Title of Document: **HANDLING MANUAL**	Issue No. CHM-1-T095	Rev. 3
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This handling manual describes points to check for smooth crimping operation of the contact for the VH connector (Contact type 21).

C O N T E N T S

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1. Part Name and Model Number

Part name			Model No.
Contact			SVH-21T-P1.1
Housing			VHR-∗N
			VHR-∗M
Header	PA66 product	Top entry type	B∗P-VH (LF)(SN)
		Side entry type	B∗PS-VH (LF)(SN)
	PBT product	Top entry type	B∗P-VH-B (LF)(SN)

Note$_1$: 2-digit figure in asterisk denotes the circuit number.
Note$_2$: The identification marking “(LF)(SN)” stands for lead-free product.

2. Applicable Wire

2-1 Applicable wire

Model No.	Wire size	Insulation outer dia.
SVH-21T-P1.1	AWG #22 ~ #18	ϕ1.7 ~ ϕ3.0 mm

Conductor: Annealed copper stranded tin-plated wire
Note$_3$: Special wires such as solid ones, tin-coated ones and shielded ones other than the above cannot be used in principle.

3. Crimping Tool

Part name	Model No.
Semi-automatic press	AP-K2N
Applicator	MKS-L
Die	MK/SVH-21-11
Applicator and die set	APLMK SVH21-11

Note$_4$: When crimping operation is conducted by using other than the applicator and the die set shown above, JST cannot guarantee the performance of the connector.

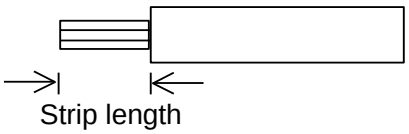
4. Crimping Operation

Before crimping operation, be sure to check the combination of the contact, wires and the crimping die are correct.
Check the below points for correct crimping at the beginning and the middle of crimping operation.

4-1 Wire strip length

Referring to the reference value of the wire strip length stated below, conduct wire stripping.
As the wire strip length differs depending on wire type and crimping method, decide the best wire strip length considering each processing condition. When a wire is stripped, do not damage or cut off wire conductors.

Reference value of wire strip length: 3.0 ~ 3.5 mm



Note$_5$: Regarding wire stripping of no-plated wires such as KV, do the operation just before crimping operation.
Do not leave such a stripped wire for a long time not to oxidize the conductor’s surface, which may result in the fluctuation of the contact resistance.

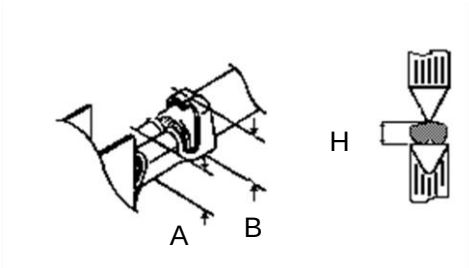
4-2 Crimp height

According to wires, adjust the dials of the applicator at the wire conductor part and the wire insulation part to a proper crimp height shown in the following table.

Wire		Crimp height (mm)	
Type	Size	Conductor part	Insulation part
UL1007	AWG #22	1.05 ± 0.05	2.3
UL1007	AWG #20	1.10 ± 0.05	2.4
UL1007	AWG #18	1.15 ± 0.05	2.6

Note$_6$: The crimp height at the insulation part is a reference value.

4-2-1 Measurement of crimp height

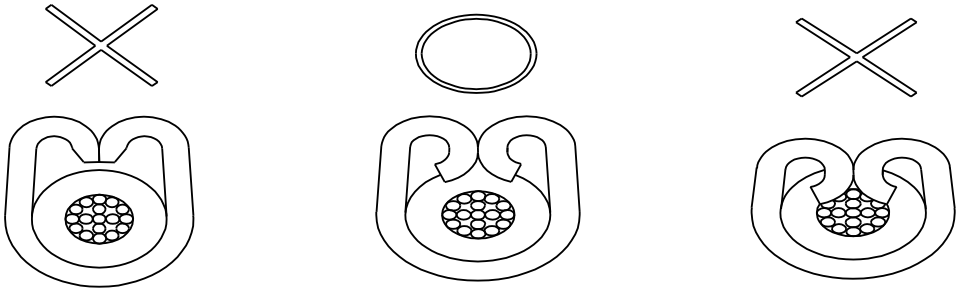


A: The crimp height at the wire barrel should be set to the pre-determined dimensions.
B: Adjust the crimp height of the wire insulation barrel to the extent that the wire insulation is slightly pressed, and set it not to crimp it excessively.
H: Measure the crimp height at the center of the barrel using a specified micrometer.

4-2-2 Measurement timing of crimp height

① When operation starts at morning and afternoon, starts after pausing and finishes.
② When the contact reel is exchanged.
③ When the applicator is adjusted. (After trouble-shooting, etc.)
④ When the crimping dies are exchanged.

4-2-3 Crimping condition at wire insulation barrel



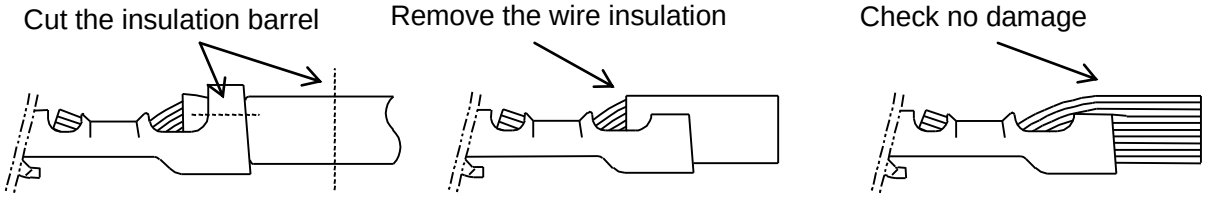
Insufficient crimping (pressed weak)
When tension is applied to a wire, the wire insulation easily comes off of the contact.

Good

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

4-2-4 Check of crimping condition at the wire insulation barrel

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



4-3 Tensile strength at the crimped part

After adjusting the crimp height, check the tensile strength using the test samples, and then, start the continuous crimping operation. In case the tensile strength greatly differs from the normal tensile strength (actual value), check if there is a defect.

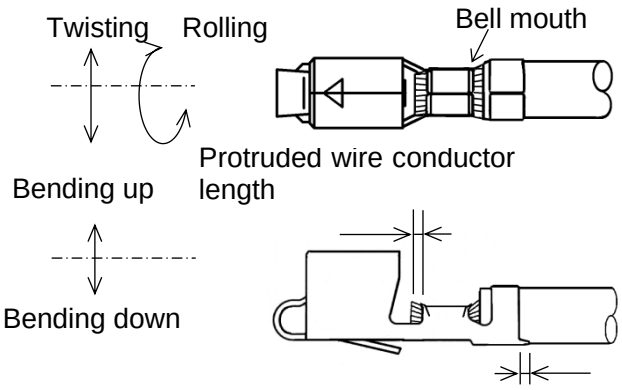
Unit: N

Wire		Tensile strength (actual value)			Requirement
Type	Size	Ave.	Max.	Min.	
UL1007	AWG #22	90.5	98.0	82.3	44.1 min.
UL1007	AWG #20	139	143	136	63.7 min.
UL1007	AWG #18	194	200	188	78.4 min.

4-4 Crimping appearance

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

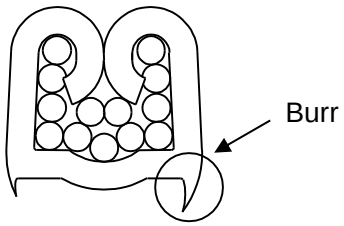
Bending up and rolling



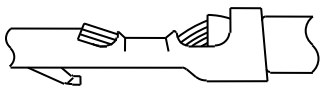
Item	Reference value
Bending up	approx. 3° max.
Bending down	approx. 3° max.
Twisting	approx. 4° max.
Rolling	approx. 6° max.
Bell-mouth	approx. 0.1 ~ 0.4 mm
Cut-off length	approx. 0 ~ 0.3 mm
Protruded wire conductor length	0.5 ~ 1.0 mm

Remarks: As far as the crimped contact can be inserted into the housing, bending up of the contact may be allowed.

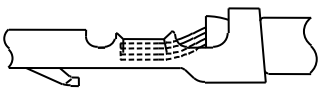
There must not be large burr or one-sided burr.



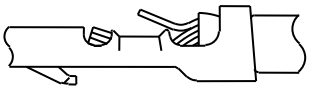
Examples of defective crimping



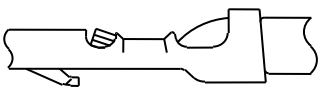
Protruded wire conductor length is long.



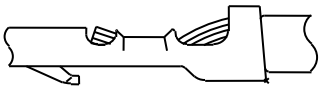
Protruded wire conductor length is short.



Wire conductors comes off.



Wire barrel bites wire insulation.



Wire insulation is not crimped sufficiently.

4-5 Precautions for crimping operation

① Conduct crimping operation properly and inspect the crimping appearance of the crimped product with loupe, etc.
Note7: If the conductors are not crimped at the center of the barrel, the contact may twist slightly but it does not affect the performance.

② Do not crimp with no terminal and do crimping twice, because they may cause outstanding burrs at the crimped part and may lead to the abrasion of the crimping die quickly.

③ As cutting residues (powder), etc. adhered to the crimping die part affects the life of the dies, clean around the crimping part occasionally and conduct appropriate crimping.

④ When chips or excessive roughness are observed on the crimping die, replace it without delay.

⑤ As the abrasion of the crimping die and insufficient adjustment of the applicator may cause defective crimping appearance, do not fail to conduct daily inspection.

⑥ When crimping operation is conducted with the wire-holding spring damaged or extracted, the wire conductors may come off or the wire barrel may bite the wire insulation.

4-6 Precautions for the storage and the handling of the crimped contact

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

① Protect the contacts by wrapping with thick paper to prevent from the deformation and the adhesion of foreign substances, 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 cause the deformation of the contact and troubles such as poor contacting.

5. 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.

5-1 Inserting the crimped contact into the housing

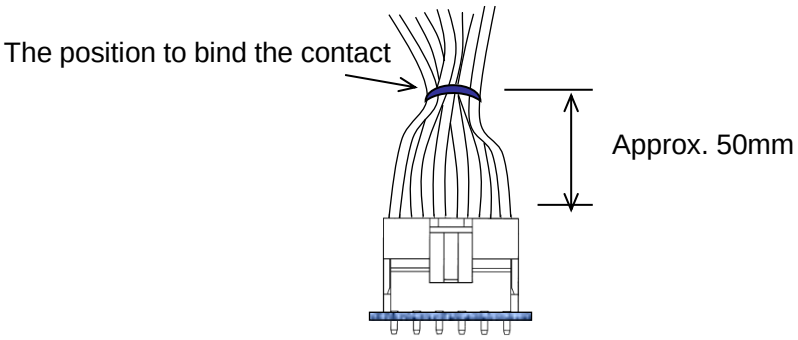
① Insert the crimped contact parallel to the housing without prying.

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 the feeling of response.

③ Check secure locking per each insertion by pulling the wire softly in order to check that the contact does not come off of the housing. Besides, check whether there is the backlash in the direction of the insertion axis.
(When the wire is pulled with too much force, the contact lance may be deformed and the contact may come off of the housing.)

5-2 Binding position of the harness

When the contacts are bound after inserting into the housing, do not bind them around the housing entrance but bind them approx. 50 mm away from the housing so that the backlash of the contact is not gone inside the housing.
If the binding position is too close to the housing entrance, a load concentrates on one circuit (especially end circuits), which may result in wire cutting.



5-3 How to extract the crimped contact from the housing in case of mis-insertion

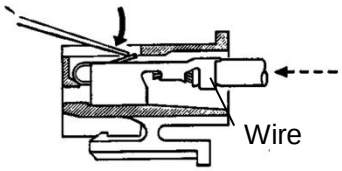
When the crimped contact is inserted into an improper circuit hole, keep the below:

① Do not reuse the housing and the contact that have been used one but use new ones.

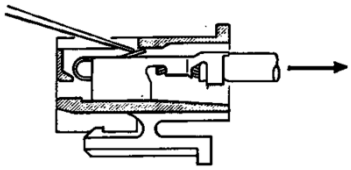
② When the contact that has been inserted in an improper circuit is extracted from the housing and the contact is reused:
- Only a specified person do the operation.
- In case such contact and housing are reused, the reuse should be once. From twice, use the new contact and housing.
- After the modification completes, be sure to check in item 5-1 ③. When the contact comes off of the housing, use the new housing.

How to extract the contact

① Push the wire to disengage the lance, and push the lance with the aid of a flat metal piece which width is same as the lance.



② Pull out the wire pushing the lance, and the contact can be extracted.



How to raise the housing lance

Insert a flat metal piece like knife between the lance and the contact, and raise the lance. (the lance height: approx. 0.6 mm)
Do not use something like a needle to raise the lance, since it enters the hole to disengage the lance, which may result in the deformation of the mating part.