Title of Document:	HANDLING MANUAL	Issue No. CHM-1-239	Rev. 2
Customer:		Issue date: February 15, 2001	
Title subject:	Bullet Terminal	Revision date: February 21, 2021	

This handling manual descries points to check for smooth crimping operation of bullet terminal.

C O N T E N T S

JST	Title subject: Bullet Terminal	No. CHM-1-239

1. Model Number

1.1 Model number of bullet terminal

Part name	Model No.	Material (plating)	Size (diameter)
ϕ4 male bullet	SGM-51-4	Brass	ϕ 4
	SGM-51T-4	Brass (tin-plated)	
ϕ 4 female bullet	SGF-41T-4	Brass (tin-plated)	
ϕ 5 male bullet	SGM-21-5	Brass	ϕ 5
	SGM-21T-5	Brass (tin-plated)	
	SGM-51-5	Brass	
	SGM-51T-5	Brass (tin-plated)	
ϕ 5 female bullet	SGF-21-5	Brass	
	SGF-21T-5	Brass (tin-plated)	
	SGF-51-5	Brass	
	SGF-51T-5	Brass (tin-plated)	
	SGF-51-5A	Brass	

Note$_1$: SGF-51-5A is low insertion force type.
Note$_2$: Mating with terminals of the same size (diameter) is applicable.
The applicable mating combination is the ϕ female bullet terminal for ϕ4 male one and ϕ 5 female bullet terminal for the ϕ 5 male one.

1.2 Crimping applicator and die set

Model No.	Press	Applicator	Die set
SGM-51(T)-4	AP-K2( )	MKS-L	MK-DS SGM51-4
SGF-41T-4			MK-DS SGF41-4
SGM-21(T)-5			MK-DS SGM21-5
SGM-51-5			MK-DS SGM51-5
SGM-51T-5			MK-DS SGM51T-5
SGF-21(T)-5			MK-DS SGF21-5
SGF-51(T)-5/SGF-51-5A			MK-DS SGF51-5

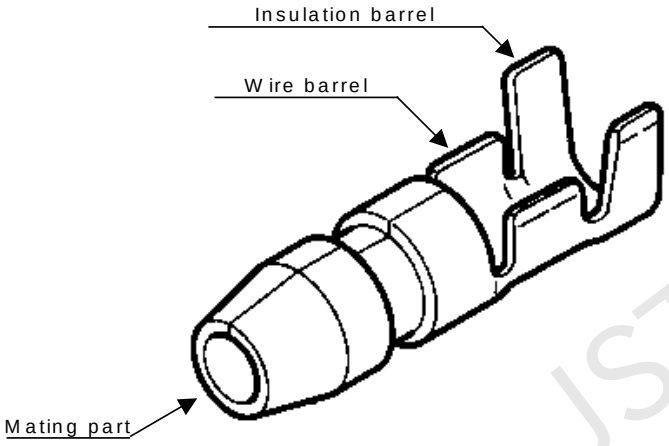
Note$_3$: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the performance of the crimped product.

2. Applicable Wire

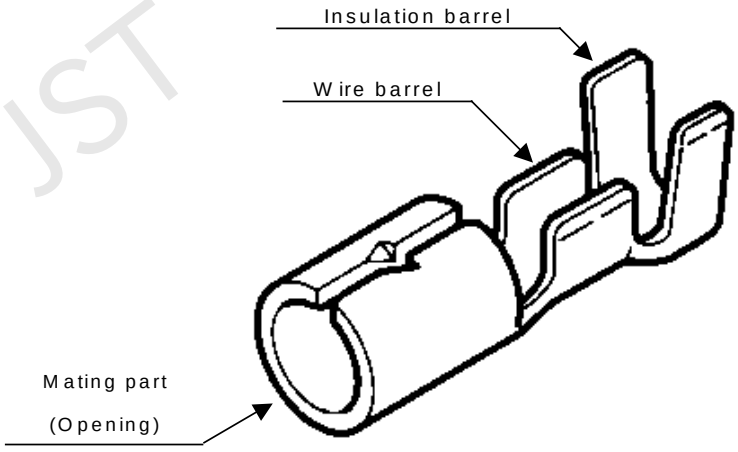
Model No.	Applicable wire	
	Conductor cross-sectional area (mm^2)	Wire insulation outer dia. (mm)
SGM-51(T)-4 SGM-51(T)-5 SGF-51(T)-5 SGF-51-5A	0.5 ~ 2.0	ϕ2.6 ~ ϕ3.8
SGF-41T-4	0.5 ~ 1.25	ϕ2.6 ~ ϕ3.5
SGM-21(T)-5 SGF-21(T)-5	0.3 ~ 0.75	ϕ1.7 ~ ϕ2.9

3. Structure and Name

Before processing and assembly, be sure to understand the structure and the name of each part.



Male terminal



Female terminal

4. Storage

4-1 Storing the connectors

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) and dusty place.

Note that the resin molding part may break due to transportation and handling, such as processing and mating, under dry or low temperature condition.
After unpacking, return the products in the original package to store.

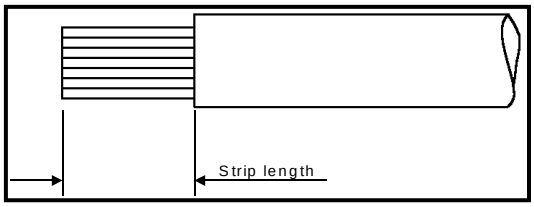
4-2 Storing the crimped terminals

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.

5. Crimping Operation

5-1 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 type of wire and crimping method, decide the best wire strip length considering the processing condition. The dimension indicated in ( ) is a target.



Model No.	Reference value of strip length
SGM-51(T)-4/SGM-51(T)-5/ SGF-51(T)-5/SGF-51-5A	5.1 ~ 5.5 (5.3) mm
SGF-41T-4	4.9 ~ 5.3 (5.1) mm
SGM-21(T)-5/SGF-21(T)-5	4.7 ~ 5.1 (4.9) mm

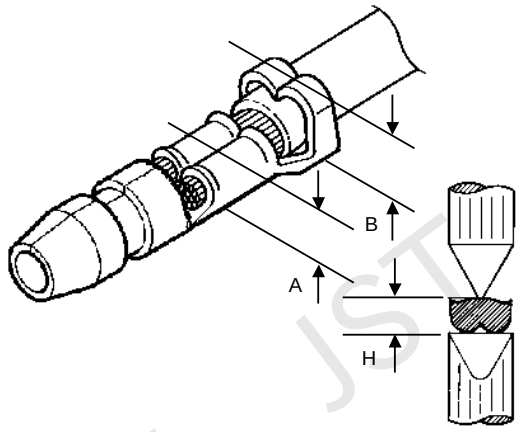
5-2 Crimping

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

5-2-1 Crimp height

According to wires to be used, adjust the dials (conductor part and insulation part) of the applicator to a proper crimp height.
Check that requirements of the table in next pages are satisfied.

5-2-2 Measurement of crimp height



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 kind of wires so that the wire insulation does not come off the contact easily and is not crimped excessively.

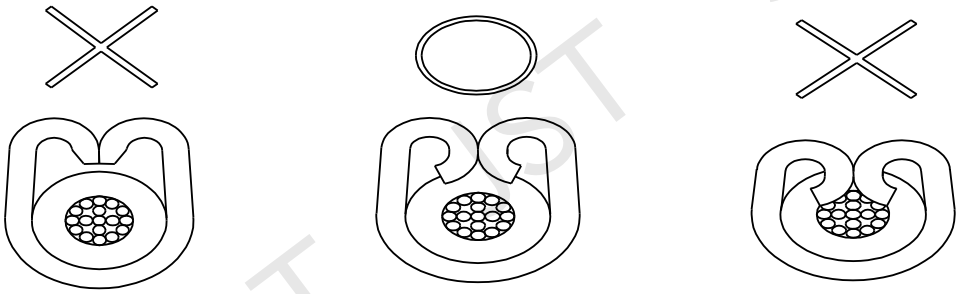
H: Measure the crimp height at the center of the wire barrel using a specified micrometer.

5-2-2-1 Crimp height table

Model No.	Wire size		Crimp height (mm)		
	mm^2	AWG	Core conductor part (±0.05)	Insulation part*	
SGM-51-5 SGM-51(T)-4	0.5	#20	1.55	3.0	AV
	0.85	#18	1.60	3.1	AV
	1.25	#16	1.70	3.2	AV
	2.0	#14	1.80	3.3	AV
SGM-51T-5	0.5	#20	1.60	3.2	VSF
	0.75	#18	1.70	3.3	VSF
	1.25	#16	1.80	3.4	VSF
	2.0	#14	1.90	3.5	VSF
SGF-51(T)-5 SGF-51-5A	0.5	#20	1.40	3.3	VSF
	0.75	#18	1.45	3.5	VSF
	1.25	#16	1.55	3.6	VSF
	2.0	#16	1.60	3.7	VSF
SGF-41T-4	0.5	#20	1.20	2.9	AV
	0.85	#18	1.25	2.9	AV
	1.25	#16	1.30	3.0	AV
SGM-21(T)-5	0.3	#22	1.45	2.9	KV
	0.5	#20	1.50	3.1	VSF
	0.75	#18	1.60	3.2	VSF
SGF-21(T)-5	0.3	#22	1.25	2.8	KV
	0.5	#20	1.30	3.0	VSF
	0.75	#18	1.40	3.1	VSF

$Note_4$: The range of the crimp height of the core conductor part is ± 0.05 mm in all combinations.
$Note_5$: The crimp height at the insulation part is reference values when using the described wire style. In case of other wire combination, adjust the crimp height at the insulation part with, referring to item 4.2.1.3 crimping condition.
$Note_6$: Note that the crimp height of SGM-51T-5 (plated) is different from that of SGM-51-5 (non-plated).

5-2-2-2 Crimping condition at wire insulation barrel



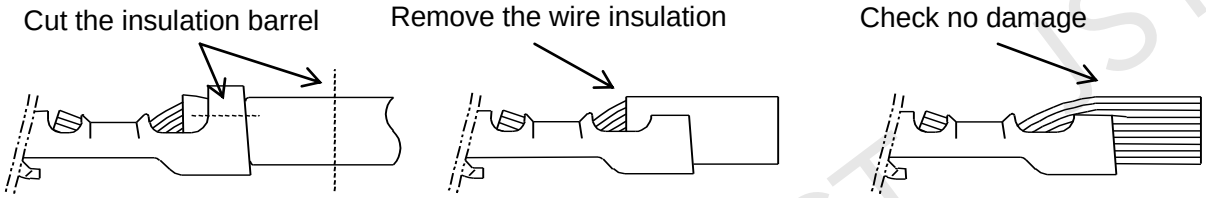
Insufficient crimping
(pressed weak)
When tension is applied to a wire, the wire insulation easily comes off of the contact.

Good

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

5-2-2-3 Checks 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.



5-2-3 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.

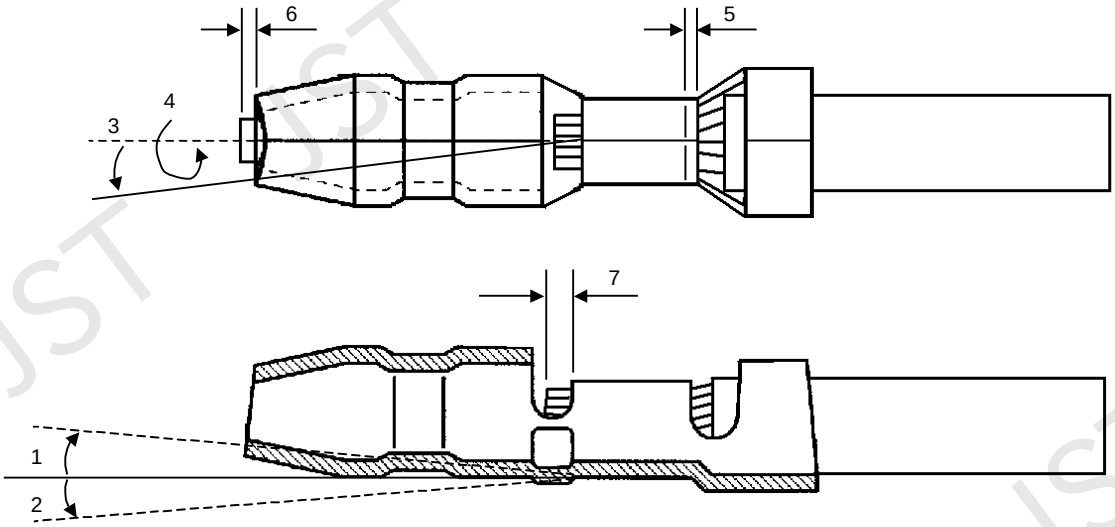
Unit: N

Wire size		Tensile strength at crimped part
mm^2	AWG	
0.3	#22	38 min.
0.5	#20	60 min.
0.75/0.85	#18	80 min.
1.25	#16	130 min.
2.0	#14	190 min.

5-2-4 Crimping appearance

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

Appearance:
- Not project cutting burrs at the cut-off part from the contact bottom surface
- No deformation at the mating part, etc.
- Satisfy the requirements of the crimped appearance shown in the following table



No.	Item	Reference value (mm)
1	Bending up	8° max.
2	Bending down	8° max.
3	Twisting	5° max.
4	Rolling	8° max.
5	Bell-mouth at wire side	0.2 ~ 1.0 mm
6	Cut-off length	0 ~ 0.5 mm
7	Wire conductor protruding length	0.5 ~1.0 mm

5-3 Precautions for crimping operation

① Conduct crimping operation properly and inspect the crimping appearance of the crimped product with loupe, etc.
Note$_7$: 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 terminals 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.

5-4 Precautions for handling the crimped terminal

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

① Protect the contacts to prevent from the deformation and the adhesion of foreign substances, and keep them in an adequate box.
In bundling the harnesses, limiting the number of the contacts to be bundled to the degree that they are not deformed, and protecting the contact part.

② 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 defective contacting.

③ When the crimped contact is taken out of the bundle, do not pull wires but hold them near the crimped section and take it out.

6. Harness Assembly Operation

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

6-1 Before inserting the crimped terminal into the housing

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 stain the contact with household goods, such as oils, detergent, seasoning and fruit juice. If stained, never use the stained contact.
③ Do not use the terminal improperly crimped and deformed.

6-2 Harness assembly operation

6-2-1 Mating operation
Hold the terminals and mate them along the mating axis.
Tilting and prying the terminals in mating may have them deformed, leading to poor contact.

6-2-2 Unmating operation
Unmate the terminals along the mating axis.
Do not pry the terminals in unmating, because they may be deformed.

- In case of the both-ended harnesses, note that wires are not pulled strongly, and they are not pulled together during withdrawing the terminal at one side.