

PAT - ADHESION / TENSILE

Testing Equipment

Hydro-dynamic self-aligning instrument for laboratory and site measurement where strict reproducibility is essential.



DFD® INSTRUMENTS

A DIVISION OF SURFTEC A/S

KRISTIANSAND, NORWAY

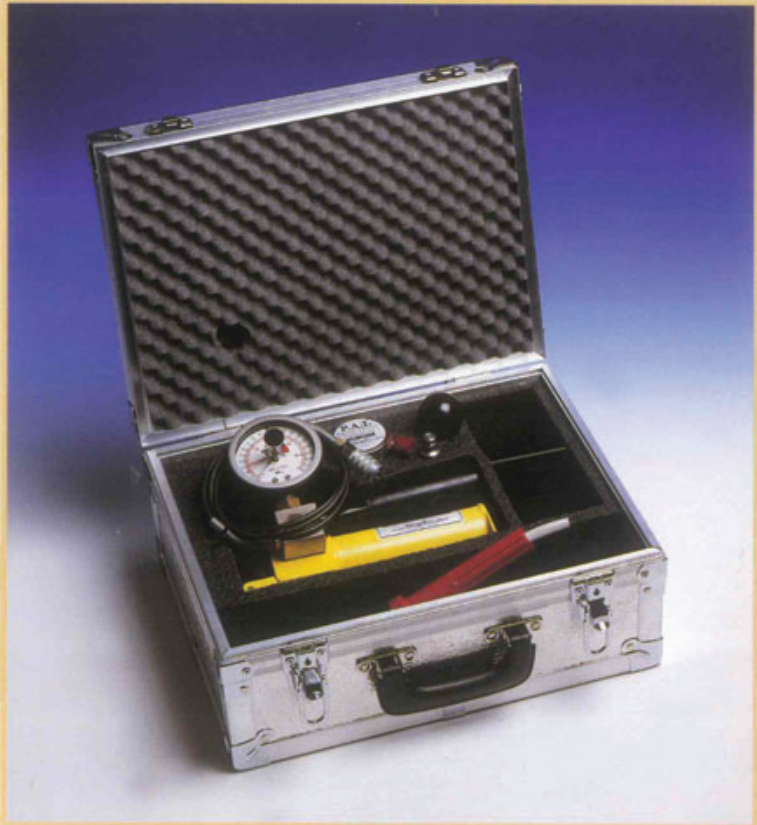
PAT MODEL GM 01

This instrument is a hydraulic adhesion/tensile tester that works on the patented Dynamic Force Distribution pull-off principle.

It complies with the requirements of ISO 4624, ASTM D4541, EN 1542 and other standards.

Many problems can arise during pull-off testing. PAT will help you solve the most difficult ones.

- 1 The DFD® technology ensures that a perfectly distributed pull force is retained. This is achieved by a centre-pull surrounded by four hydraulic cylinders with the force equally divided among these. The instrument automatically compensates for uneven surfaces and uncontrolled movements during the test.
- 2 Wide range of applications including mechanical testing of most solid materials, polymers, ceramics, concrete, metals and adhesives. It offers bond testing of coatings of any thickness to relevant substrates.
- 3 The accuracy and reproducibility achievable make the DFD® test method invaluable to scientific research into materials, coatings and thin films.
- 4 Simple to use, making only moderate demands on the operator and the shape and condition of the surface.
- 5 Broad range of applications in any position such as internal, external and curved surfaces.
- 6 Power source is separate, ensuring that the force is applied in a controlled incremental and stable mode.
- 7 Precision gauge with detailed, easy-to-read scale for accurate measurements.
- 8 Hydraulic shock-absorber securing a smooth and balanced pull. No jerks, even at very high force.
- 9 Non-destructive testing by discontinuing the test when a pre-determined force is reacted. Removal of the test dolly by using the including heating iron.
- 10 The instrument is supplied in a solid protective aluminium case.
- 11 Calibration of the instrument using GM 03 calibrator, provides additional assurances that the instrument is in good condition.
- 12 The range of test equipment includes solutions for many other testing applications. These are featured in other brochures available upon request.
- 13 Special-purpose test solutions are available to order.



DFD® TECHNOLOGY EXPLAINED

The breakthrough into the DFD® technology (Dynamic Force Distribution) has made it possible to carry out coatings and materials testing and eliminate previously unexplained random result variations. Using the DFD® principle, only physical variations in the tested material will cause the test results to vary. Meaningful test conclusions can therefore be drawn where previously statistical uncertainty prevailed or test results to be rejected.

PAT GM01 STANDARD EQUIPMENT

Hydraulic power unit with precision gauge.
Testing head GM 01 01.
5 standard 3.14 cm² steel test dollies.
Coating cutting tool.
Heating iron for removal of dollies.
Calibration certificate.
User instructions.
Instrument case with moulded protective interior.

DEFD®

PAT MODEL GM 01

Many types of apparatuses are known for the measurement of adhesion and cohesive strength of paints, metallic coatings, concrete etc. A common problem is the inability to apply the lifting force evenly over the test area.

Not even the most advanced tensile testing machines can distribute the pull force with an imbalance of less than a few micrometers, or compensate for the imbalance and tearing arising from the strong force applied.

The critical problem arises when the coating is being torn up from one side causing an artificially low reading.



TECHNICAL DATA

Safety

Pump has 20 MPa relief valve
Gauge has blow out plug on rear.

Hydraulic measuring head: \varnothing 56 x 58 mm
Weight: 0.7 kg
Max. pull force 6.3 kN

Accuracy 1% of the full scale.

Test Area

12.56 cm²
6.28 cm²
3.14 cm²
1.57 cm²
0.52 cm²

Test range

0- 5 MPa
0- 10 MPa
0- 20 MPa
0- 40 MPa
0-120 MPa

Case dimensions: 400 x 300 x 170 mm
Weight with contents: 8 kg

ANCILLARY EQUIPMENT



Digital logger where the test results are documented in graphical diagrams and statistical form. The test samples may be presented in a variety of formats with arithmetic averages, histograms, standard deviation etc.

An invaluable tool for the characterisation and computation of the quality of materials and coatings.

Simplifies the recording of test results and documentation thereof.

The progress of each test can be observed on the computer screen and offering a whole new dimension in testing procedures and data review.

The digital logger meets ISO 9000 quality documentation requirements.

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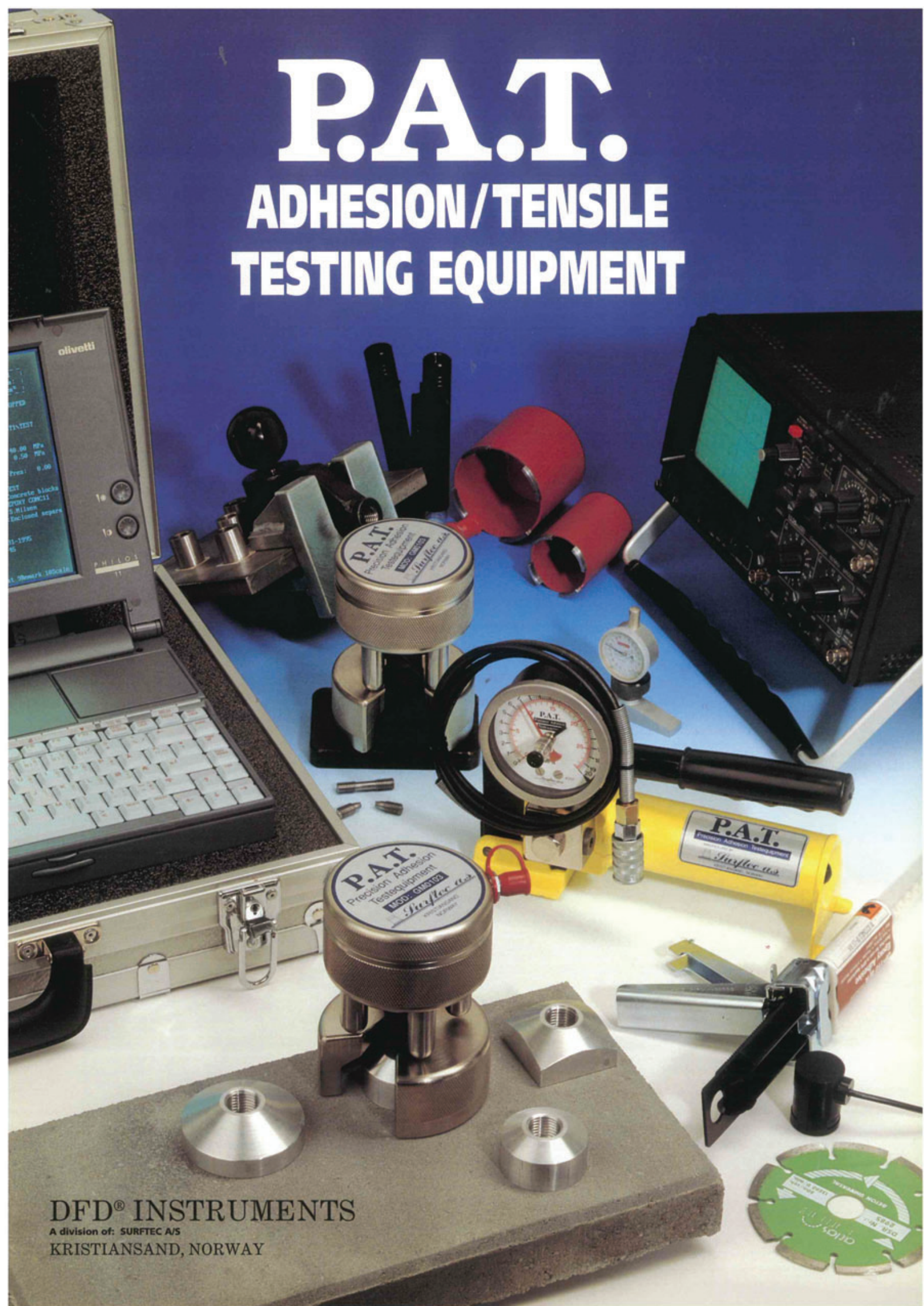
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P.A.T.

ADHESION/TENSILE TESTING EQUIPMENT



DFD® INSTRUMENTS
A division of: SURFTEC A/S
KRISTIANSAND, NORWAY

P.A.T. GM 04 is a micro hydraulic materials test instrument which has adopted the DFD® (Dynamic Force Distribution™) principle.

Traditional tensile test methods are troubled with unsatisfactory reproducibility which is of a complex nature and impossible to define. This leads to incorrect scientific conclusions about the tested material's homogeneity, maximum strength and other characteristics.

This problem is so critical that it completely outweighs other problems in the area of mechanical materials testing. With P.A.T. test equipment this problem has been eliminated by means of the DFD® testing principle. The test result reproducibility is therefore only affected by physical variations in the tested materials.

The test results are consequently predictable, and any variations in the results can be traced to specific causes.

P.A.T. Model GM 04



TECHNICAL ADVANTAGES

- **No other test method (not even advanced tensile testing machines) is able to compensate for such small deviations as the DFD® method.**

The pull force is distributed evenly and dynamically through the test specimen as the force is balanced continually between the four hydraulic legs until material fracture (if any) occurs. The force distribution takes place within a deviation of a few nanometers.



- **Meets the requirements of all relevant testing standards.**
- **P.A.T. GM 04 is simple to operate**, placing only moderate demands on the operator and the material to be tested.
- **The testing head** is detached from the power source ensuring stable and uniform transmission of force to the specimen.
- **The equipment has a wide range of applications** including mechanical testing of most solid materials like concrete, grouts, screed, repair materials, adhesives, bitumens, polymers, ceramics, steel and other metals, etc. It also offers adhesion testing of coatings of any thickness to relevant substrates.
- **The accuracy and reproducibility** make this method invaluable in connection with extended scientific research into materials, coatings and thin films under various stress conditions like tear, shear, dynamic influences, curing capabilities, temperature and other atmospheric variations.
- **The equipment is supplied in a strong aluminium case** for protection and ease of transportation.

DFD® TECHNOLOGY PREVENTS:

- **premature materials fracture** with erratic test results far lower than actual values.
- **the use of inaccurate test results** for scientific and other purposes.
- **rejection of contractual work** on the basis of incorrect data with unnecessary, costly consequences.
- **costly delays caused by inability** to comply with contract specifications which are based on laboratory test results.

DFD® TECHNOLOGY PROMOTES:

- **knowledge and awareness** of materials, leading to improved quality, consistency, reputation and ultimately financial strength.

P.A.T. GM 04 STANDARD EQUIPMENT

- Hydraulic Power Unit with Precision Gauge
- Testing Head GM 0103
- 3 Test Specimens (Dollies), dia. 50 mm
- Support Jig and Adaptor
- Aluminium Instrument Case

ANCILLARY EQUIPMENT

- Portable computerised testing unit for graphic data presentation, documentation and data storage. (See separate brochure.)
- Adaptors and equipment for mechanical tensile testing of steel and other materials.
- Equipment for shear test of coatings directly on test panels. (See separate brochure.)
- Special technical solutions for extended applications.

Other testing models and types are also available. (Information upon request.)

TECHNICAL DATA MODEL GM 04

Case Measurements (mm).....	400 x 300 x 170
Weight including contents.....	12 kg

TESTING HEAD

Measurements (mm).....	Ø 95 x 90
Weight.....	2.8 kg
Max. Pull Force.....	40 kN

(Model GM 04 can also be supplied as an 80 kN version.)

TEST SPECIMENS (DOLLIES)

Test Area	Diameter	Testing Range
3.27 cm ²	20.4 mm	0- 102 (120) MPa
4.91 cm ²	25.0 mm	0- 68 (80) MPa
19.62 cm ²	50.0 mm	0- 17 (20) MPa
39.25 cm ²	70.7 mm	0- 8.5 (10) MPa
50 x 50 mm	N/A	0- 13.6 (16) MPa

() = computer logging. See separate brochure for computer.

MANUFACTURED BY

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