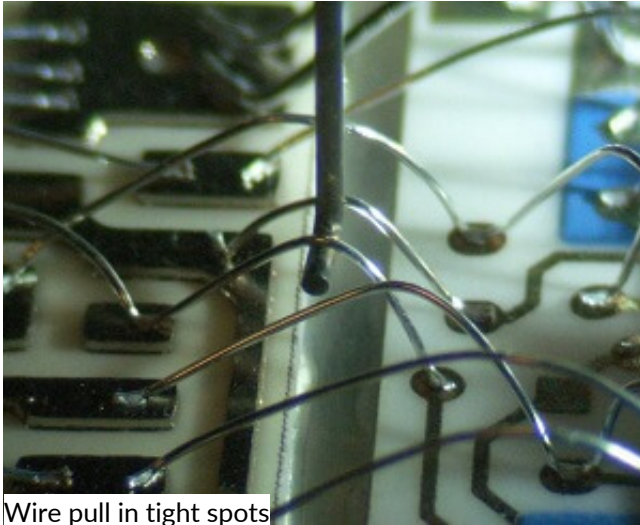




## How to test bonds » Wire Pull



Wire pull in tight spots

[www.wirepull.how](http://www.wirepull.how)

This extensive how-to consists of 13 paragraphs over 7 pages and 4 appendices. Please use the navigation on the right.

### 1. Introduction

This manual is a guide advising what to consider and how to best perform a Wire Pull test. The main focus of this manual is on wire- and ribbon pull using wire hooks. Loop height measurement is also covered. The manual briefly touches on surrounding topics like [tweezer pull and peel testing of wires](#), which is the subject of a [separate how-to](#) by XYZTEC.

### 2. What is Wire Pull?

Wire Pull Testing applies an upward force under the wire, effectively pulling it away from the substrate or die. The purpose of the test is as [MIL-STD-883 2011.9](#) describes it: "[To measure bond strengths, evaluate bond strength distributions, or determine compliance with specified bond strength requirements](#)". A wire can be pulled to destruction, but there are also non-destructive variants whereby one tests whether the wire can withstand a certain force. Non-destructive test methods are typically used for 100% testing of safety critical, high quality and high cost products, avoiding damage to the acceptable wired bonds tested.

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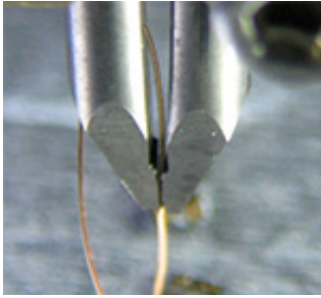
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#### Bond testers

- Condor *Sigma*
- Condor *Sigma Lite*
- Condor *Sigma W12*
- Condor *150HF*

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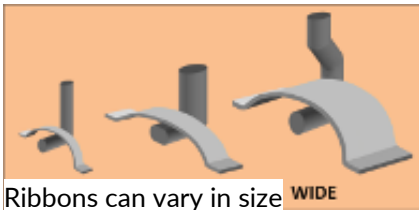


Copper wire pull test by tweezers: [click here to go to our how-to on tweezer pull](#)

The term Wire Pull usually refers to the act of pulling a wire with a hook mounted on a pull sensor on a bond tester. However, to promote certain failure modes, wires can be cut and then pulled by tweezers, also mounted on a pull sensor on a bond tester. Wire Pull is sometimes abbreviated to WP. Our [wire pull test type page](#) contains videos of both [thin wire pull testing](#) and [thick wire pull testing](#).

Usually wires up to 75µm diameter (3 mil) are classified as thin wire. Beyond that size, we speak about thick wire testing.

### 3. What kind of wires can be tested?



Ribbons can vary in size **WIDE**

The cross sectional shape of wires are either round or rectangular then being referred to as ribbons. Slightly more exotic than pulling regular wires and ribbons is pull testing on SMT gull wing leads. In this how-to we also share our thoughts on testing those.

Wires can be made of various materials, most common in semiconductor are gold, aluminium, copper and silver. In principle every wire can be tested, although some wires may be difficult to reach because of surrounding wires and/or components. In some cases, sample preparation is required.

Also, especially ribbons sometimes have very low loop heights and require customized tooling to effectively get underneath and pull successfully.

### 4. Objectives

As is always the case XYZTEC's Golden Rules of Bond Testing apply;

Golden rule #1: Choose the test type and settings that gives the most failure modes of interest.

Golden rule #2: If you cannot get the failure mode of interest choose a test type that tests the

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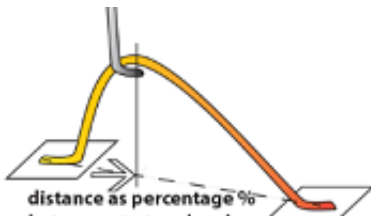
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bond with a load most similar to the true loading condition.



Alignment is important for a meaningful result

Golden rule #3: Choose the test settings that produce the highest force.

For more information on the Golden Rules refer to [Science of bond testing module BTM1.1](#).

**Continue to read:**

Next page: [Tool design / Tool quality](#)

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