



NOTE

1. All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.13 [$\pm .005$] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.
2. Connectors can only be used with approved combination of TE machines and TE approved wires. Contact sales representative for approved combination list or to initiate an approval for a new combination IDC TE Connector – TE Termination machine – wire.
3. According to RAST guidelines and for a proper machine functioning at least one keying rib has to be kept on the finished configuration.

1. INTRODUCTION

This specification covers the requirements for application of MONO-SHAPE and MONO-SHAPE LONG Mark I IDC Connectors for direct PCB (Printed Circuit Board) installation.

Basic terms and features of this product are provided in Figure 1.

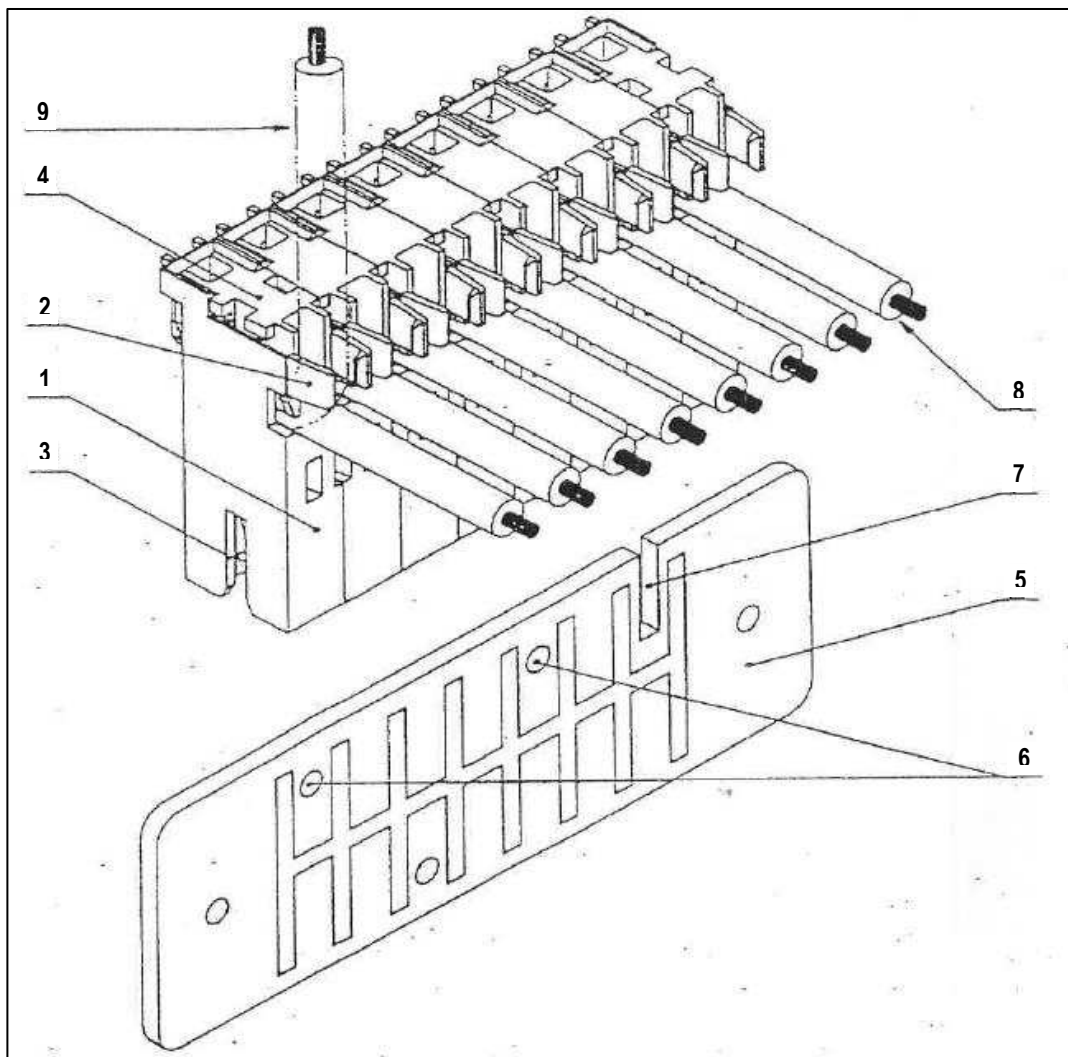


Figure 1 (continued)

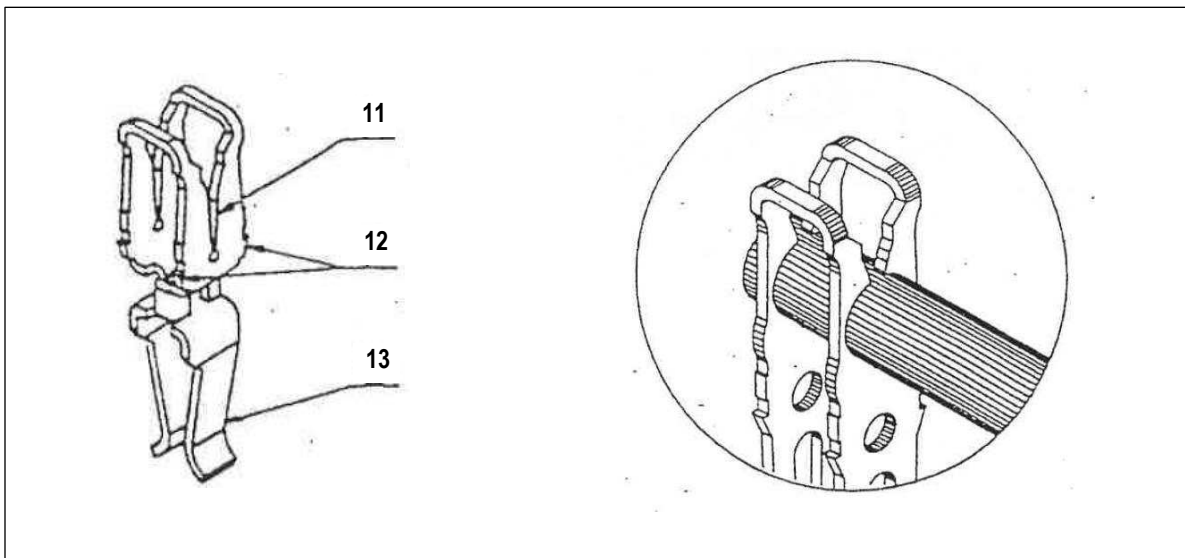
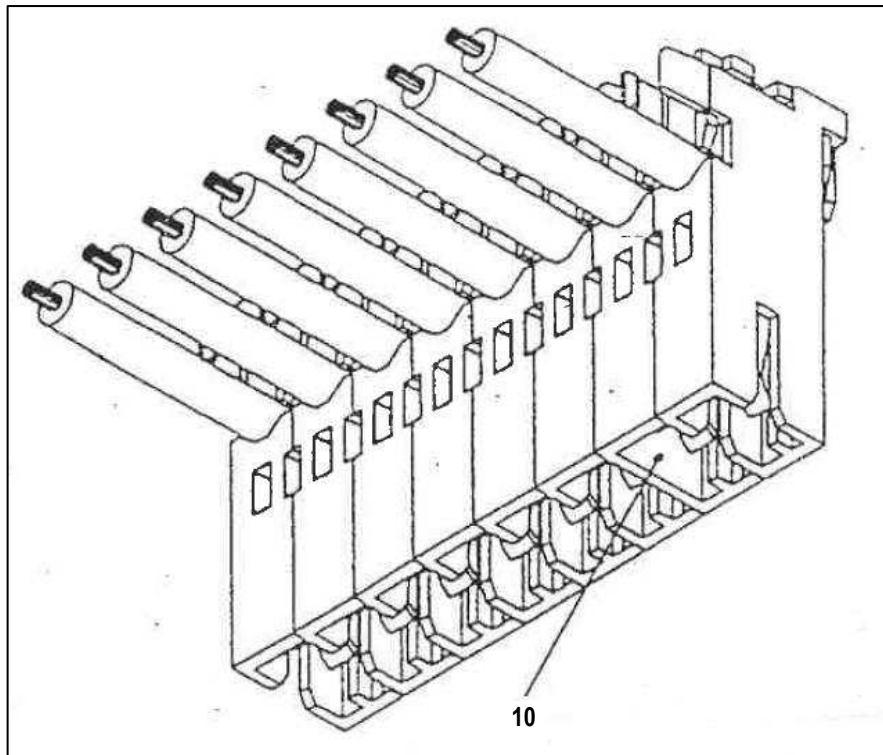


Figure 1 (continued)

Key Feature Number	Feature Description
1	Front
2	Connecting Tabs
3	Cavity for PCB/Polarization
4	Cover
5	PCB
6	Cavities for Locking Latches
7	Polarization Cavity (Example)
8	90° wires exit
9	180° wires exit
10	Polarization Tab – Position of tab can vary
11	“V”-shaped slot (electrical connection) for insulation displacement
12	Retention features (acting on cavity)
13	Contact springs (suitable for 1.5 ± 0.14 mm PCB)

Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this Application Specification include:

- Updated template and logos to comply with corporate standards.
- Added 0.35 mm² wire size.

2.2. Customer Assistance

Customer Drawing 282042 and Product Code 0319 are representative of MONO-SHAPE Mark I IDC Connectors, PCB version. Use of these numbers will identify the product line and help you to obtain product and tooling information when visiting www.te.com or calling the number at the bottom of page 1.

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. Information contained in the customer drawing takes priority.

[282042](#) MONO-SHAPE, MKI PCB Connector 2 – 12 Position

2.4. Specifications

Product Specifications (108-series) provide product performance and test results.

[108-20067-1](#) Product Specification for MONO-SHAPE 5 mm Pitch IDC Connectors for Printed Circuit Boards (English)

2.5. Instructional Material

Instruction sheets (408-series) provide product assembly instructions or tooling setup and operation procedures and customer manuals (409-series) provide machine setup and operating procedures. Instructional material that pertain to this product are:

- [107-20065](#) Packaging Specification for AMP MONO-SHAPE Connector
- [412-18756](#) Instruction Sheet for Hand Tool (P/N 528015-7)

3. REQUIREMENTS

3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

3.2. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the product material.

B. Shelf Life

The product should remain in the shipping containers until ready for use to prevent deformation to components. The product should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

C. Chemical Exposure

Do not store product near any chemical listed below as they may cause stress corrosion cracking in the material.

Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites		Tartrates

3.3. Packaging

Figure 2 shows the packing methods for this connector and reeling direction of the product. The connectors are linked in chains by the connective tabs. The cover shall be connected to the housing as shown. Details of the packaging are reported in the Packaging Specification.

Few connecting tabs missing are acceptable without affecting the chaining retention.

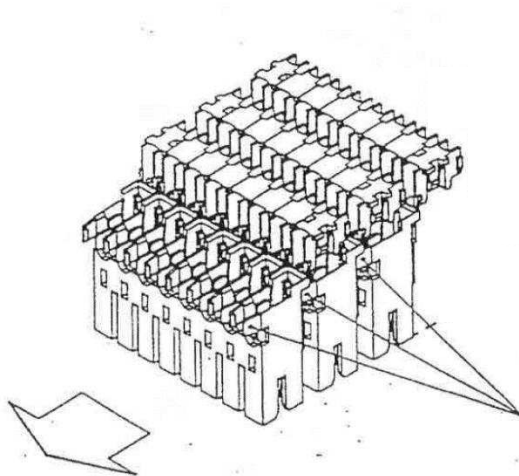
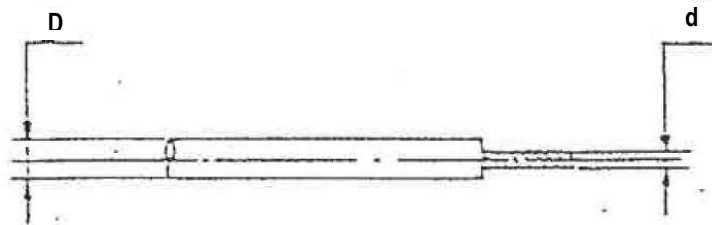


Figure 2

3.4. Wire Selection

Figure 3 lists wire sizes suitable for the IDC connectors with 5 mm pitch for direct PCB installation.



Wire Size [mm ²]	Wire Type	Strand Material	Wire Strand Nominal Diameter ("d") [mm]	Insulation Diameter (max) [mm]	Single Strand Diameter (min) [mm]	Number of Strands
0.50	H05V-K (70°C max) or FR 3/2 (105°C max)	Copper and Tinned Copper	0.9	2.6	0.21	15
0.75	H05V-K (70°C max) or FR 3/2 (105°C max)	Copper and Tinned Copper	1.1	2.8	0.21	21

Figure 3

3.5. Connector Requirements

A. Contact

The contact should not be visibly deformed. Contacts shall not show any kind of damage caused by the application of the wire by the insulation displacement termination technique. The contact is to be placed in the cavity as shown in Figure 4 in the indicated direction; this direction is determined by the shape of the cavity. Checking the shown dimension will be done before the wire is put in place. The dimension must match the customer drawing 282042.

B. Visual Inspection

The following features are to be checked with reference to Figure 4.

Feature Number	Feature Description
1	Control zone of the contact after termination
2	Retention pins for contact cavity application
3	Cover clip front retention
3a, 4a	Slots for cover front and back retention
4	Cover clip for back retention
5	Additional cover retention on lateral end ways
6	Contact Position: 1.5±0.2mm (See Customer Drawing 282042)

Figure 4 (continued)

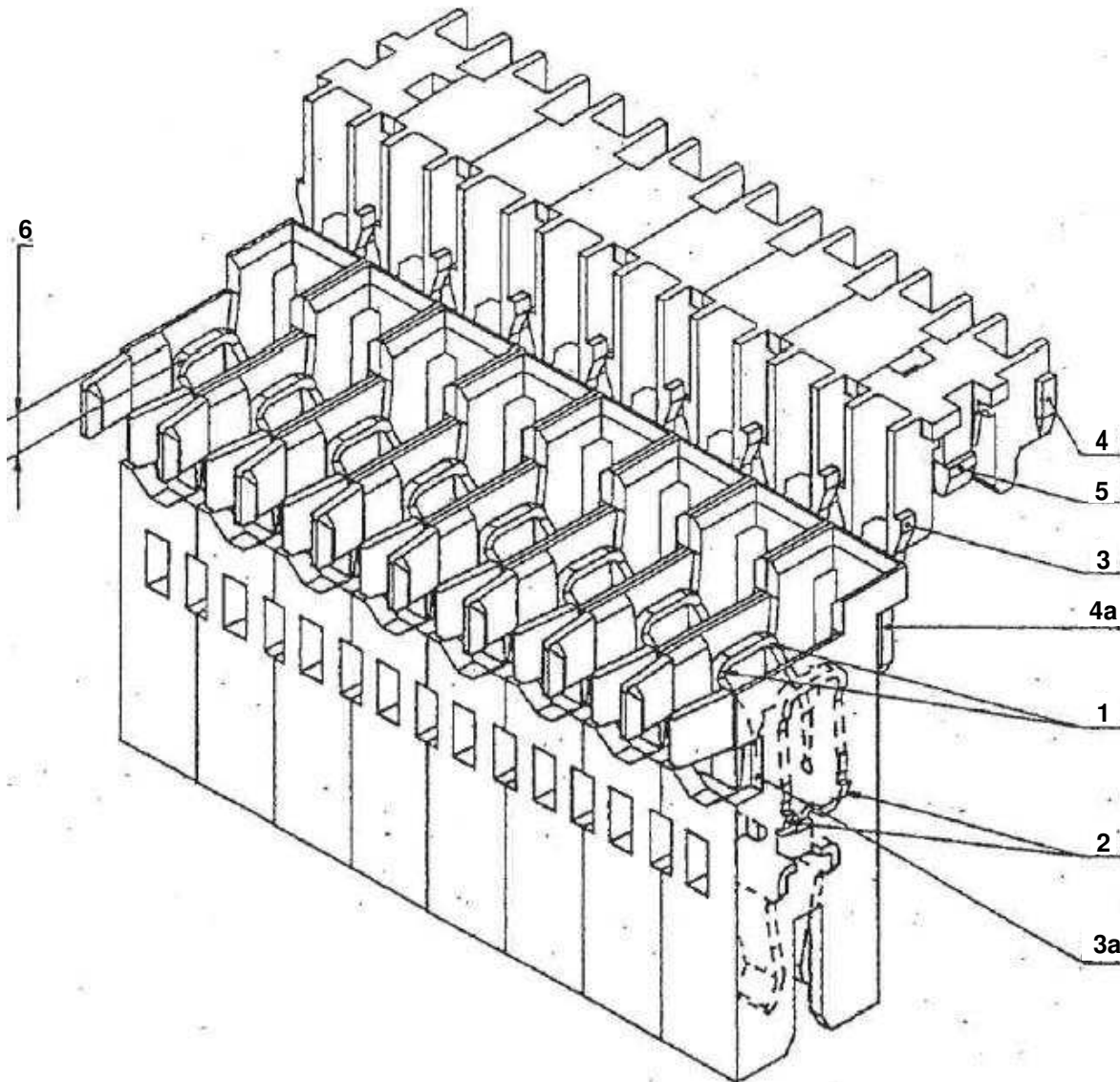


Figure 4 (end)

C. Contact Retention in Housing

The contact retention in the cavity is provided by the retention pins shown in Figure 4, Feature 2. The product is supplied with all contacts loaded. The retention feature is dimensioned and shaped properly to avoid loosening of terminals due to connector handling before wire termination.

D. Wire Insertion Depth

An essential characteristic for the correct function of the insulation displacement technique is the wire insertion depth. The displacement of the insulation material caused by the “V” shaped slot in the contact assures the electrical connection. An examination of wire insertion depth is required. The wire strand shape will vary according to the different cross-section sizes of the wire in the contact zone. Dimension A in Figure 5 must be within the required limits. This dimension is the same for all wire sizes.

The arrangement of the strands after the wire application onto the connector is determined by the “V” shape of the connector and it changes along the height of the connector itself.

E. Position of Contact Within the Housing

After completion of all operations, the contact shall fit into the housing correctly in the indicated direction in Figure 4. This direction is determined by the shape of the. The application of the wire to the contact will cause the contact to be pushed deeper into the cavity, especially in cases of large wire sizes. Dimension 6 in Figure 5 must be within the required limits.

Product	Feature Letter	Description	Nominal Dimension [mm]	Tolerance [mm]
MONO-SHAPE MKI PCB	A	Wire Insertion Depth	15.1	+0.1/-0.2
MONO-SHAPE LONG MKI PCB	A	Wire Insertion Depth	17.1	+0.1/-0.2

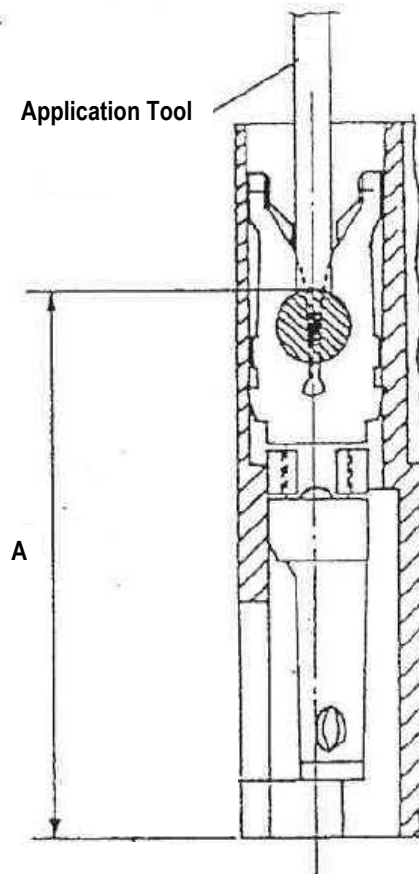


Figure 5

F. Wire Position Inside of Housing

The application of the wire inside the housing shall be checked as shown in Figure 6, Feature E. To avoid incorrect termination, wires must not touch the housing walls. Burr dimensions (Feature A) due to cover removal cut-off may not exceed 1.0 mm maximum.

G. Cover Position

The cover assures the wire strain relief and the covering of the connection, which helps to maintain the connections secure during the handling of the cables. Figure 6 shows relevant features. The front and back retentions of the cover shall be positioned on the housing as shown. The application of the cover does not cause the displacement of the insulation material of the wires. The cover is designed to fasten the connections between the wires and the contacts.

Feature Letter	Description	Dimension [mm]
A	Burr Dimension	1.0 (maximum)
B	Front Cover Retention Feature	
C	Back Cover Retention Feature	
D	PCB Locking Latches. Positions and quantities may vary.	
E	Distance Between Wire and Housing	0.6 (maximum); Wire not to contact housing

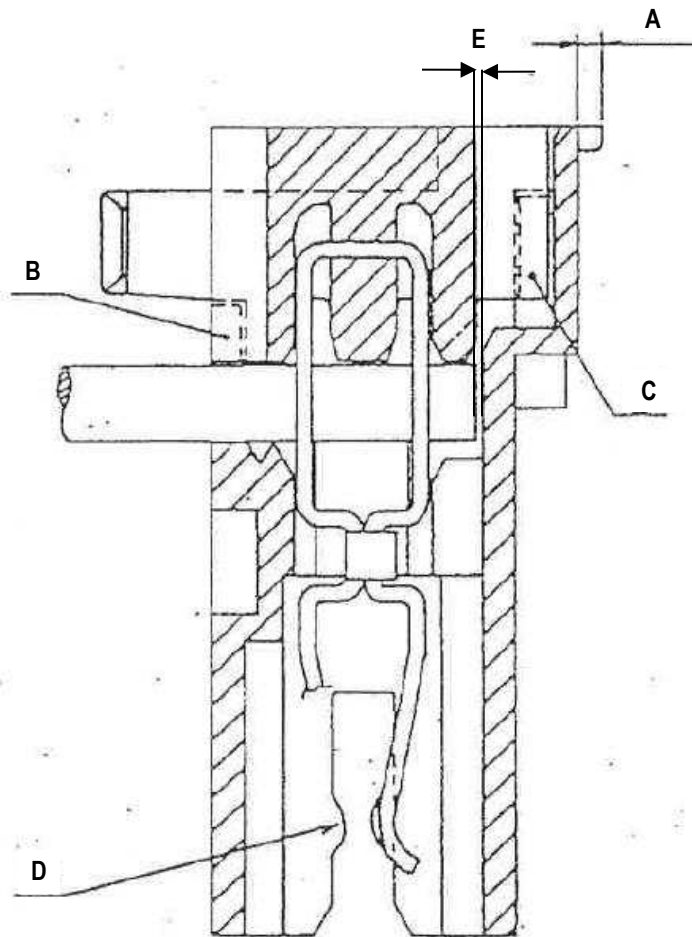


Figure 6

H. Cable Conditions

When terminated on an HHM machine, ensure that wires are not compressed or deformed, creating a bulge, or deforming plastic. See Figure 7 and Figure 8 for acceptable and unacceptable conditions.

**Acceptable
Cable Conditions**

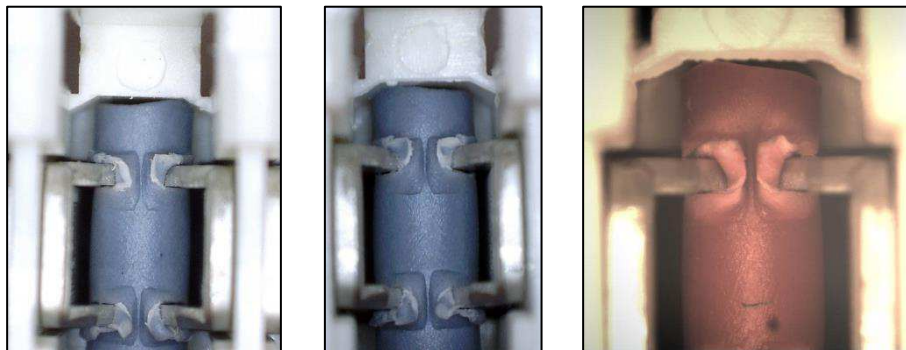


Figure 7

**Unacceptable
Cable Conditions**

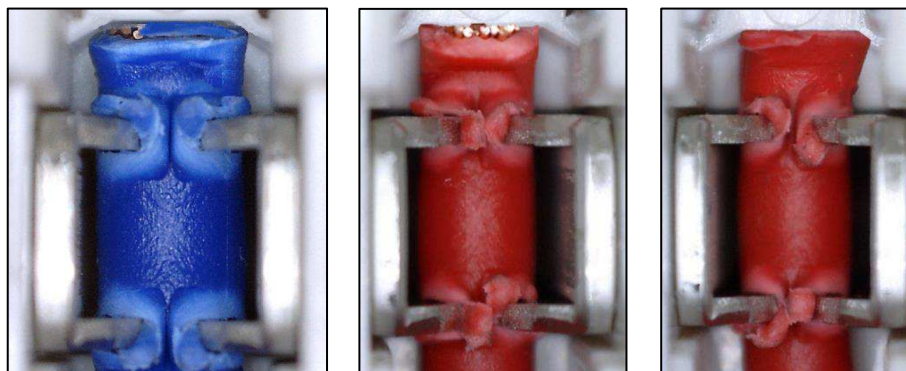
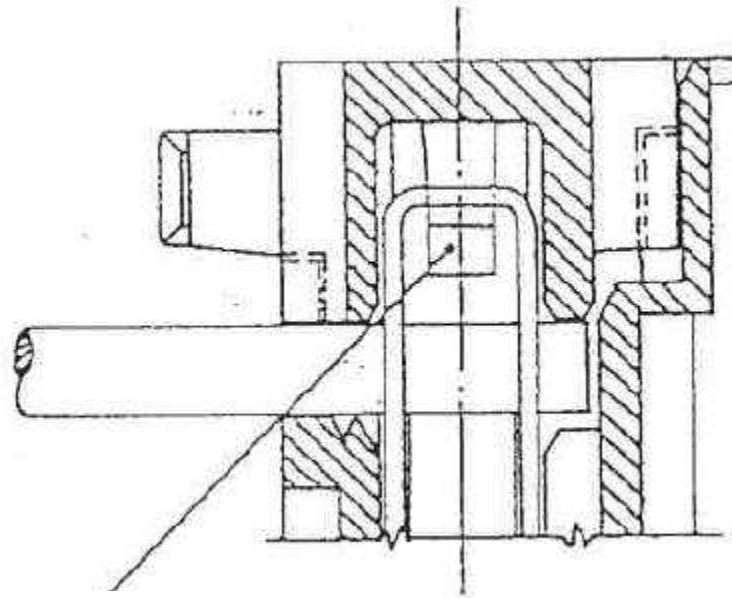


Figure 8

I. Cover Retention

Lateral end ways (first and last) assure an additive locking of the cover by means of pins latching the contacts as shown in Figure 9.



ADDITIONAL RETENTION

Figure 9

J. Inspection of Wires in IDC Slots

The position and disposal of the wire strands into the IDC slots is a means to be confident that production will fully meet the requirements of a good connection in terms of electro-mechanical performance. This control should be made each time that variables occur on the product, the application tools or the IDC harness process. (Variables are external factors not mentioned in this specification but could be added by the operators such as improper use of the application tooling, environments, dust, etc.)

The method suggested for examining the strands is known as the cross-section method. This method is destructive and consists in preparing a test connector sample straining cold resin in a special plastic shell (in which the connector sample has been properly fixed) using a resin added with a hardening component (max temperature increasing during hardening process 40°C e.g. resin type CYB-GEIGY ARALEDIT D + HY 956). When the resin is completely hardened (approximately six hours), take the cross section and polish the surface to be examined.

Figure 10 shows a cross section of a correct termination. The wire strands are compressed into the "V" slot of the IDC contact and approximately 40% of the strands are in contact with the slot blade. The PVC is separate from the copper wire in the slot. This is representative of a good and stable electrical connection.

Figure 11 shows a cross section of a poor termination. The wire strands are not compressed and not in contact with the slot blade. The wire is not completely inserted into the slot and the PVC separation is incomplete. This is representative of a non-stable and poor electrical connection.

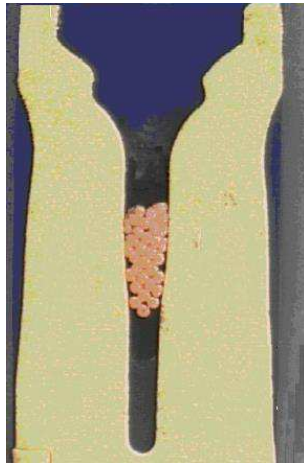


Figure 10



Figure 11

K. Breakages of the Connecting Tabs

Breakage of the connecting tabs (chaining hooks) is accepted with the limit shown in the below table. The external tabs cannot be missing.

This is not affecting the product performance and the chaining retention function is kept. This is applicable before or after termination.

Pos.	Connecting Tabs	Accepted breakages
2	4	0
3	6	1
4	8	1
5	10	1
6	12	2
7	14	2
8	16	2
9	18	3
10	20	3
11	22	3
12	24	3

4. QUALIFICATION

4.1. Underwriters Laboratories Inc. (UL)

MONO-SHAPE Mark I IDC connectors are recognized by Underwriters Laboratories Inc. (UL) in File E28476, Report Issue Date 1997-10-27.

4.2. Verband der Elektrotechnik (VDE)

MONO-SHAPE Mark I IDC connectors are certified by VDE in Certificate 40044132 and Certificate 40045434.

5. TOOLING

5.1. HHM

The HHM is a modular designed fully automatic IDC – IDC and/or IDC – Crimp harness maker. See Figure 12.

A base machine, the wire handling module, provides all wires in the required lengths and configuration. It performs the wire related processing steps, e.g. wire storage, wire feeding, cutting, fixing, transfer and positioning into the IDC connectors. This common base machine is equipped with one product specific interchangeable IDC module. A lead making (crimp) module is available as an option.

The IDC module performs all connector handling steps, e.g. connector feeding and separating, coding cutting, connector transfer, wire insertion into the IDC slots by using mass termination and cover closing. Because one IDC module is designed solely for one product system, the HHM can only produce harnesses with one connector type at the same time. However, additional IDC modules can be adapted upon customer request so different IDC modules can be used with the base machine and the production can be switched over to another product family by only exchanging the IDC module.

IDC modules are available for the TE RAST connector systems AMP DUOPLUG 2.5, AMP DUOPLUG 2.5 Mark II and AMP DUOPLUG Power, AMP Multifitting Mark II and AMP MONO-SHAPE.

The lead maker (crimp) module provides the crimped leads and performs the crimp related steps, e.g. wire storage, wire feeding, cutting, stripping and the crimping step itself. When the crimp module is available, the wire transfer of the base machine records also the crimped leads in its comb and provides the wire ends for termination into the IDC module. The crimp unit was defined as an option so it can be renounced when no crimp applications is needed. In this case the HHM can do IDC – IDC and IDC – loose wire ends only.

Various checking.



Figure 12

5.2. I.H.M. Mark III

The new IHM Mark III is a very high performance, fully-automatic machine to manufacture parallel jumper harnesses using IDC technology. The simultaneous feeding of up to 21 wires guarantees high productivity and flexibility and a choice of 5.0 mm pitch IDC systems. The gripper unit on the left side of the machine is able to spread the wires in both directions to enable the production of harnesses. Available options are a stripper crimper unit with an integrated crimp force analyzer and a good/bad sorting unit. Quality checks integrated in the manufacturing process guarantee the highest quality harness for every production run. Other types of automated tools and hand tools are available; contact a sales representative for details. See Figure 13.



Figure 13

5.3. Hand Tool Kit for AMP MONO-SHAPE* Mark I (1-1579012-4)

RAST hand tools are only for sample production and repair work and not released for regular production. The customer operation manual is 744015-5. See Figure 14.



Figure 14