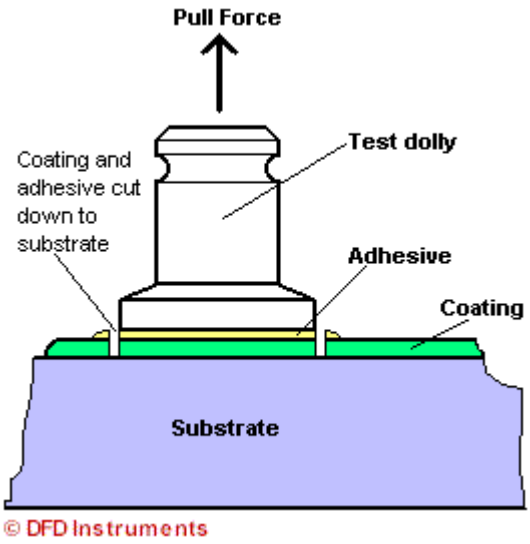
ASTM D4541 and ISO 4624

Pull-off adhesion testing of paint, varnish and other coatings and films with the PAT adhesion tester and the DFD? method

The Test Method

ASTM D4541 and ISO 4624 (EN 24624) both define the method and procedures for carrying out pull-off adhesion testing of paints, varnishes and other coatings.



The purpose of this test is to measure the mechanical tensile strength of a coating. The sample will be subjected to increasing tensile stresses until the weakest path trough the material fractures. The weakest path could be along an interface between two coatings, a cohesive fracture within one coating, a cohesive fracture of the substrate (e.g. concrete) or a combination of these.

Pull-off adhesion testing is simply like any other tensile testing but where the sample is very short, often only a few microns, even nanometers (see illustration below).

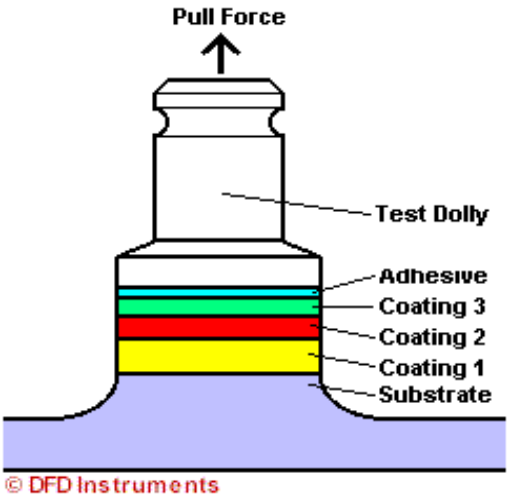
ASTM D4541 / ISO 4624 key issues:

Loading fixtures (or test elements or dollies)

The dollies must be cleaned sufficiently to prevent "glue failure" during testing.

Rate of Pull Force Increase

Stress increase must be steadily incremental within the rate intervals specified in ASTM D4541 / ISO 4624.



Adhesion testing to ASTM D4541 is very much like conventional tensile testing, the only difference is that the test sample for ASTM D4541 is very short.

" Perpendicular pull direction"

The word "perpendicular" does not have a proper meaning when testing the coatings

adhesion on curved surfaces. What ASTM D4541 and ISO 4624 are really trying to say is that the pull stress must always be evenly distributed in the tested coating.

Self-leveling pull testing devices, etc.: Beware!

The only thing that matters for accurate adhesion test results is that the pull stress is 100% evenly distributed throughout the pulled coating. If not, the area where the stress is concentrated will fracture long before maximum stress has been reached elsewhere. Result: Test results will be far too low.

Gage accuracy

The gage or the result display of the test equipment must be calibrated to acceptable norms.

Adhesive

The adhesive used must be sufficiently strong to prevent it from failing before the coating system fractures. Also, it should not be made of chemicals which affects (weakens) the coating which is tested.

If you want to be absolutely sure that you:

never reject or question perfectly good coatings

can convince your customers that you have full control over the coating quality

can objectively document the quality of your coatings

never waste any time arguing about the quality of your coatings

then get a quote here

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