insert a tester stick into the mating part, because the diameter of the tester stick and prying operation sometimes make the mating part deformed.
Contact a tester stick to the wire insulation side from the connector contact entrance of the housing, and inspect the electrical continuity.



9-2 Wiring inspection using an inspection jig

Note the following points:

① Use the header applicable to the housing for inspection.
Do not remove the housing wall of the header. If removed, the contact may be pried easily during the inspection and defective contacting may be caused.

② Use the header free from deformation, damage and stains.
When they are found, replace with a new one.
Periodical replacement of the header should be conducted as well.

③ Carefully conduct mating and unmating connector, holding the housing not to pry.
When an inspection board is used, design it considering that mating and unmating works are not difficult.

④ When the harness described above is mounted on or dismounted from PC board, conduct the operation within 20 degrees or less.

10. Header

① Floating from PC board

The header of ZH connector has a mechanism to prevent from coming off PC board when inserting. However, when the header floats by external force or vibration, push the header softly so that the bottom of the header coheres to the surface of PC board, and then, solder it.

② Flux

Use rosin type flux.
As inorganic flux may corrode the wafer, do not use it.

③ Dipping soldering

Conduct soldering operation at a temperature range of 245°C - 260°C and within 3 - 5 seconds.

④ Soldering by hand and soldering repair

When soldering by using a soldering iron or soldering repair for bridge are conducted, note the following points, because the header resin may deteriorate due to heating.

Soldering iron:	Use a soldering iron with small heat capacity (40W max.).
Soldering time:	Conduct soldering operation quickly within 3 seconds.
Soldering method:	Do not apply external force by such an operation as pushing the header post with the tip of a soldering iron during soldering operation.

⑤ Cleaning operation

Under normal flux cleaning, the header of ZH connector is not subject to cleaning solvent.
However, when polluted cleaning solvent by flux is left in the header, it may cause poor contact and other defect.

11. Control Points of Crimping Operation and Harness Assembly

As the crimping and harness assembly operation affects the reliability (percent defective) of the connector, it is recommended that the crimping operation and the finished products be controlled concentrating upon the following check items.

Process	Check item	Description	Reference
Crimping	Appearance	① Check that a wire is crimped at the normal position. ② Check that the crimp configuration is normal and excessive burr does not appear. ③ Check that an uncrimped wire is not left behind. ④ Check that the contact is not bent, deflected or deformed. ⑤ Check that the contact is free from dirt, scratches, scratches, stains, discoloration.	Item 7
	Crimp height	① The crimp height is proper.	
	Tensile strength	① Check that the tensile strength is proper.	
Harness assembly	Appearance	① Check that the contact is properly inserted into the housing. ② Check that the contact is securely locked with the housing. ③ Check that wiring is correct. ④ Check that the housing is free from dirt and foreign matters.	Item 8
Finished product (Harness)	Appearance Continuity	① Follow all descriptions stated above in “Appearance.” ② Check that harness passes continuity test.	Item 9

12. Handling Precautions

① Do not contaminate the contact with household goods such as oils, detergent, seasoning, fruit juice and insecticide. If contaminated, do not use.

② Do the mating and unmating operation of the harness products mounted on PC boards along the mating axis (at an angle within 20° against the axis) with holding the housing.
When it is difficult to hold the housing main body due to the connector connecting and mounting condition, hold all wires so as to apply a load evenly to them, and do the operation with supporting the housing with your finger. (The mating and unmating operation with applying a load to some wires only may lead to breakage on the connector.)