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### Tensile Pull-Off Adhesion Testing and Tremco PUMA Primer

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The intent of this document is to inform readers about the use of a pull-off adhesion tester as a way of measuring the strength of a coating's bond to the underlying material. The values captured by the pull tester are important when evaluating whether a substrate is fit to receive a coating or not. The effectiveness of any paint or coating system is directly influenced by the quality of its bond to the underlying material.



*Fig. 1 – A Proceq DY-206 Pull Tester*



*Fig. 2 – A dolie bonded to substrate with Vulkem PUMA Primer*

Pictured above (Figure 1) is an example of an instrument known as a “Pull-Off Tester” (Model DY-206, manufactured by Proceq). These devices may also be casually referred to as “elcometers”, though this is industry slang (“Elcometer” is a brand of pull-off tester manufactured by a company of the same name). Other companies that produce this type of instrument include Defelsko, Dyne Testing, and DFD Instruments.

Regardless of the manufacturer, all pull-off adhesion testers are used to measure the adhesive bond—in this case, of a paint or coating—to the underlying substrate to be overcoated. A tensile load is applied perpendicular to the substrate being tested at a predetermined, controlled rate. The resulting values (in psi or MPa) quantify the bond strength of a particular paint or coating system to the surface receiving the application. These values are ultimately used to accurately qualify whether a surface is fit to receive that particular paint or coating system.

In this test, the adhesion of a given product is determined to be the lowest tensile stress required to detach or rupture the coating perpendicular to the substrate. The test is performed by securing loading fixtures (“dollies”) perpendicular to the surface of a coating with an adhesive (Figure 2). The strength assessments derived from this test depend on two primary factors:

- Material properties/parameters
- Test Instrument properties/parameters

The strength of the adhesive bond as measured between the loading fixture, coating system, and the substrate (or, the cohesive strengths of the adhesive, coating layers, and substrate) limit the assessments. By default, this is a destructive test, which will require spot repairs upon completion.

Tremco requires that concrete achieves a minimum 4,000 psi compressive strength prior to the application of the Tremco PUMA system. Additionally, the concrete should exhibit a CSP 3-4 (“Concrete Surface Profile” as measured per applicable ICRI standards). In order to obtain this CSP on a new construction project, Tremco requires that the surface be shot blasted prior to installation.

To determine the overall quality/soundness of the concrete prior to installation, it is recommended that a pull-off adhesion test using Tremco PUMA Primer be conducted. Doing so will confirm that any potential laitance (or other non-obvious, deleterious subsurface condition(s), which may compromise the bond of the coating system to the substrate) has been removed.

Depicted in the photos below (Figure 3), Tremco PUMA Primer bonds so tenaciously to the sound substrate, that the concrete ruptures and fails prior to the primer itself. This illustrates the importance of ensuring a clean and sound concrete substrate prior to installation of the Tremco PUMA system, which will cure with an extremely aggressive bond.



**Fig. 3 – Concrete substrate being pull tested failed prior to Tremco PUMA Primer, showing the primer's tenacious bond.**