



NICOMATIC HEADQUARTERS

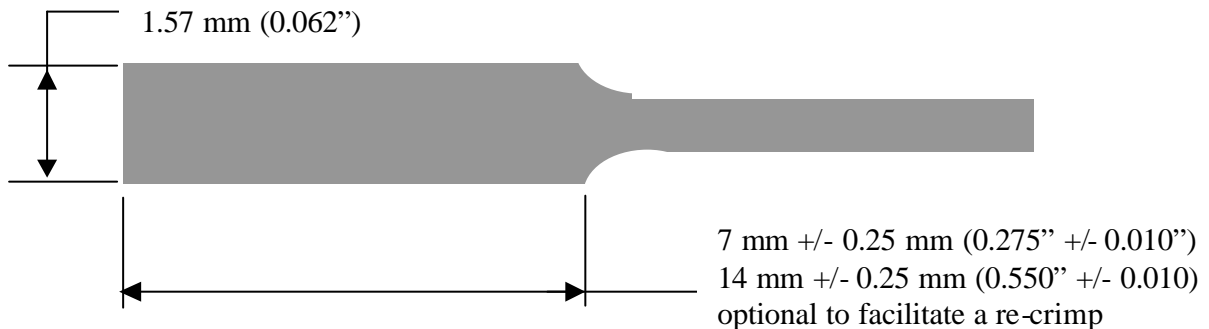
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CrimpFlex[®] Crimping Guidelines

The following guidelines are suggestions to the design engineer and quality control personnel on proven methods of incorporating the CrimpFlex[®] contact into their designs and into their manufacturing and inspection processes. These guidelines are not intended to eliminate the possibility of other constructions and inspection processes. In fact, the CrimpFlex[®] contact has been proven to be a reliable connection system in a wide variety of applications and constructions.

Design Guidelines

Crimp Pad Design – Nicomatic recommends a trace width of 1.57 mm (0.062") nominal and a length of 7 mm (0.275") nominal with a smooth transition to a thinner trace if there is one; similar to what is shown below;



Note: When possible, the traces (circuit and dummy), should be designed 14 mm (0.550") long. This may allow the connector to be cut off and re-attached if it is mis-crimped, if this would be an acceptable repair for the end customer.

Crimp Direction – Virtually any switch can be designed to be crimped reliably with the CrimpFlex Connector system. The designer should keep the following basic guidelines in mind when designing a switch tail;

1. Crimp into an exposed ink layer whenever possible
2. When not crimping into exposed ink, then crimp thru a double layer of ink to improve reliability.
3. The crimp thickness should be the same for all contacts crimped with the same set up

The following examples illustrate how these guidelines can be put to use to design reliable switch tails;



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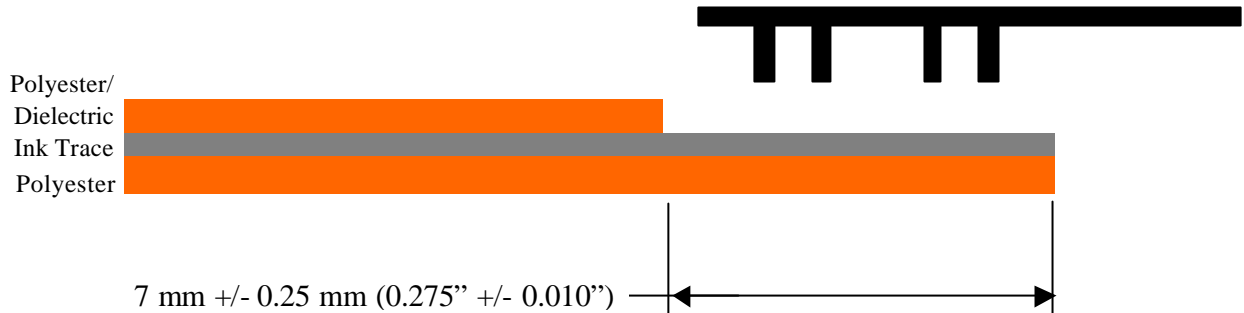
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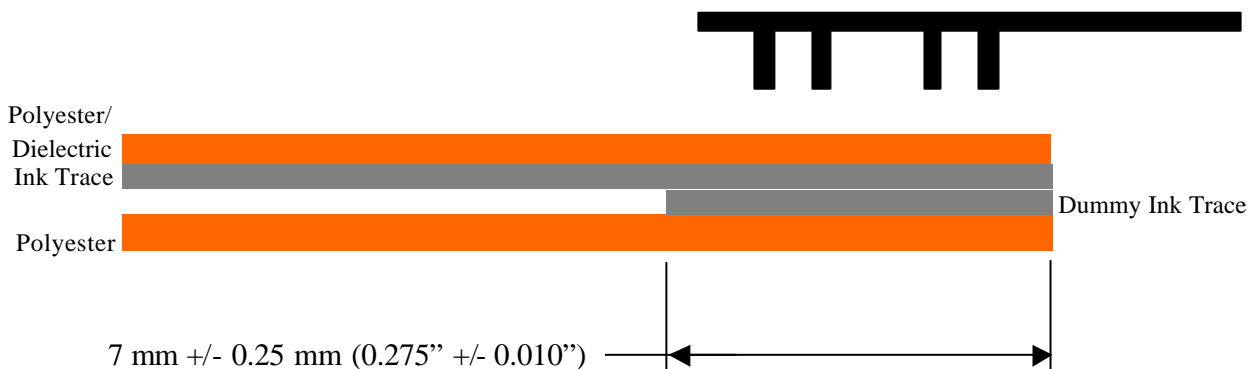
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A. Single Sided Circuit – a 7mm (0.275”) length of ink should be exposed at the end of the tail and the contact be crimped into the exposed ink as shown below.



B. Double Sided Circuit – A dummy trace should be provided opposite the actual circuit. I.e. Opposite a trace on the top circuit there should be a dummy trace printed on the bottom circuit. The dummy trace should have a width of 1.57 mm (0.062”) nominal and a length of 7 mm (0.275 “). This provides a thicker layer of ink to insure a reliable electrical connection. Note: There should be no adhesive or dielectric between the dummy trace and the active trace.





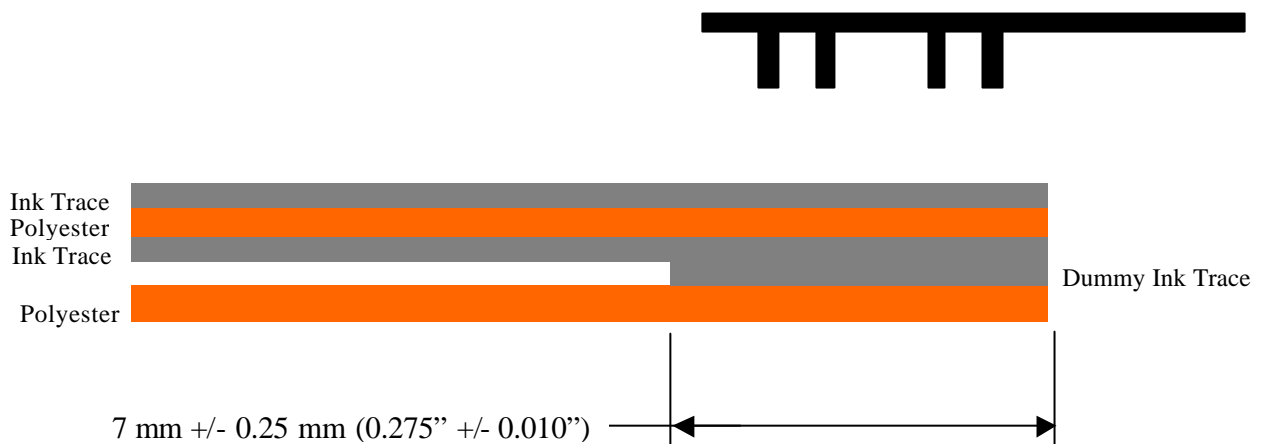
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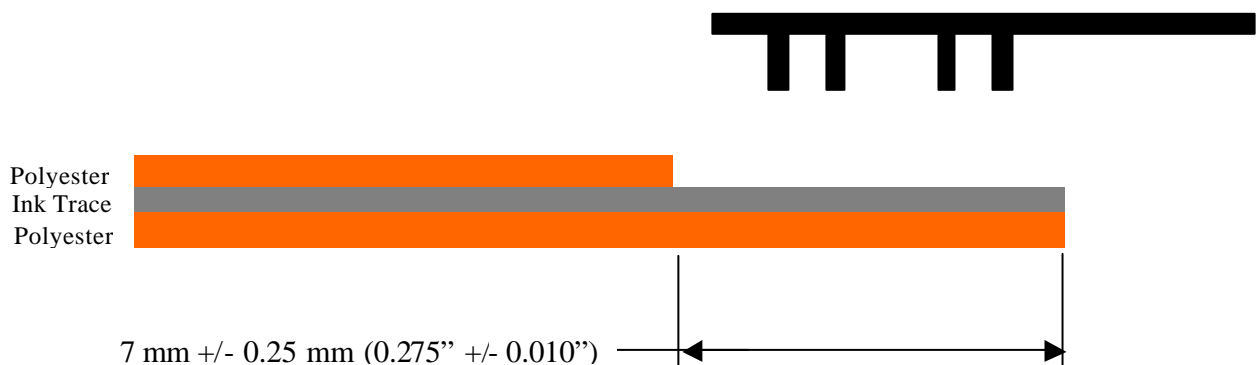
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C. Three Layer Circuit (Double Circuit with a shield for example) – The two internal layers should be designed the same as a double sided circuit. A dummy trace should be provided opposite the actual circuit. I.e. Opposite a trace on the top circuit there should be a dummy trace printed on the bottom circuit. The dummy trace should have a width of 1.57 mm (0.062”) nominal and a length of 7 mm (0.275”). This provides a thicker layer of ink to insure a reliable electrical connection.

The shield layer should then be exposed and crimped into, as shown below;



D. LED Circuit/Spacer/Upper Circuit – Both layers are prepared with tails that have exposed traces as in ‘A’ above. The tails are then ‘scalloped’, so the upper circuit is cut away to expose the bottom circuit and the bottom circuit is cut away so the combined tail is the same thickness across its entire width. The end of the tail then has the identical design to the single layer circuit shown in ‘A’ above. Care must be taken to insure that the two layers are registered well enough to maintain the 2.54 mm (0.100”) spacing where the tails meet.



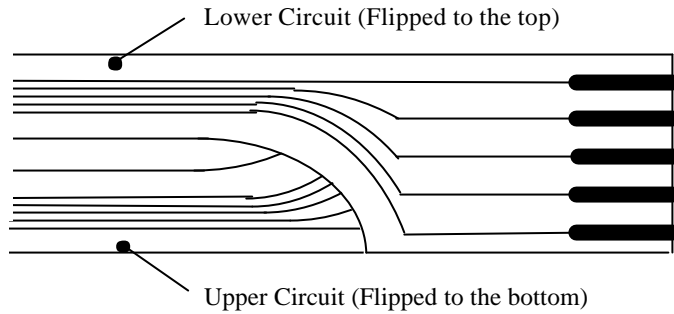


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E. Double Layer Circuit for use with a Dual Row Housing – The tail must be designed so that the tails can be reversed, or ‘flipped’ prior to crimping, so that the bottom circuit is on top with the ink exposed and facing upwards. The top circuit will be on the bottom and facing downward. This allows the contacts to be crimped into the ink as shown in section ‘A’. The two rows of contacts can then be assembled into a dual row housing.



Quality Control Guidelines

Nicomatic suggests as a minimum, that a First Article Inspection and a Final Inspection be performed on CrimpFlex assemblies. In addition, the manufacturer may consider in process inspections on large production runs and 100% visual inspection when training new operators. The following are suggested inspections and inspection criteria to be performed on CrimpFlex assemblies during a First Article Inspection and for a Final inspection.

First Article Inspection– Performed each time a machine is set-up for a new part or is adjusted in any manner to correct a production problem.

A. Visual Inspection - Visual inspection is considered to be the *most important step* in insuring a good quality crimp. The inspector should look for the following items in particular;



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- 1. Proper formation of the Six Crimps** – Poorly formed crimps generally indicate a set-up problem. The contacts are not designed to turn back and lay flat on the tail as is shown in some of the depictions in the catalog. They should have a curvature and depending on the thickness of the tail they will roll over and turn back towards the tail to some extent.
- 2. Gap between the barrel of the contact and material** – A noticeable gap would indicate that the crimp height is too high for the material thickness being crimped.
- 3. Cracked ink Traces** – Indicates the crimp height is too low for the material thickness being crimped.
- 4. Crimp Direction** – insure that the contacts are crimped to the tail in the manner specified on the drawing
- 5. General Problems** – Bent or mis-aligned contacts. This would generally indicate a problem with the handling of the parts or the feeding of the contacts into the machine.

It is suggested that samples of both acceptable and unacceptable products be kept on hand for use as quick references and training aids.

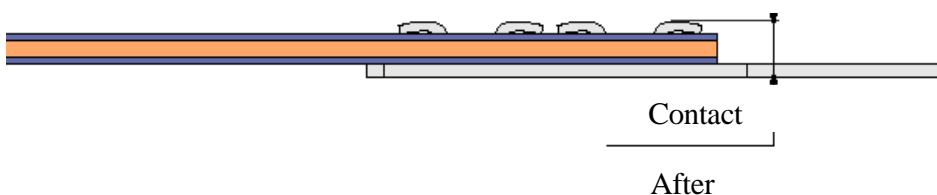
B. Crimp Height – The purpose of inspecting the crimp height is to insure that gross errors have not been made in the set-up of the machine. For tails with a thickness of 0.125 mm to 0.35 mm (0.005” to 0.014”) in the crimp area. This includes any stiffener in the crimp area. The height of the crimp should be between 0.7 mm (0.028”) and (0.9 mm) 0.035”. While this height does vary by machine and by set-up to some extent, it is scalable. The following table shows a more specific correlation for the height of the crimp to the thickness of the tail;

<u>Tail Thickness</u>	<u>Approximate Crimp Height</u>
0.075 mm	0.55 mm to 0.68 mm
0.100 mm	0.57 mm to 0.70 mm
0.125 mm (0.005”)	0.59 mm to 0.72 mm
0.250 mm (0.010”)	0.78 mm to 0.83 mm
0.350 mm (0.014”)	0.88 mm to 0.93 mm

Note: The crimp height should **NEVER** be used to reject a part, only to identify it for further investigation. If the crimp is tight and not cracking the ink it is acceptable, regardless of the height, but a good crimp will typically fall within the ranges shown above.

The crimp height should also never be used as the sole criteria for accepting a crimp. The part should always be checked for cracked ink traces and for gaps between the contact and the tail, as well as, misalignment and the other items mentioned above.

A crimp that is too high will have a noticeable gap between the barrel of the contact and the tail. A crimp that is too low will show signs of cracking the ink trace.





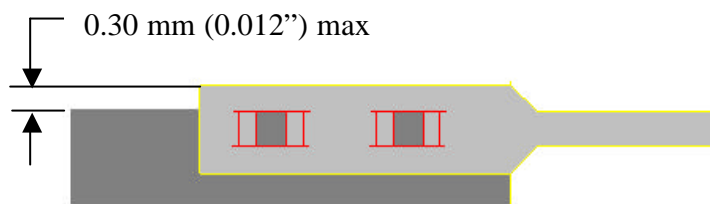
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Slight adjustments to the crimp height can typically be accomplished by changing the pressure on the machine between 4 and 6 bars. Increasing the pressure will reduce the crimp height and decreasing the pressure will increase the height.

C. Alignment – To insure good electrical conductivity of a crimp, it is important to make sure that each contact is aligned properly over the ink trace. This will enable all the crimping portions to penetrate the ink properly, providing a sound electrical connection. When checking the alignment of a contact, it is suggested that the edge of the contact be no more than 0.30 mm (0.012”) from the edge of the trace. Even though electrical conductivity will be present if only a few crimps penetrate the trace, this margin is suggested so that all of the crimps will come in contact with a portion of the ink.



Final Inspection – Final inspection should consist of a First Article Inspection performed by the Inspection department on a minimum of one piece. The second part of Final inspection should consist of a randomly selected sampling of parts based on your in-house sampling procedures. This sample should be visually inspected per the guidelines listed above.

In-Process Inspection – During the assembly of the housing to the tail, it is suggested that the operator be trained to hold the tail with the crimp side showing up and assemble the housing to the tail while holding the tail in this manner. The operator should also be trained to identify a good crimp and a bad crimp and will then be able to check for potential crimping problems during the assembly process.