Title of Document: **HANDLING MANUAL**	Issue No. TCM-0-032	Rev. 3
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This manual describes control points about harness proecssing operation for insulation displacement connector (IDC) of ASR connector by using JST's fully automatic insulation displacement (ID) machine, pneumatic ID machines and hand presses.

Refer to handling manual of ID machine for smooth operation as well.

C O N T E N T S

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1. Composition and Parts Identification

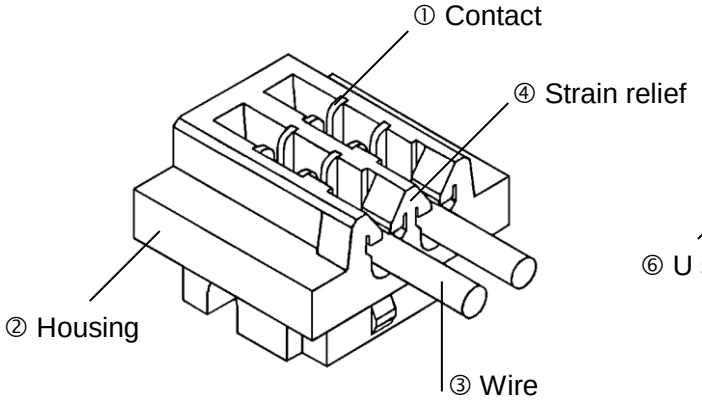


Fig.-1 Harness

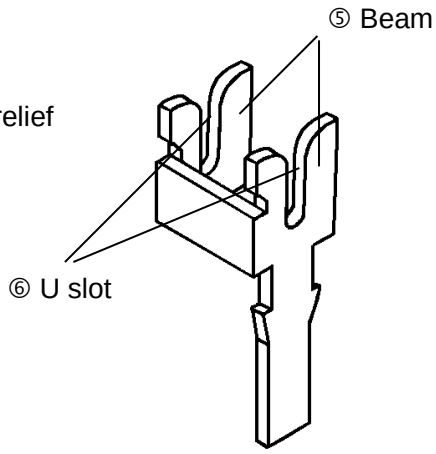


Fig.-2 Contact

(4) Strain relief: ....It retains wire insulation not to apply external load that places on wires to U slot.
(5) Beam: .....Two beams have an individual U slot construction.
(6) U slot:.....It cuts wire insulation to contact with wire conductors electrically and mechanically.

2. Storage

2-1 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.

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 products in the original package to store.

2-2 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.

3. Applicable Wire

3-1 Wire size, UL style and wire insulation outer diameter

Wire size	UL style	Material of insulation	Insulation outer dia.
AWG #30	UL1571	PVC	ϕ0.56 ± 0.02 mm
	UL10625	Halogen-free	ϕ0.52 + 0.01/–0.02 mm

Note$_1$: Use wires that we've confirmed the applicability.

3-2 Wire conductors:..... 7 stranded wire (Annealed wires with tin plating)

4. Applicable ID Tools

4-1 Hand press and pneumatic press

ID tools and model No.	ID applicator model No.
Hand press model No.: HPD-M2A	H2-ASR20ED-X
	H2A-ASR
Pneumatic press Model No.: AP-2, AP-2H	H2A-ASR

Note$_2$:When termination is conducted by using other than the above press, JST cannot guarantee the performance of the connector.

4-2 Automatic ID machine

Contact JST for the model number of automatic ID machines.

Note$_3$: When termination is conducted by using other than the above press, JST cannot guarantee the performance of the connector.

5. Model Number, Housing Color and Applicable Wire Size

Model No.	Applicable wire
**ASR-30( )	AWG #30

Note$_4$: Two-digit figures denote the circuit number. e.g.) 2 circuits……02
A letter in ( ) denotes the connector color.

6. Control Points of Terminating Operation

Check the following points to conduct an appropriate terminating operation.

6-1 Check ID machine operates properly.

Refer to the handling manual of the ID machine before conducting an operation.

Main check points

① Automatic ID machine
- Check the operation sequence is normal.
- Check the bowl-feeder and the straight chute run normally.
- Check wire tension is appropriate.
- Check the wire measuring system operates accurately.
- Check the connector is set at the proper position.

6-2 Check the connector size fits to wire size.

6-3 Check wire color and wire length conform to the drawing.

6-4 Check the termination depth is applicable. (Refer to item 7 “Termination Depth.”)

6-5 Check the wire retention force satisfies the specified value. (Refer to item 8 “Wire Retention Force.”)

6-6 Check the termination appearance is good. (Refer to item 9 “Termination Appearance.”)

6-7 Check whether connectors with different circuit No. or wire size used in previous operation do not remain in the bowl-feeder or the straight-chute of the automatic ID machine.

6-8 Conduct periodically cleaning to remove wire chips and connector cutting residues.

7. Termination Depth

Applicable termination depth is stated below.

7-1 Termination appearance

Wires must be located under the protrusion of the strain relief of the connector as shown in Fig.-3.
Rigid condition of wire insulation and the connector may cause a large wrinkle on wire insulation at the strain relief part of the connector as shown in Fig.-4.
If such a wrinkle is found, be sure to check the wire retention force referring to item 8 “Wire Retention Force.”
When the measured wire retention force satisfies the specified value mentioned in item 8, the termination
has no problems.

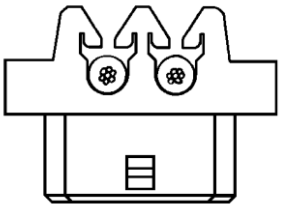


Fig.-3

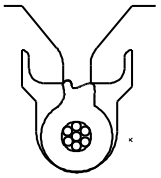


Fig.-4 (Example of wrinkling)

7-2 Wire conditions at the termination part (U slot part)

After termination, cut off the shaded area (the strain relief and the housing wall) of the housing as shown in Fig.-5 and pick up the connector contact with the terminated wires by using pliers.
Then, hold down the wires as shown in Fig.6 and take them out of the contact U slot with care.

Observe the wires caught between the U slots. Fig.7 shows good termination.
Do the observation soon after the wires are pulled out because of elasticity that the wire insulation returns to the original condition by the lapse of time.

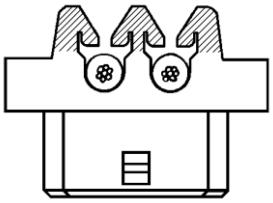


Fig.-5

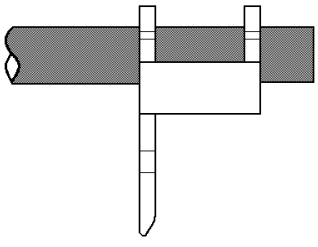
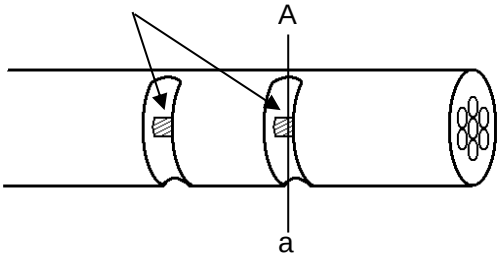
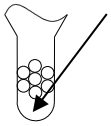


Fig.-6

Conductors can be seen.



Wire insulation remains.



Cross section at A - a

Fig.-7

7-3 Termination depth dimension (Reference value)

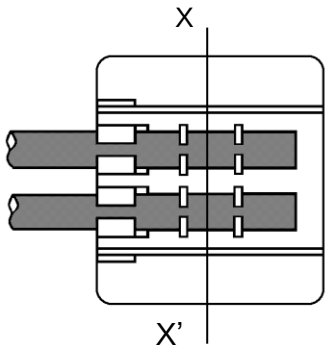


Fig.-8

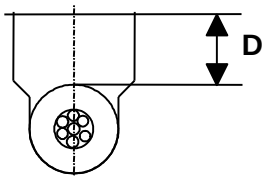


Fig.-9

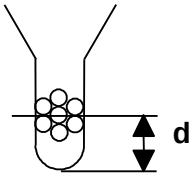


Fig.-10

Measure the termination depth dimension “D” in Fig.-9 at X-X’ part in Fig.-8, where is in the middle part of two U slots and a flattened part pressed by a termination punch, and check it satisfies the specified value in the following table.

Table-3

Wire size	UL style	Insulation O. D.	Termination depth
AWG #30	UL1571	ϕ0.56 $\pm$0.02 mm	0.55 $\pm$0.05 mm
	UL10625	ϕ0.52 $+$0.01/$-$0.02 mm	0.61 $\pm$0.04 mm

Note$_5$: Contact JST for the use of UL style other than the above mentioned.

Regarding the measurement of termination depth dimension, refer to appendix IDC Manual No. TCM-0-002 “Method of Measuring Termination Depth by Dial Depth Gauge.”

The termination depth dimension for ID connectors is similar control points to crimp height for crimp type connectors, but it is totally different in principle.
Crimp height for crimp type connectors is one of important control points, because a coefficient of wire conductors greatly fluctuates, having a great impact on electrical and mechanical connection with the connector.

On the other hand, U slot dimensions of ID connectors varies every wire size, and connection between wire conductors and a connector is decided according to U slot dimension.
Therefore, it is good to control where wire conductors are located in U slot.
This is the concept of termination depth.

The termination depth which is measured at the dimensions between the terminated wire insulation and the housing datum plane is subject to influence by wire hardness and wire outer diameter. Thus, the value of the termination depth is reference values, not absolute ones.

Exact termination depth is to measure “d” between the bottom of the slot and the position of center core wire of wire conductors as shown in Fig.-10; however, it is very troublesome to conduct daily.
Thus, JST specifies termination depth dimension “D” in Fig.-9 instead of “d” by measuring the conditions of wire conductors in U slot and wire retention force.

7-4 Shallow termination depth……Insufficient termination

When termination is insufficient,

① Wire insulation is not located under protrusions of the strain relief as shown in Fig.11.
② Wire conductors in U slot are hardly seen or not seen at all as shown in Fig.-12.

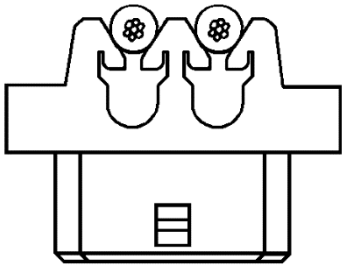


Fig.-11

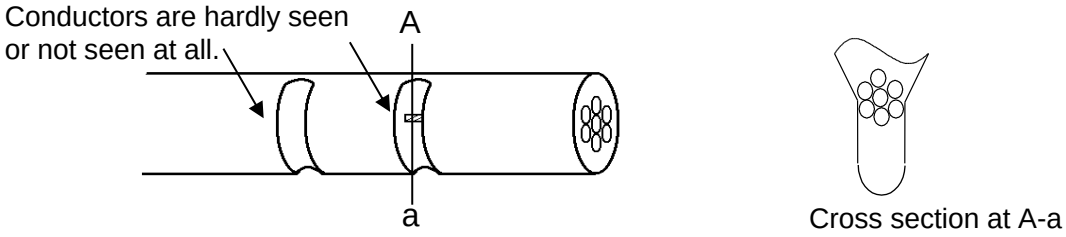


Fig.-12

7-5 Deep termination depth……Excessive termination

When termination is excessive,

① Wire insulation is cut at the bottom of the U slot and wire conductors are visible as shown in Fig.-13.
② Dents caused by a termination punch appear on the flange of the housing as shown in Fig.-14.

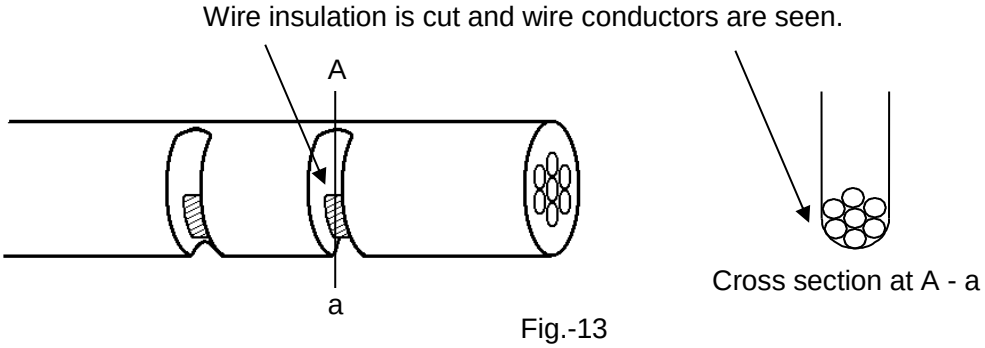


Fig.-13

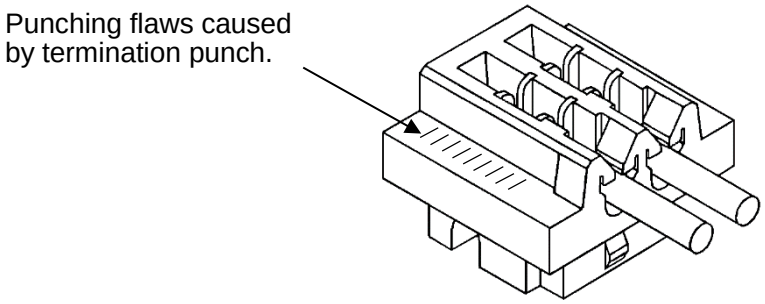


Fig.-14

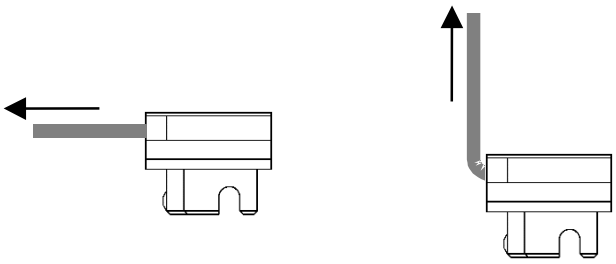
8. Wire Retention Force

Pull a terminated wire one by one in the direction of arrow in Fig.-15 and measure the force to separate the wire from the contact by a push-pull gauge. (Wire retention force)
Then, check that the measured wire retention force satisfies the value specified in the following table.

Refer to appendix manual No. TCM-0-005 “Method of Measuring Wire Retention Force” for how to measure the wire retention force.

Table-4

Wire	Material of insulation	Parallel	Perpendicular
AWG #30	PVC	8N min.	4N min.
	Halogen-free	8N min.	3N min. (End circuits: 4N min.)



Parallel direction Perpendicular direction

Fig.-15

9. Termination Appearance

Inspect the following points after termination.

9-1 Dents on the housing caused by a termination punch……Housing must be free from flaws.
When the connector set position deviates to the pitch direction, scratches and deformation caused by the termination punch may appear at the shaded area of the housing as shown in Fig.-16.

9-2 Flaws and deformation at the contact beams……The beams must be free from flaws and deformation.
When the connector set position deviates to the wire axis direction, scratches and deformation caused by the termination punch may appear at the contact beams as shown in Fig.-17.
In this case, note that not only the contact but also the termination punch may be damaged.

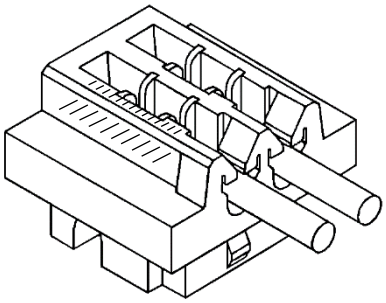


Fig.-16

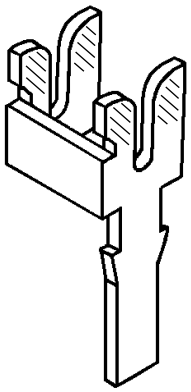


Fig.-17

9-3 Exposure of wire conductors around the beams of the contact……Wire conductors must not be exposed.

When the connector set position deviates to wire axis direction, wire conductors are sometimes visible at the front or back of the beams of the contact as shown in Fig.-18.

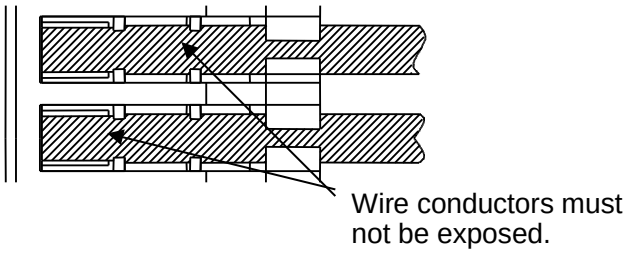


Fig.-18

9-4 Gap between the housing wall and wire front end (Wire protruding length)
Gap “G” between the housing wall and wire front end in Fig.-19 should be 0.2 mm max.

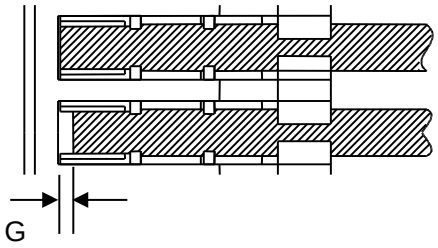


Fig.-19

9-5 Overrun of wires……Wires must not overrun.
When wire tension is inadequate, wires may overrun as shown in Fig.-20.

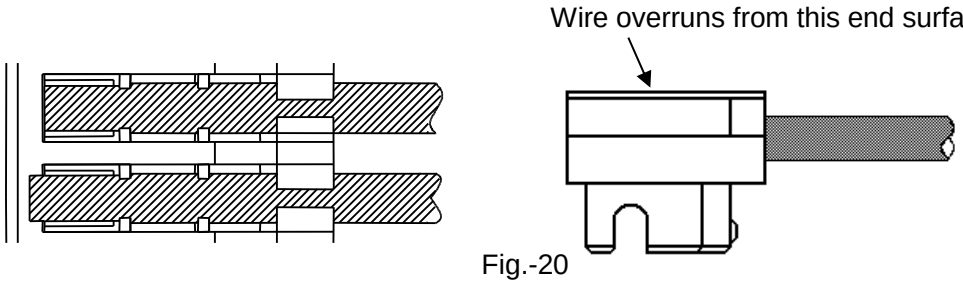


Fig.-20

9-6 Deviation of insulation displacement center……Deviation of insulation displacement center must not happen.

When the connector set position or a wire deviates to the pitch direction, a termination punch, a wire and the U slots do not align with deviating the insulation displacement center as shown in Fig.-21 and -22.

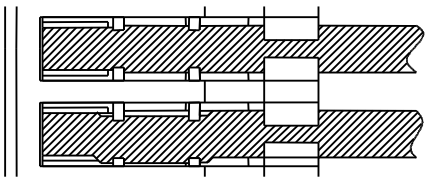


Fig.-21

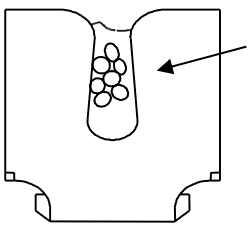


Fig.-22

10. Packing

10-1 Packing method

Bundle the harnesses with a rubber band per unit quantity (example: 10 sets, 50 sets) to prevent them from getting entangled with each other, and put it in the product boxes.
(Bundle them with a rubber band, keeping approx. 30 mm away from the connector.)
Give consideration for not damaging the connector, such as wrapping a bubble wrap, when packing.

11. Harness Inspection

Inspect the following points.

Inspection points	Inspection method	Requirements
(1) • Harness dimensions • Wire strip length	• Verification with drawings • Caliper (or a scale)	• Satisfy drawing dimensions.
(2) Wires to be used • Wire color • Wire size • UL style, etc.	• Verification with drawings • Visual inspection	• Wire colors conform to drawings. • Wire size and UL style conform to drawings.
(3) Termination depth • Wire conditions • Termination depth dimensions	See item 7 Termination Depth	See item 7 Termination Depth
(4) Wire retention force	See item 8 Wire Retention Force	See item 8 Wire Retention Force
(5) Dents on housing caused by termination punch.	Observe terminated housing visually or by stereomicroscope. See item 9-1 Dents on the housing caused by a termination punch.	Housing must be free from dents caused by a termination punch.
(6) Flaws and deformation at the beams of the contact.	Observe terminated contact beam visually or by stereomicroscope. See item 9-2 Flaws and deformation at the contact beam.	The contact beams must be free from scratches and deformation caused by a termination punch.
(7) Wire conductors expose around the contact beams.	Observe conditions of wire conductors around contact beams visually or by stereomicroscope. See item 9-3 Exposure of wire conductors around the beams of the contact.	Wire conductors must not be exposed.
(8) Gap between the housing wall and wire front end	Measure by a gauge, projector. See item 9-4 Gap between the housing wall and wire front end.	Gap: 0.2 mm max.
(9) Overrun of wires	Observe wire tip visually or by stereomicroscope. See item 9-5 Overrun of wires.	Wire must not overrun.
(10) Deviation of insulation displacement center	Observe terminated wire visually or by stereomicroscope. See item 9-6 Deviation of insulation displacement center.	According to the limit samples

Refer to the attached limit samples.

12. Other Precautions

Be sure to conduct termination operation under the condition that wires are set in all circuits. When even one wire is not set in termination, both-sided circuits of the vacant circuit is affected, possibly leading to breakage on the strain relief.
If wire-omitted condition is required (pin-omitted condition for crimp type connectors), cut a wire of the relevant circuit after terminating all circuits.