

## **IDC CONNECTORS FOR INTEGRATED HARNESSSES**

### **APPLICATION SPECIFICATION**

**FOR IDC HARNESSSES MANUFACTURED BY:**

- **PISTOL GRIP**
- **MT BENCH PRESS**
- **IDC WORKSTATIONS**
- **FULLY AUTOMATIC HARNESS MACHINE**

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## 1.0 SCOPE

The document scope defines the manufacture control parameters for the IDC connectors when applied in a harness .

The follows classification list defines which are the control parameters to verify on the IDC harness.

## 2.0 APPLICABLE DOCUMENTS

The following documents have to be considered as integral part of this specification:

AMP Product Drawings

Product Spec. 108-20182

Fully Automatic Machine technical specification.

Customer manual for MT Bench Press 412-18150

Customer manual for IDC Harness Machine 412-18380

## 3.0 COMPONENTS

The list below is referred to IDC components used to manufacture the IDC harness

IDC CONNECTOR	PN's
9 pos. IDC connector 2.54mm ( right )	284126-1
9 pos. IDC connector 2.54mm ( left )	284126-2
9 pos. IDC connector 3.5mm	284127-1; -2; -3
6 pos. IDC connector 3.5mm	284128-1

These components have to be applied in according to the limits defined on product spec. 108-20182

## 4.0 APPLICATION TOOLS

The following tools must be used to apply the IDC connectors:

**PISTOL GRIPS** - Three versions are foreseen:

For IDC connectors 284126-1 & -2

PN 528013-3

For IDC connectors 284127-1; -2; -3

PN 528013-4

For IDC connectors 284128-1

PN 528013-5

**MT BENCH PRESS** - Five versions are foreseen:

For 2.54 mm IDC connectors 284126-1&-2 (harness 188/223)

PN 1-528356-6 (\*)

For 2.54 mm IDC connectors 284126-1&-2 (harness 178)

PN 1-528356-8 (\*)

For 2.54 mm IDC connectors 284126-1&-2 (harness 937)

PN 1-528356-9 (\*)

For 3.5 mm IDC connectors 284127-1 & 128-1 (harness 188/178/223)

PN 1-528356-7 (\*)

For 3.5 mm IDC connectors 284127-1 & 128-1 (harness 937)

PN 2-528356-0 (\*)

**POLARIZATION CUT ON ON IDC CONNECTORS**

The IDC harness needs polarization cutting operation according to the polarization keys system scheme 98-51211.

This operation is included in the production cycle of the fully automatic machine , while using pistols grip or MT bench presses, the possibilities to cut pol. keys are:

- pistol grip pol. cut for IDC conn. PN's 284126-1 & -2 PN 528013-6
- pistol grip pol. cut for IDC conn. PN 284127-1 & 128-1 PN 528013-7
- pol. cutting device for MT bench machines PN 528356-8 (\*),(\*\*)

(\*\*)This tools simultaneously cuts the connector polarization key making the harness, according to the polarization keys system scheme 98-51211

**IDC WORKSTATION**

PN 528014-5/-8

**FULLY AUTOMATIC HARNESS MACHINE**

PN 528362-.

(\*): *OBSOLETE*

**5.0 CONTROL PARAMETERS**

The following parameter below described, permits to control the quality termination made with the different tools type ( See par. 4.0 )

**5.1 VISUAL EXAMINATION**

After wires termination, the connectors profile must be according to the lateral and front examination as per pictures definition here below:

Lateral examination: the connector profile has to be free from extraneous parts, as shown on Fig.1

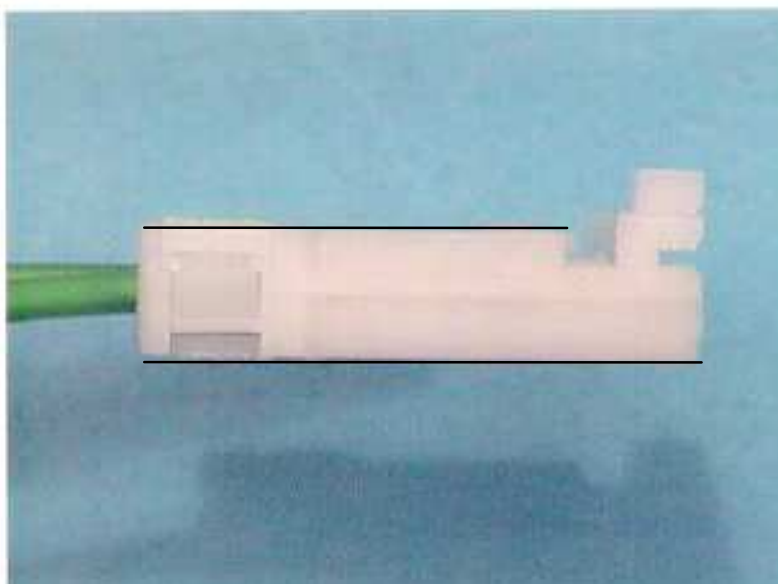


FIG. 1

*Front examination:* each connector must have wires inserted and the insulation barrels closed as shown on FIG. 2 and 3.



FIG. 2- IDC connector 3.5mm pitch

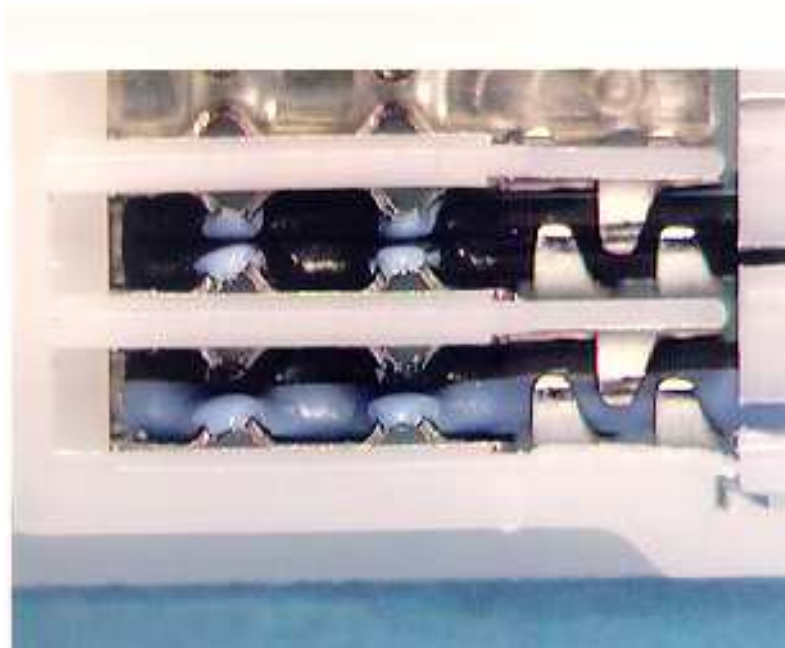


FIG. 3- IDC connector 2.54mm pitch

5.2 CONTROL DIMENSIONS

Crimp height: must be measured on the insulation barrels as indicated on the fig. 4 here below

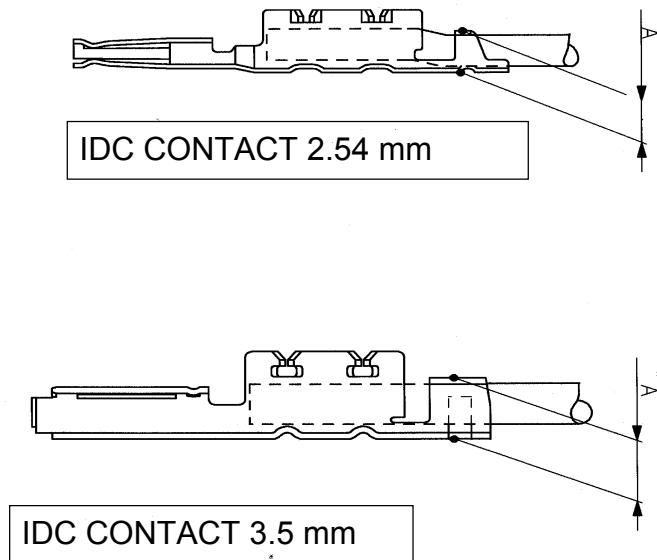


FIG 4 - IDC connectors 2.54 mm with 0.35 mm wire

The dimension “A” must be measured on the contact insulation barrels as shown. The contact must be dismounted by the connector system and it cannot be reused after this check.

The reference wire section for all connector types is 0.35 mm<sup>2</sup> and the correspondent values are written on the following table .

The table below , defines dimension “A” for each connector type.

<p><b>IDC connector 3.5mm pitch ( fig. 2 )</b>            0.35mm<sup>2</sup> wire section</p>	<p><b>Dimension “A” [ mm ]</b>            1.7 ± 0.1</p>
<p><b>IDC connector 2.54mm pitch ( fig. 3 )</b>            0.35mm<sup>2</sup> wire section</p>	<p>1.7 ± .0.1</p>

Wire insertion into the first IDC slot. Dimension “B” as shown on Fig. 15 & 16, has to be 0.7mm min.

### 5.3 WIRE STRANDS INTO IDC SLOTS

Inspection of the wire strands into the IDC slots, is a means to be confident that production we are manufacturing will fully meet the requirements in terms of electro-mechanical performances.

This control should be made each time that “external factors” occur on the product or on the application tools or on the IDC harness process.

For external factors we mean those variables not mentioned in the specifications, but that could be added by the operators, bad use of the application tools, environment, dust etc.

#### How to inspect wire strands

The methods we suggest for examining the strands into their own IDC slots, are:

#### Cross section.

The method 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 temp. increasing during hardening process 40°C )

( e.g. . resin type CYBA- GEIGY “ ARALDIT D + HY 956 ) . When the resin is completely hardened ( it takes about six hours ) it's possible make cross section polishing the surface to examine.

An example of cross section realized with this technique is shown on Fig. 5.

#### Cyclohexanone acid .

The method consists in preparing a test connector samples using the cyclohexanone acid to attack the wires insulation.

The sample must be completely immersed in the acid for about 15-20 hours ; then wire strands will be clearly visible in each slot.

It 's important to properly fix the connector and the wires to a support before immersing the sample into the acid; this to avoid improper strands movement during all the operation.

An example made with this technique, is shown on Fig.6

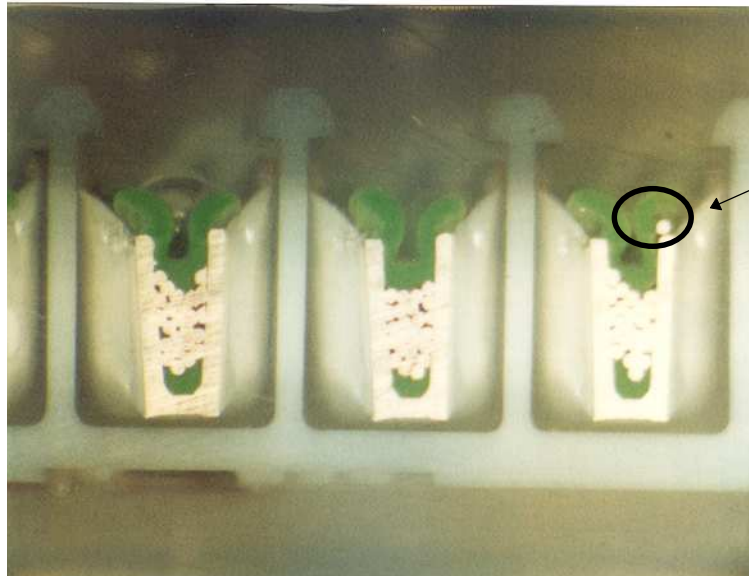
### 5.4 ACCEPTANCE CRITERA of the WIRE STRANDS into the IDC SLOT

Following we are going to describe the strands disposition we can meet on our examination that hasn't influence on the electromechanical contact performances.

#### Strand slot overcome.

On 2,54mm pitch connectors line using 0.5sqmm wires , termination is accepted even if there is one strand overcoming into the IDC slot .

On 3,5 mm pitch connectors line using 0.5 & 0.75sqmm wires, termination is accepted even if there is one strand overcoming the IDC slot as shown on the picture below .



**FIG. 5**

This typically presents on 0.75sqmm wires and 0.5sqmm applied on 2.54mm pitch connectors and depends on twist strands pitch, versus the wire section. If used wires are according to DIN norm 72551-6 this aspect is minimized, because it's possible consider the total mass of the strands as a solid, during the insertion into the slot.

Cut strands

The table below shows the allowed cut strands in each IDC slot and for each wire section

Wire section [ mm <sup>2</sup> ]	n° of cut strands per Fiat wires	Max strands per wire
0.35	0	11
0.5	1	17
0.75	2	24

It doesn't cause loss of electromechanical performances.



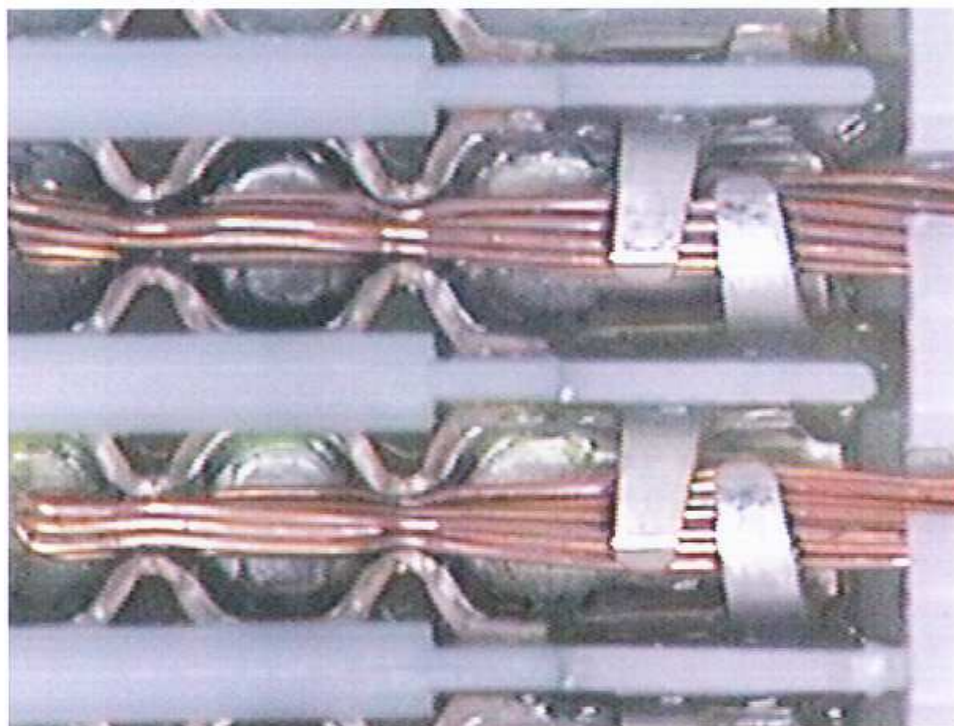


FIG.6  
(connector treated with cyclohexanone acid)

5.5 POLARIZATION CUT MEASURE DIMENSION

The dimension C for each connector type , as per Fig. 7, must be according to the following:

connectors 9 ways 2.54mm pitch PN'S 284126-1 &-2      dimension C: 5.8mm min.- 6.1 mm max.

connector 6 ways 3.5mm pitch PN 284128-1      dimension C: 7.0mm min.- 7.3 mm max.

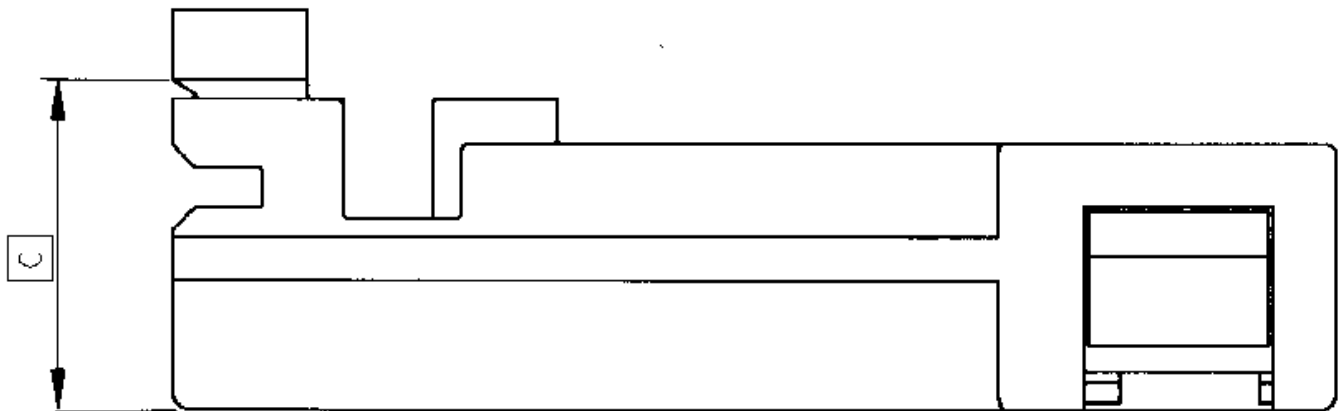


FIG. 7

**6.0 EXAMPLES OF CORRECT TERMINATIONS**

The following pictures show examples of correct IDC termination.

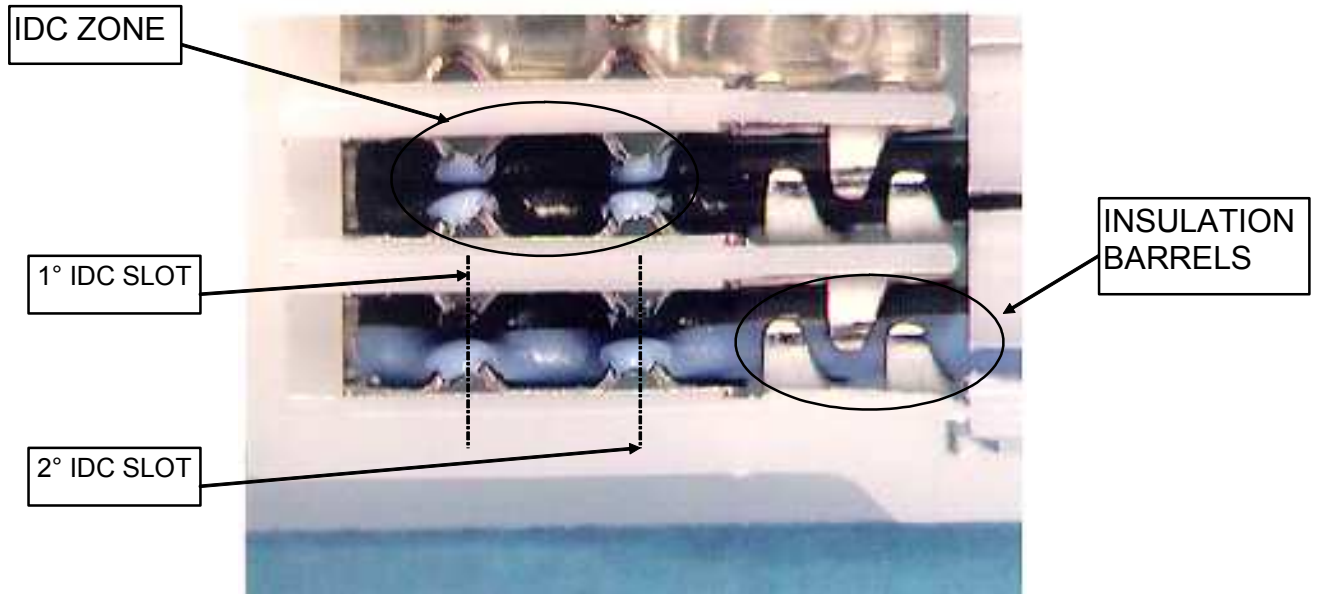


FIG. 8 - IDC connector 2.54mm pitch terminated onto 0.35mm<sup>2</sup> wires

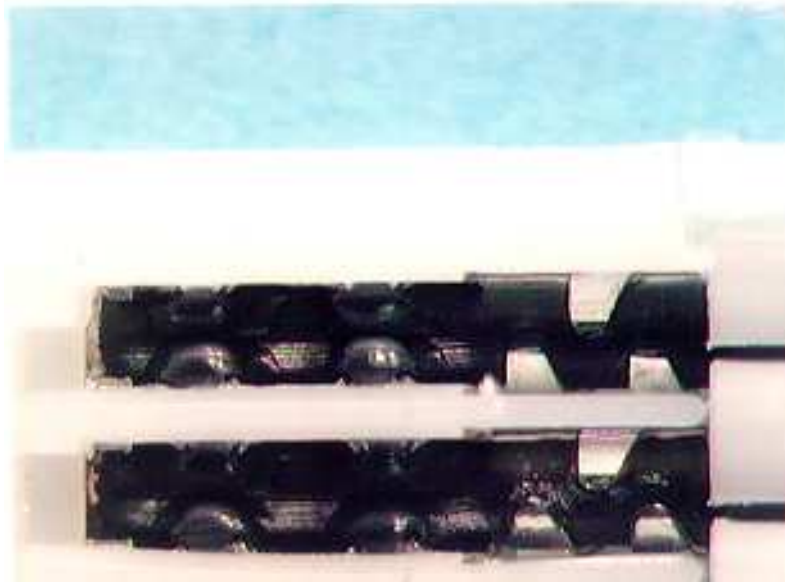


FIG. 9 - IDC connector 2.54mm pitch terminated onto 0.50mm<sup>2</sup> wires

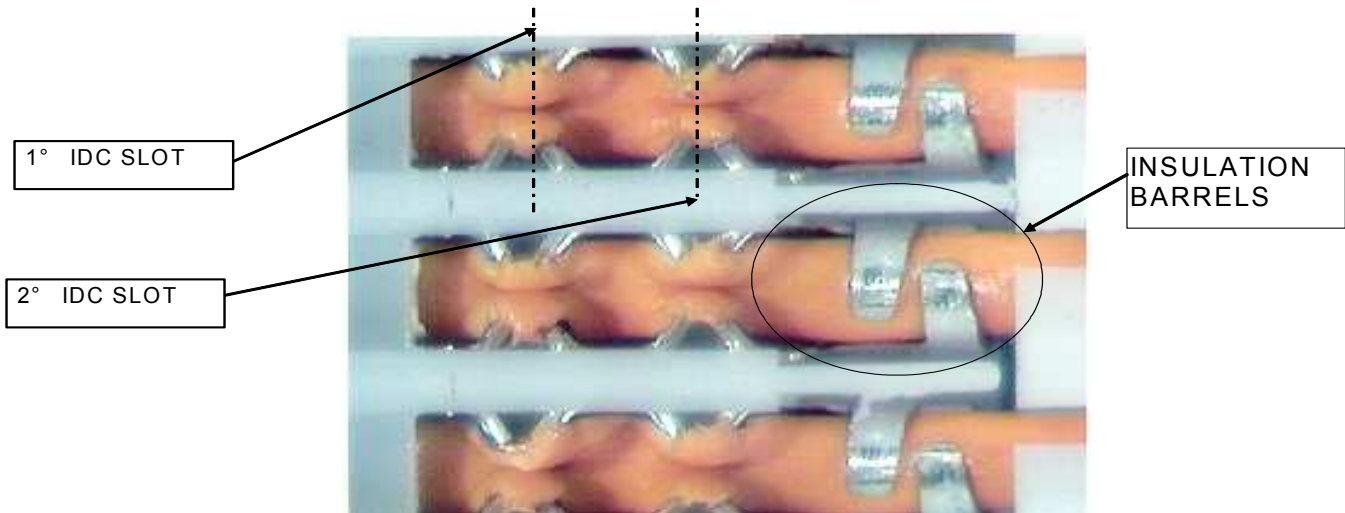


FIG. 10 - IDC connector 3.5 mm pitch terminated onto 0.75mm<sup>2</sup> wires



FIG.11 - IDC connector 3.5 mm pitch terminated onto 0.50mm<sup>2</sup> wires

## 7.0 UNACCEPTABLE WIRE TERMINATIONS

On the below pictures 12 & 13 , a class of defects is shown: an uncompleted wire insertion into the IDC contact.

The defect survey is through dimension A ( see par. 5.2 ) and insulation barrel not completely closed.

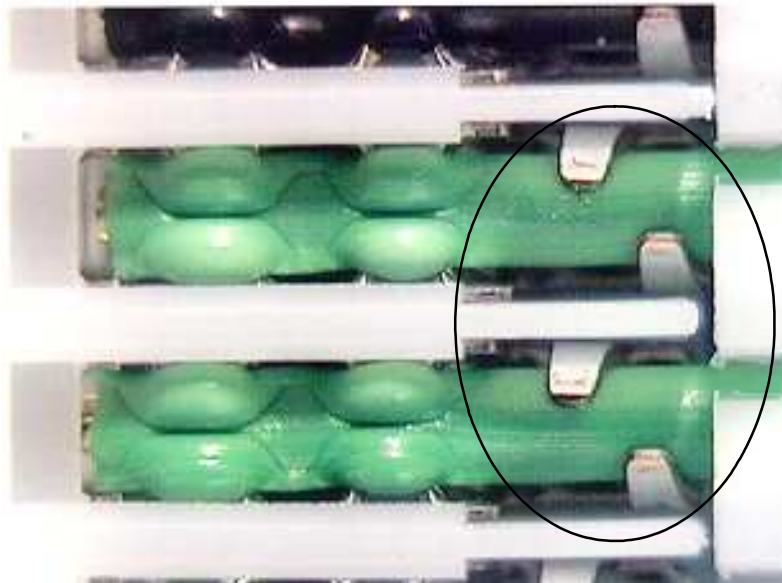


FIG. 12 - IDC connector 3.5mm pitch

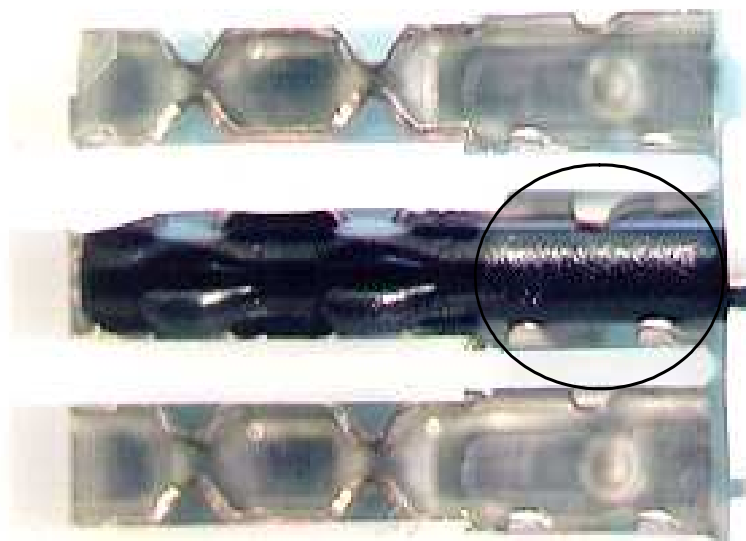


FIG. 13 - IDC connector 2.54mm pitch

FIG. 14 -Wire positioning out of the IDC cavity and out of the housing profile ( see par. 5.1 )

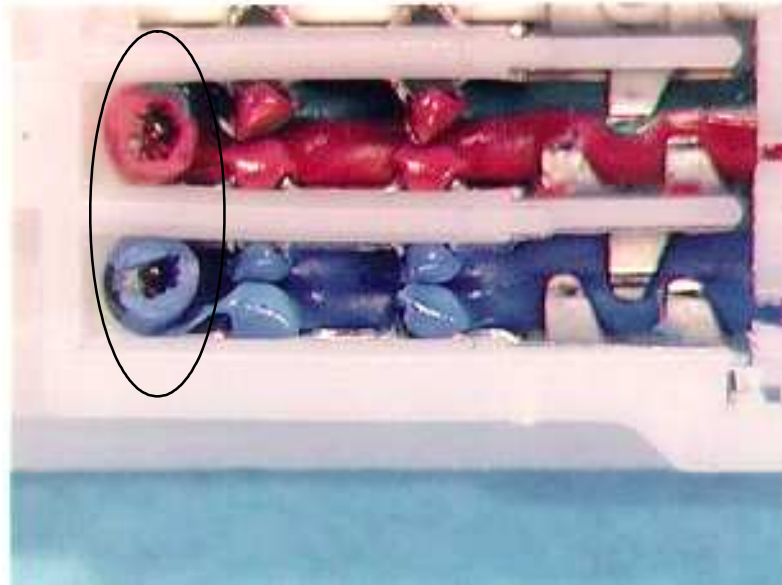


FIG. 14- IDC connector 2.54mm pitch

FIG.15- Wire length inadequate. Acceptance limit for dim. B is 0.7mm min.

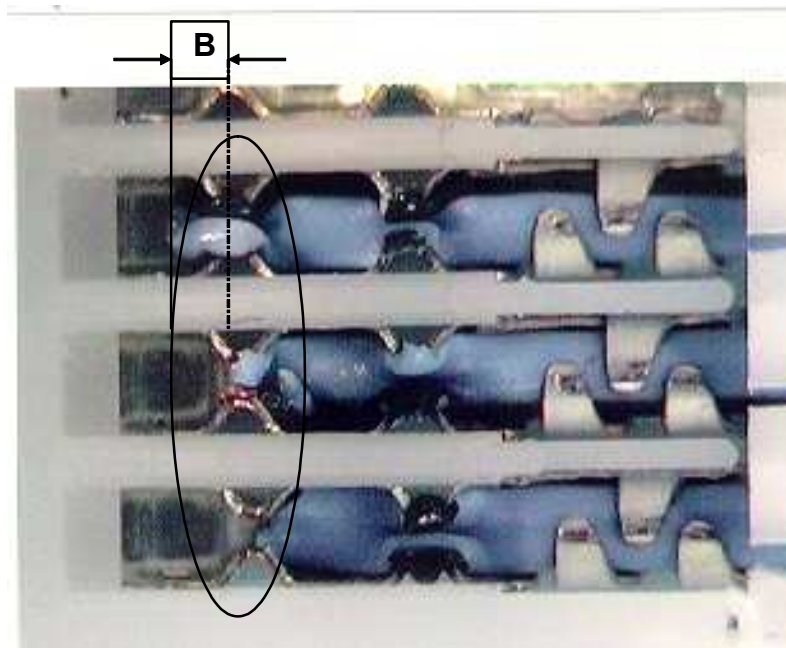


FIG 15- IDC connector 2.54mm pitch

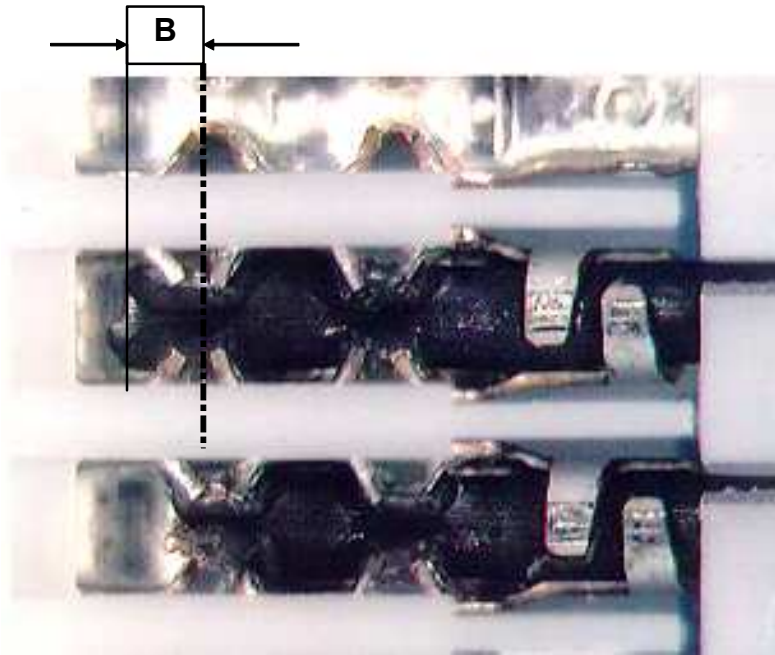


FIG. 16- IDC connector 3.5mm pitch

FIG. 16 - Wire length inadequate. Acceptance limit for dim. B is 0.7mm min.

**8.0 APPLIED WIRES**

**Applied wires must be chosen in accordance to FIAT Spec. 9.91107/13**

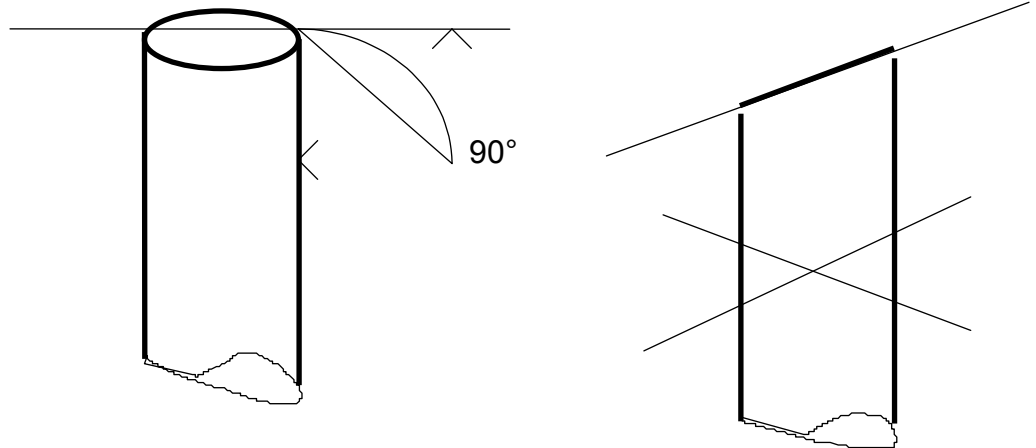
8.1 ) INSULATION DIAMETERS

Wire section [mm <sup>2</sup> ]	Insulation diameter [mm]	N° max of strands
0.35	1.3 max	11
0.5	1.6 max	17
0.75	1.9 max	24

Insulation material must be PVC or similar suitable for 105°C max temperature with a harness grade of 95 ± SHA

**8.1 WIRES CUT**

The wires must be clear cut in a perpendicular plan according to the sketch here below :



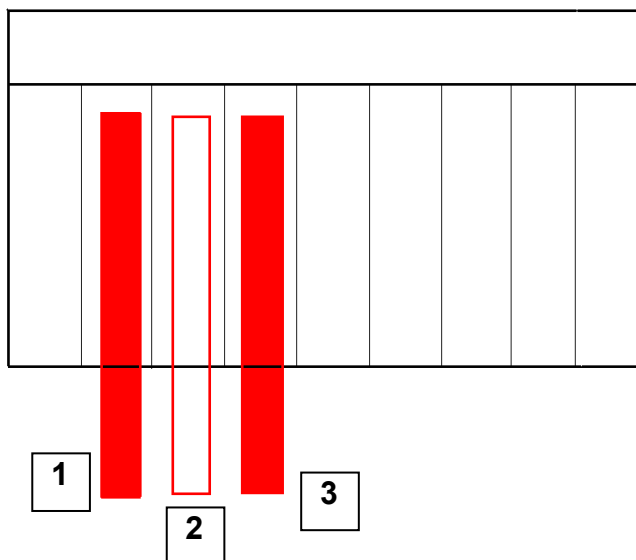
**9.0 WIRES INSERTION SEQUENCE (WITH AUTOMATIC H.M.)**

For 3.5mm connectors

Wires of 0.75mm<sup>2</sup> section in adjacent position have to respect the insertion sequence according to the scheme here below :

For 2.54mm connectors

Wires of 0.50mm<sup>2</sup> section in adjacent position have to respect the insertion sequence according to the scheme here below :



Correct sequence:

- 1 2 3
- 2 1 3
- 3 2 1

Uncorrect sequence

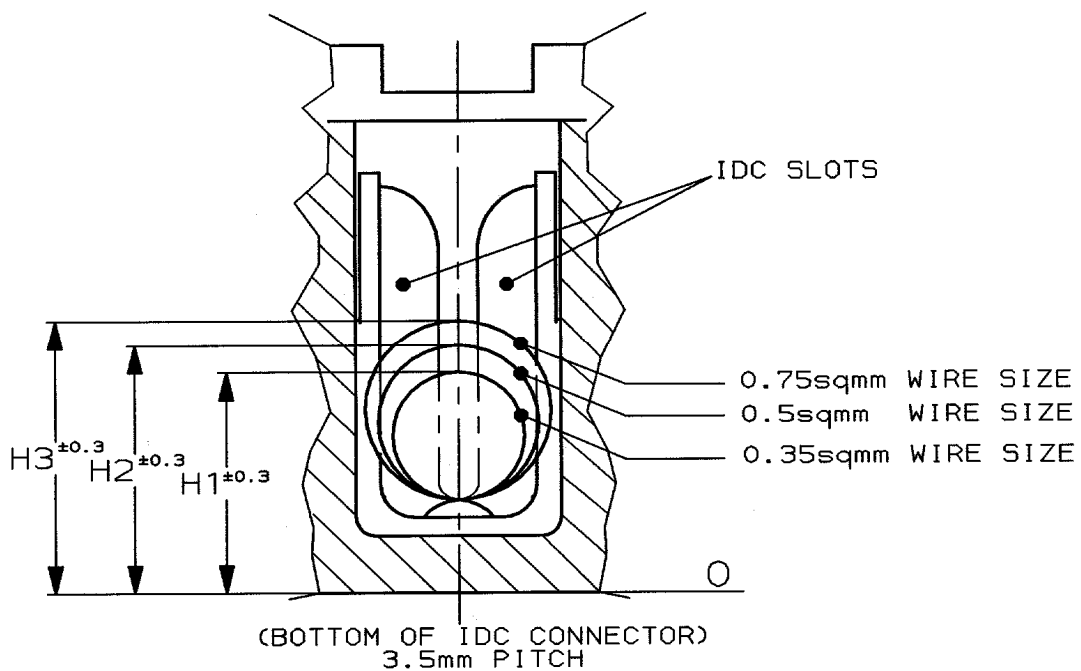
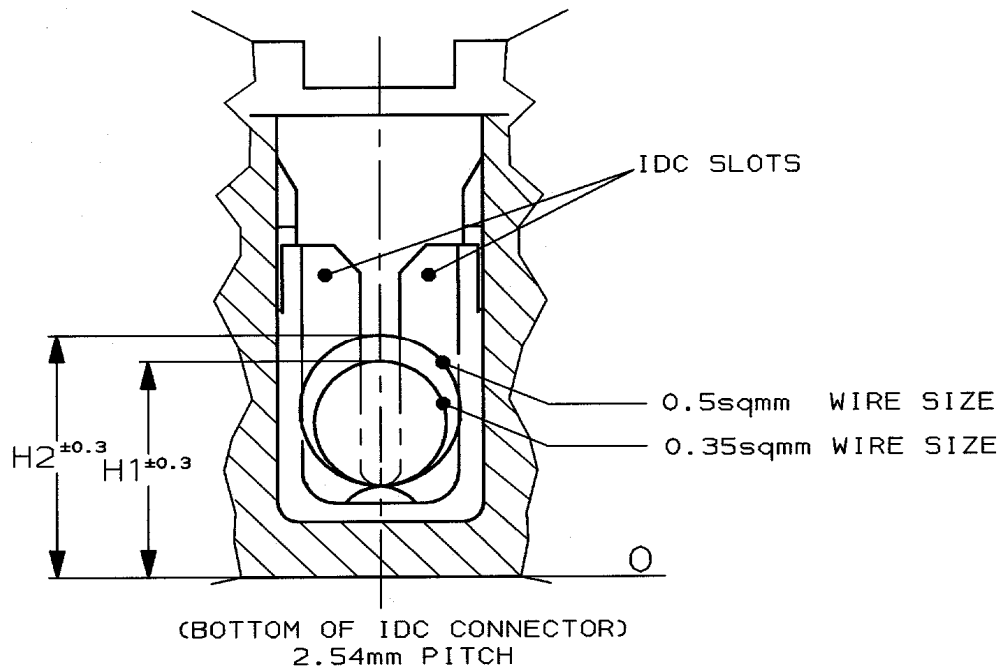
- 1 3 2
- 3 1 2



**10.0 PROCESS CONTROL**

One of the primary features to keep under control during IDC harness manufacture is the position of the wire among the two IDC slots.

Assuming that used wires should be in accordance to FIAT Spec. 91107/03 (Ref. Para. 8.1), and considering the two sketches here below (one for 2,54mm pitch connectors and the other for 3,5mm pitch ones):



the control parameters are the wire heights H1,H2 and H3, taking as zero plane the bottom of each connector type.

Their value must be included in the following ranges:

*( IDC connectors 2,54mm pitch ):*

H1=  $2,5 \pm 0,3$ mm ( 0,35sqmm wires)

H2=  $2,7 \pm 0,3$ mm ( 0,5sqmm wires)

*( IDC connectors 3,5mm pitch ):*

H1=  $2,9 \pm 0,3$ mm ( 0,35sqmm wires)

H2=  $3,1 \pm 0,3$ mm ( 0,5sqmm wires)

H3=  $3,2 \pm 0,3$ mm ( 0,75sqmm wires)

All the external factors that could affect the measure have been taken into consideration in given final tolerance. They are:

- Wire Diameter (± 0,1mm)
- Wire positioning by the harness machine (±0,05mm)
- Tolerances onto connector/contact/fixing system (±0,05mm)
- Regulation onto Crimp Height (±0,1mm)

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Total..... (±0,3mm)

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## 10.1 REWORK CRITERIA

### 10.1.1 INSULATION BARRELS AND PLASTIC RELIEF FOR WIRES

#### Insulation barrels

IDC harness has to be reworked when one barrel (the single wing) has not been closed in more than 2 ways in a complete harness. This is valid for both connector pitch systems, considering that the total number of insulation barrels not closed for harness must be 2 maximum.

This does not cause loss of electromechanical performances.

In the case of insulation barrels under the insulation wire plastic, they have not to be considered as scrap or rework.

#### Plastic relief for wires – Retainer

The retainer function is to make easier the IDC connector insertion into the relevant shells, keeping the wires in the right position.

An IDC harness must be reworked when more than 3 plastic relieves are broken.

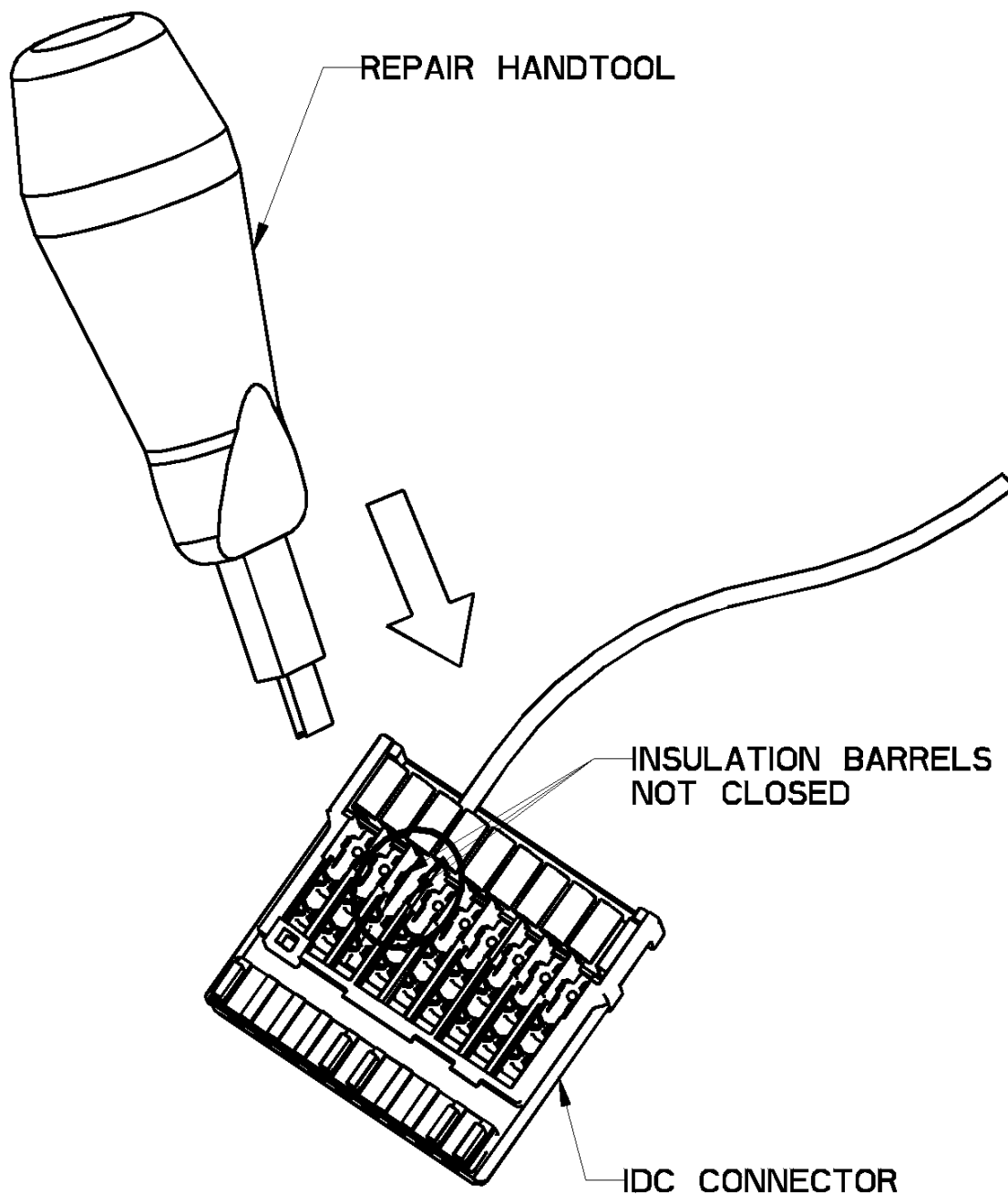
This is valid for both connector pitch systems, considering that the total number of plastic relieves broken per harness must be 3 maximum.

This does not cause loss of electromechanical performances.

### 10.1.2 REPAIR HANDTOOL

In case of insulation barrels not closed ( see para. 10.1.1 ), a special repair handtool must be used. In particular :

- P/N 658167-4 ( for 2.54mm pitch connectors)
- P/N 658167-5 ( for 3.5mm pitch connectors)



Push down the tool as shown on pictures 1A-1B, 2A-2B, until the complete closure of open barrels.

