

<https://laboratorium-industri.com>

texture analyzer

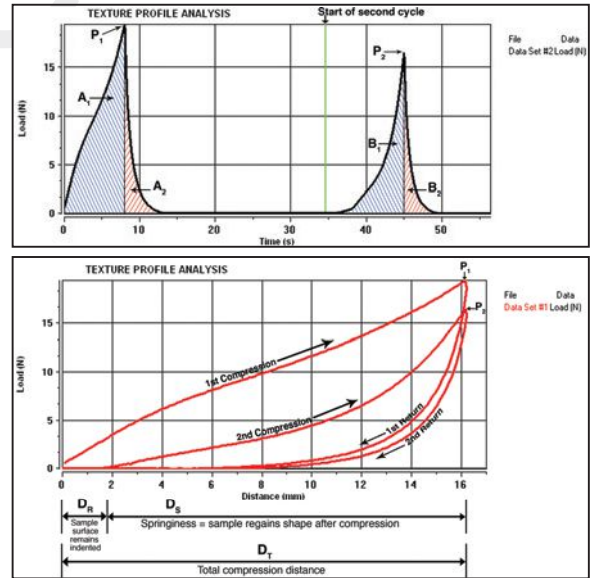


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What is texture analysis?

Texture analysis is primarily concerned with measurement of the mechanical properties of a product, often a food product, as they relate to its sensory properties detected by humans. Fifty years of texture research has developed a set of definitions relating the sensory properties of a product to the instrumental properties which can be calculated from the results of a two cycle texture profile analysis test. Texture analyzers perform this test by applying controlled forces to the product and recording its response in the form of force, deformation and time.

These graphs show two ways of looking at the data from one 2 cycle Texture Profile Analysis test. The force vs time graph clearly shows the force peak resulting from each compression cycle, while the force vs distance graph better displays the response of the sample to the application and removal of strain.



PARAMETERS	SENSORY DEFINITION	INSTRUMENTAL DEFINITION	
Hardness	Force required to compress a food between the molars (Defined as force necessary to attain a given deformation)	Peak force of the first compression cycle	P_1
Resilience (PELEG, 1976)	Measurement of how a sample recovers from deformation in relation to speed and forces derived	Resilience is the ratio of work returned by the sample as compressive strain is removed (known as recoverable work done A_2), to the work required for compression (known as hardness work done A_1)	$\frac{A_2}{A_1}$
Adhesive Force (Fizman and Damaio, 2000)	The maximum force required to separate teeth after biting sample	Maximum negative force generated during probe return	
Adhesiveness	The work necessary to overcome the attractive forces between the surface of the food and the surface of other materials with which the food comes into contact (e.g. tongue, teeth, palate) (Work required to pull food away from a surface)	The negative area for the first bite, representing the work necessary to pull the compressing plunger away from the sample (No adhesiveness is seen in graphs above)	
Springiness Index Preferred for comparing samples of different lengths	Ratio of the height the sample springs back after the first compression compared to the maximum deformation	Springiness divided by total deformation	$\frac{D_s}{D_T}$
Cohesiveness A measurement of how well the structure of a product withstands compression	The strength of internal bonds making up the body of the product (Greater the value the greater the cohesiveness)	The ratio of the work during compression (downward stroke only) of the second cycle B_1 divided by that of the first cycle A_1	$\frac{B_1}{A_1}$
Corrected Cohesiveness (PELEG, 1976)	Net work invested in the non-recoverable deformations of the first and second chews	The ratio of the net work of the second cycle $B_1 - B_2$ divided by that of the first cycle $A_1 - A_2$	$\frac{B_1 - B_2}{A_1 - A_2}$
Chewiness Solid foods only	The energy required to chew a SOLID food to the point required for swallowing it	The product of hardness, cohesiveness and springiness	$P_1 \times \frac{B_1}{A_1} \times D_s$
Corrected Chewiness	The net energy required to chew a SOLID food to the point required for swallowing it	The product of hardness, corrected cohesiveness and springiness	$P_1 \times \left(\frac{B_1 - B_2}{A_1 - A_2} \right) \times D_s$
Gumminess Applies to semi-solid products only if they have no springiness & undergo permanent deformation	Energy required to disintegrate a SEMI-SOLID food product to a state ready for swallowing (Related to foods with low hardness levels)	The product of hardness and cohesiveness	$P_1 \times \frac{B_1}{A_1}$

Why Choose AMETEK Brookfield?

AMETEK Brookfield is recognized around the world for offering high quality measurement instruments at an affordable price. Unsurpassed customer support is but one more reason to choose an AMETEK Brookfield product when you are considering a viscometer, rheometer, texture analyzer or a powder flow tester. To find out about the in-depth service that we provide, ask any customer who has uses one of our viscometers.

The CT3 offers the highest performance/cost ratio on the market. Distance accuracy is assured during calibration for each and every CT3 by storing the unique compensation curve for load cell deflection. Each load cell deflects naturally and uniquely as the force builds to the maximum range for the load cell. This unique deflection of each load cell is stored during calibration and applied to the drive system in real time as the test runs. This compensation assures accurate distance travel regardless of the load force recorded.

The CT3 Texture Analyzer utilizes uni-axial compression and tension forces in combination with a selection from our extensive list of probes, grips and fixtures to test a wide variety of food, personal care products and industrial materials. Most tests desire to imitate conditions imposed on these products during manufacture, handling, and consumption or use. Characterizing the physical properties of your products in such an analytical manner provides “real life” insight and can be invaluable toward maintaining consistent, high quality manufacturing while minimizing cost.

The AMETEK Brookfield Texture Department can also provide customers with complete texture assessment service. We specialize in the development of novel and innovative test applications and accessories for solid and semi-solid materials, enabling our customers to maximize the practical value of their texture studies within all test environments.

AMETEK Brookfield’s compact design of the CT3 has a long heritage dating from the Stevens gelatin Bloom tester. The CT3 still contains the Bloom test method and we now offer the complete gelatin bath preparation system along with GMIA and GME approved Bloom bottles. The system includes a CT3, a rack allowing easy handling of twelve Bloom bottles, two TC-450MX large reservoir baths and a TC-351 chiller.



CT3 Gelatin System

Why Measure Texture?

Consumer products succeed in the marketplace in part because their “textural characteristics” are pleasing to customers. This is certainly true with food products but it also applies to cosmetics, pharmaceuticals, packaging, industrial materials and even adhesive type materials.

Applications

Quality Control, Product Development and R&D

FOOD

Dairy	Bakery	Snack Foods	Meat	Fruit & Vegetables
Butter	Bread	Chips	Beef	
Cheese	Dough	Confections	Poultry	
Tofu	Pastry	Granola Bars	Seafood	
Yogurt			Surimi	

COSMETICS & PERSONAL CARE

Creams	Eye liner pencils	Lipstick
Mascara	Powder compacts	Soap bars

PHARMACEUTICALS

Adhesive dressing	Gelatins	Inhalation	Syringe testing
Tablet hardness	Topicals	Transdermal	

MATERIALS

Adhesives	Caulking	Grease	Packaging
Paste	Rubber	Wax	

Properties Measured

Adhesiveness	Apparent Modulus	Breaking Point
Burst Strength	Chewiness	Coefficient of Friction
Cohesiveness	Consistency	Elasticity
Fracture Force	Gel Strength	Gumminess
Hardness	Pliability	Relaxation
Ripeness	Spreadability	Tackiness
Yield Point		

CT3™ Texture Analyzer

compression and tension testing for rapid QC analysis

An extensive history and customer input have contributed to the development of the most powerful, low cost, stand-alone Texture Analyzer ever produced. With six test modes (plus calibration check) and a wide choice of accessories, no other texture analyzer has ever done so much without requiring a computer and software!

Standard Test Modes

Normal Test:

a single compression cycle

Hold Time Test:

compress and hold

Cycle Count Test:

compress multiple times

Bloom Test:

gelatin bloom strength test

TPA Test:

texture profile analysis

Tension Test:

tensile testing

Surimi Test:

gel strength

Static Load Test:

calibration check

Texture Loader Software

allows up to ten custom tests and ability to lock parameters

Compression distance

up to 10cm, can accommodate sample up to 22.5cm, almost 9 inches tall. Probe shaft is 8cm from back wall.

Choice of Load Cells

7 measurement ranges up to 50kg

Choice of Base Tables

allows for larger samples and more accessory choices



CT3 with Fixture Base Table
and Cylindrical Probe in
compression (TPA) mode

What's Included?

Instrument with choice of load cell
Texture Loader Software
USB & Power Cables

What else do I need?

Rotary Base Table, Fixture Base Table (see below) or Adjustable Base Table (p66)
At least one probe or test fixture (p60-64)

Optional Accessories

The CT3 has a wide variety of probes, fixtures and jigs which enable it to be very versatile. AMETEK Brookfield can also custom design a fixture and probe for most applications.

TexturePro CT Software TA-CT-PRO-AY (p59)
Temperature Probe DVP-94Y
Bubble Level TA-LVL
Calibration Weight Set (p59)
Gelatin Bath System for gel conditioning (p57)
Bloom Jar - industry approved TA-GBB-2

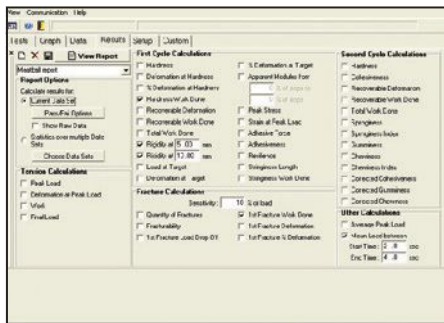
TexturePro CT Software Optional

COLLECT DATA AND PERFORM DETAILED DATA ANALYSIS WITH REAL-TIME GRAPHIC PLOTTING.

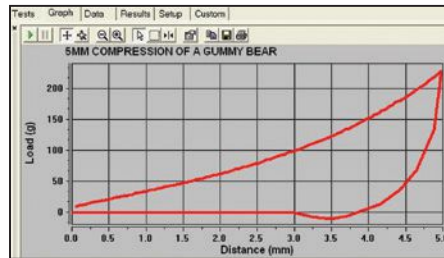
While the CT3 can perform many tests in stand alone mode, use of TexturePro CT Software permits creation of multiple tests and automatic execution without operator involvement.

Easily create custom reports and graphs right from the menu screen.

- Sample identification set-up screen helps new operators quickly get started; test fields outline a variety of parameters
- Intuitive set up for test methods and database file structures in a single window
- Data is captured as a graph and stored in tabular database format
- Advanced data analysis with built-in parameter calculations such as springiness, chewiness, hardness and much more!



Sample Test Set-up



On Screen Live Force Deformation Curve



Tension Mode

provides tensile testing capability

MODEL	Load Range / Resolution*
CT3-100	0-100g/0.01g
CT3-1000	0-1000g/0.10g
CT3-1500	0-1500g/0.20g
CT3-4500	0-4500g/0.50g
CT3-10kg	1-10000g/1.0g
CT3-25kg	1-25000g/2.0g
CT3-50kg	2-50000g/5.0g

g = grams kg = kilograms *Accuracy = ±0.5% Full Scale Range (FSR)

ALL CT3 MODEL SPECIFICATIONS	
Speed:	
Range	0.01-0.1mm/s (increments 0.01mm/s) 0.1 - 10mm/s (increments 0.1mm/s)
Accuracy	±0.1% of setspeed
Position:	
Range	0-101.6mm
Resolution	0.1mm*
Accuracy	0.1mm

mm = millimeter s = seconds
*Resolution 0.01mm when used with TexturePro CT Software



TA-CW-1500C

Calibration Weight Set contains a combination of certified weights which may be used to confirm the calibration and linearity of each specific load cell.

CT3 Accessories

FOR A WIDE RANGE OF TESTS.

While many CT3 accessories have multiple applications, some are particularly useful for specific industries. The following color coded icons are used here to identify these industries.

- F** FOODS
- C** COSMETICS
- P** PHARMACEUTICALS
- M** MATERIALS & PACKAGING
- D** DEVICES - MECHANICAL



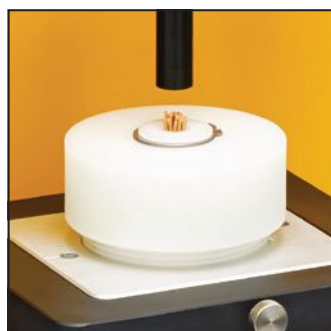
TA-KF F
Kieffer Dough and Gluten Extensibility Fixture quantifies maximum force and distance needed to break sample. Fixture Base Table required.



TA-JPA F M
Junior Punch Fixture is for punching through flat samples; 12.7mm max. diameter probe. Hole in fixture is 14mm. Rotary Base Table required.



TA-TPB F
Three Point Bend Fixture is used with TA7 blade from general probe kit. Fixture Base Table required. Small scale version TA-JTPB is available.



TA-DSJ F
Dough Stickiness Fixture is standard test for measuring dough stickiness; important for processing raw dough. Fixture Base Table required.



TA-DE F
Dough Extensibility Fixture for holding sheet of raw dough or flat bread to measure breaking point of stretched sample. Fixture Base Table required.



TA-CTP F
Compression Top Plate for applying uniform compression forces on samples up to 4x6 inches (10x15cm) Fixture Base Table required.



TA-VBJ F
Volodkevich Bite Jaws for testing bite force of meat products using shear cutting-test. Fixture Base Table required.



TA-PTF F M
Pizza Tensile Fixture quantifies cooked pizza firmness by measuring the tensile force and deformation distance to break sample.



TA-FMBRA F
Standard dough pot set for preparing dough samples and measuring dough firmness.



TA-AACC36 F
AACC spec probe for measuring bread firmness and performing texture profile analysis (TPA). Fixture Base Table required.



TA-SBA-WB-1 F
1mm Shear Blades for cutting-shear test: meat, fish, sausage, etc. TA-SBA-WB-3 option for 3mm blades. Fixture Base Table required.



TA-SFF

Spaghetti Flexure Fixture quantifies flexure characteristics of uncooked spaghetti and other dry pastas.



TA-OC-002

Ottawa Cell (447cc) for bulk compression to determine hardness and crispness of cereals, vegetables or fruits. Fixture Base Table required.



TA-PFS

Pasta Firmness and Stickiness Fixture measures the firmness and stickiness of uncooked pasta. Fixture Base Table required.



TA-PFS-C

Pasta Firmness and Stickiness Fixture measures shear strength when biting pasta and like products. Fixture Base Table required.



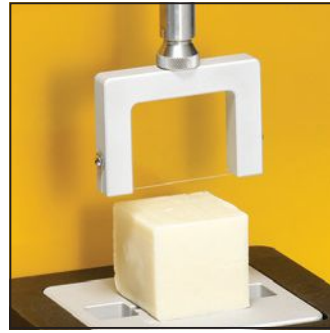
TA-KSC-002

Kramer Shear Cell - Sharp to measure shear force of small composite samples such as grapes, corn and beans. Fixture Base Table required.



TA-CSF

Circular Support Fixture provides support for round samples and retains any potential fluid expressed during the test. Fixture Base Table required.



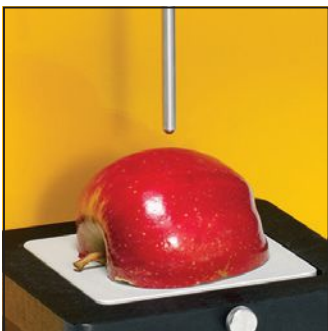
TA-WSP

Wire Shear Plate cuts through the sample. Good for products with significant stickiness like cheese and butter. Fixture Base Table required.



TA-CEF

Cheese Extensibility Fixture measures the extensibility of molten cheese sample to breaking point.



TA-MTP

Magness-Taylor Probes for puncture test to measure hardness of fresh fruit and vegetables. Fixture Base Table required.



TA10

GMIA & GME probe and spec Bloom bottle TA-GBB-2 sold in package of twelve bottles.



TA-MCF

The Multiple Chip Fixture is used for testing the penetration or firmness of multiple chips / french fries. Fixture Base Table required.



TA-CJ

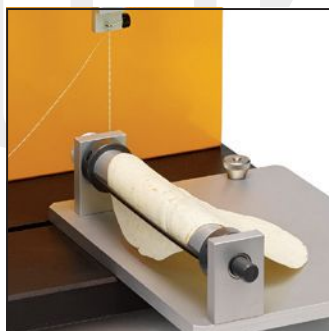
Confectionary Fixture for holding candies and similar products for penetration testing. Fixture Base Table required. Probe not included.

CT3 Accessories

FOR A WIDE RANGE OF TESTS.

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TA-TRF F
Tortilla Roll Up Fixture evaluates changes in corn tortilla texture per AACC technical paper by measuring the force to roll up a tortilla.



TA-CKA F
Craft Knife Adapter cuts cleanly into and through material with minimum deformation of the sample.



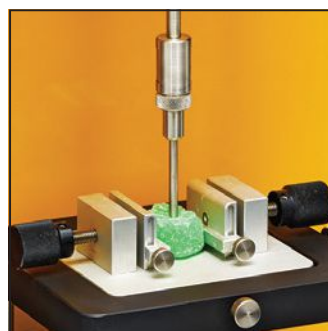
TA-52 MOHRS F
Shear Blade used for cutting tests, especially meat, poultry, fish or similar products. Fixture or rotary base table recommended.



TA-MP F M
Mesh Probe quantifies the consistency of products such as mayonnaise and yogurt.



TA-BEC F M
Back Extrusion Cell for measuring consistency of applesauce, pudding, yogurt and similar products. Rotary Base Table required.



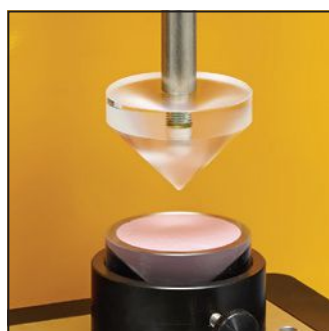
TA-AVJ F M
Adjustable Vice Fixture for holding small samples for puncture test. Good for jelly beans, gum drops, etc. Rotary Base Table required.



TA-JMPA F P
Multiple Probe Assembly consisting of nine 3mm probes and base plate designed to hold nine small samples of irregular geometry. Base Table required.



TA-DEC F C P
Dual Extrusion Cell for either forward or back extrusion of fruit puree, pudding, yogurt or similar products. Fixture Base Table required.



TA-STF C P F
Spread Test Fixture quantifies the spread force of a material. Comes with 1 male cone probe, 5 five samples cups and 1 sample cup holder. Base Table required.



TA-HCF C
Hair Combability Fixture measures the effect of hair dye, shampoos and conditioners on the combability of hair.

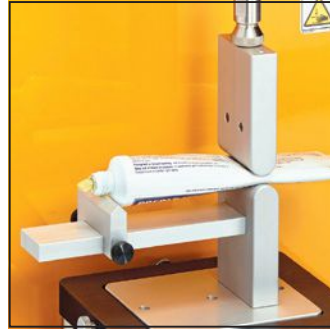


TA-EP C M
Eye Pencil Test Fixture measures hardness of cosmetic pencil tips for eye- or lip-lining products and can also be used for artistic type pencil tips. Fixture Base Table required.



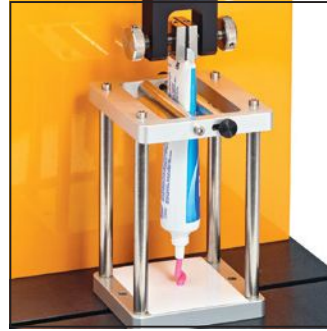
TA-LC C

Lipstick Cantilever Test Fixture allows imitative tests on lipstick and similar products to quantify strength of product. Fixture Base Table required.



TA-TE C P

Tube Extrusion Jig measures the force needed to squeeze cream, paste or ointment out of a tube. Base Table required.



TA-TEF C P

Tube Extrusion Fixture measures continuous extrusion force of tube or sachet samples. Top vice grip included.



TA-MA P

Muco Adhesion Test Fixture Simulates body/temperature conditions and force needed to pull a tablet away from a mucosal surface.



TA-RT P

Raft Tester measures alginate Raft Strength by pulling wire raft hook out of the sample material.



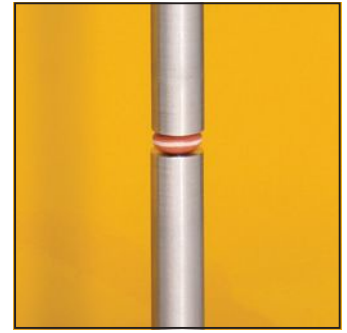
TA-MDI P

Metered Dose Inhaler Fixture measures the push-button force to actuate the inhaler. Fixture Base Table required.



TA-STJ P

Syringe Test Fixture for measuring the force required to push or pull syringe plunger. Important to all syringe markets. Base Table required.



TA-TCA P

Tablet Coating Adhesion Fixture measures the adhesion force of a tablet coating to a tablet. Fixture Base Table required.



TA-BLS P

Bi-Layer Shear Fixture measures shear strength by cutting a two-part tablet or capsule using a guillotine blade. Fixture Base Table required.



TA-BPS P

Blister Pack Support Fixture is used to measure the force required to remove the tablet from its blister pack. Fixture Base Table required.



TA-CLT P

Capsule Loop Tensile Test Fixture is used to measure the force required to split one half of a hard gel capsule. Fixture Base Table required.



TA-TCF P

Tablet Compression Fixture performs a ring crush test (includes four rings). Bead compression test fixture is also included. Fixture Base Table required.



TA-ATT M P

Adhesive Tack Tester for measuring stickiness of pressure sensitive adhesive materials such as tape. Rotary Base Table required.



TA-FSF M P

Film Support Fixture for puncture test to measure strength of fine films. Fixture Base Table required.



TA-LTT M

Loop Tack Test measures the adhesive strength of pressure sensitive tape and stickers according to ASTM D6195.



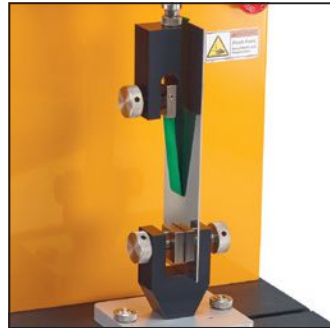
TA-RIF M

Rotary Indexing Fixture measures adhesive force to pull tape off a surface. Multiple tests done on same sample for average value. Fixture Base Table required.



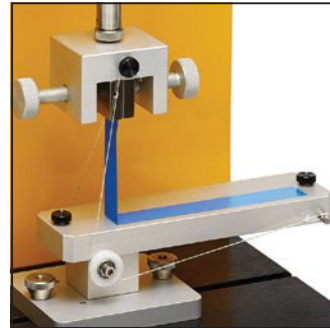
TA-GPJ M

General Peeling Jig measures the adhesive strength needed to remove the lid from a sealed container at 0°, 45°, and 90° angles.



TA-PF180 M

180° Peel Fixture consists of top & bottom grips to measure adhesive strength when pulling tape off rigid surface using force at 180° angle.



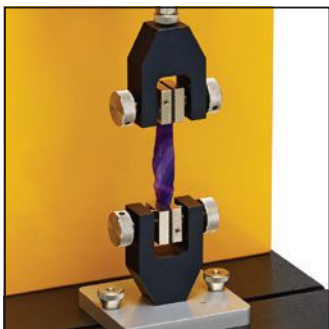
TA-PF90 M

90° Peel Fixture measures the adhesive strength to pull a tape off of a rigid surface using force at a 90° angle.



TA-ATTPT M

Adhesive Test Fixture measures adhesive force of plaster and similar samples. Includes flat cylindrical probe, base plate and top clamp to hold the sample.



TA-DGF M P D

Dual Grip Fixture for tensile testing of thin films or integrity of seals for packaging.



TA-RCA M D

Roller Cam Accessory grips measure the tensile strength and tear characteristics of material such as polymer films.



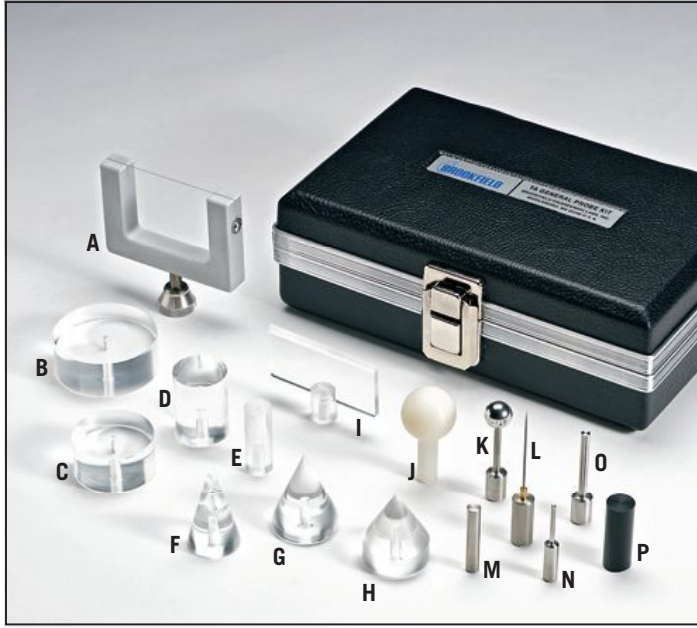
TA-SFJ M D

Sliding Friction Jig measures the coefficient of friction for packaging materials according to ASTM D1894.



TA11 D

Cylindrical probe TA11 is used to measure the force vs. distance in mechanical springs. TA11: included in TA-P-KIT2 or as a standalone part.



TA-P-KIT2 F C P M D

General Probe Kit
with Carrying Case

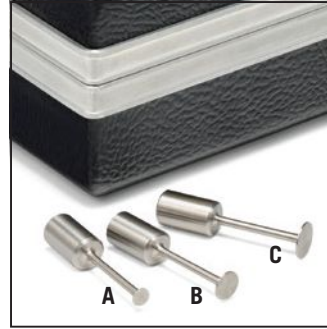
Variety of probes:

- (1) cutting wire
- (8) cylindrical
- (3) cone
- (1) knife-edge
- (2) ball
- (1) needle

Complies with BS and AACC.

Standard Probes

A	TA53	cutting wire
B	TA25/1000	50.8mm dia.
C	TA4/1000	38.1mm dia.
D	TA11/1000	25.4mm dia.
E	TA10	12.7mm dia.
F	TA17	24mm dia. 30°
G	TA15/1000	30mm dia. 45°
H	TA2/1000	30mm dia. 60°
I	TA7	knife-edge
J	TA43	25.4mm dia.
K	TA18	12.7mm dia.
L	TA9	needle
M	TA41	6mm dia.
N	TA39	2mm dia.
O	TA44	4mm dia.
P	TA5	12.7mm dia.



TA-P-KIT3 F

Curd Probe Kit
one each of:

- A TA46 5mm
- B TA47 8mm
- C TA48 10mm



TA-CW-1500C

Calibration Weight Set contains a combination of certified weights which may be used to confirm the calibration and linearity of each specific load cell.

Also available:

A variety of cylindrical, cone, ball, needle, knife-edge, and wire cutting probes are also available.

AMETEK Brookfield can also make custom fixtures and probes for a variety of applications. Please contact AMETEK Brookfield or an authorized dealer to discuss solutions to your texture and materials testing challenges.

BASE TABLES



TA-RT-KIT

Rotary Base Table provides quick and easy height adjustment to accommodate samples of various sizes. Included are pair of T-bolts for securing Rotary Base Table to slot in base of CT3 Texture Analyzer.



TA-BT-KIT

Fixture Base Table is rectangular with removable insert which can be used as test surface or replaced with a number of test fixtures. Included are pair of T-bolts for securing Fixture Base Table to slot in base of CT3 Texture Analyzer. Also included are four sets of extension legs with different lengths to adjust the test surface height.



TA-ABT-KIT

Adjustable Base Table for use with fixtures requiring table heights between 1.5" and 5"



The AMETEK Brookfield Texture Analysis Lab

TEXTURE ANALYSIS TESTING SERVICES

A variety of texture analysis testing services can be performed at all AMETEK Brookfield locations (USA, UK, Germany, China and India). Most services are performed free-of-charge.

TEST AND RECOMMEND

A simple evaluation designed to help determine the appropriate CT3 equipment for your application.

SAMPLE PROFILING

Analysis testing to determine specific properties of your sample.

DISPUTE RESOLUTION

Analysis testing for mediating a resolution between producers and/or suppliers in cases where each has different results for the same material.

MULTIPLE SAMPLE TEST

Expands the capability of your laboratory by utilizing AMETEK Brookfield's services to accomplish testing work on a timely basis.

TEXTURE APPLICATIONS

The CT3 Texture Analyzer is used to test many different types of materials. General categories are identified and examples from each are presented.



TA-HCF
Hair Combability
Fixture

COSMETICS

Measure the effect of shampoos and conditioners on the combability of hair. Lipstick firmness is confirmed with a bending test. Extrusion cell characterizes physical consistency of cosmetic creams.

SOME RECOMMENDED CT3 ACCESSORIES

TA-DEC TA-EP TA-HCF TA-LC TA-TEF



TA-NTF
Noodle Tensile
Fixture

FOODS

Evaluate noodle quality by stretching it with tension test. Snap test on cracker gives clear indication of freshness. Two-cycle compression test on bread slice quantifies firmness and springiness.

SOME RECOMMENDED CT3 ACCESSORIES

TA-DE TA-DSJ TA-FMBRA TA-JPA
TA-KF TA-MP TA-PFS TA-PFS-C
TA-PTF TA-SBA TA-SFF TA-TPB
TA-VBJ TA-WSP *and many more*



TA10
GMIA & GME
probe and spec
Bloom bottle

GELATIN

Universal method for establishing the value of gelatin is via the Bloom Test which measures the physical strength of the sample using a cylinder probe.

RECOMMENDED CT3 ACCESSORY

TA10, TA5



TA11
Spring Rate Test
measures force vs
distance of springs

MECHANICAL DEVICES

The CT3 has been extensively tested with various mechanical components. We have solutions for o-ring force vs. compression distance, key pad button actuation force, crimping force test for wire in clamps, life cycle testing for switches and actuators and much more. Call us for details.

RECOMMENDED CT3 ACCESSORY

TA11 TA-DGF TA-RCA TA-SFJ TA-P-KIT2



TA-DGF
Dual Grip Fixture

PACKAGING

Tensile test on package seals determines how hard it will be to rip open. The force required to remove capsules from blister packaging is measured with a finger probe in compression.

SOME RECOMMENDED CT3 ACCESSORIES

TA-ATT TA-AVJ TA-BEC TA-DGA TA-FSF
TA-GPJ TA-JPA TA-LTT TA-PF90 TA-PTF
TA-SFJ TA-TSF



TA-TEF
Tube Extrusion Fixture

PERSONAL CARE PRODUCTS

The squeezing force to extrude creams and pastes is quantified using a support fixture to hold the tube in place while pressing down with a finger-shaped blade.

RECOMMENDED CT3 ACCESSORY

TA-TEF, TA-STE, TA-TE, TA43



TA-BLS
Bilayer Sheer
Test Fixture

PHARMACEUTICALS

Measure shear strength of two-part tablet or capsule using guillotine blade. Burst strength of capsule shell is quantified using tension test to rip the capsule apart. Adhesive property of tablet coating is determined with tension test.

SOME RECOMMENDED CT3 ACCESSORIES

TA-BPS TA-DEC TA-FSF TA-MA TA-MDI
TA-RH TA-STF TA-STJ TA-TCA TA-TEF