## Strength

<table>
<thead>
<tr>
<th>No.</th>
<th>Instrument</th>
<th>Description</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Windsor HP Probe</td>
<td>In place compressive strength test. ASTM C-803, BS-1881 #207</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Windsor Pin</td>
<td>In place strength test. (brick, mortar, &amp; concrete) ASTM C-803</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Concrete Test Hammers</td>
<td>In place strength test of harden concrete. ASTM C-805, BS-1881 #202</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Digital Test Hammers</td>
<td>In place strength test of harden concrete. ASTM C-805, BS-1881 #202</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Anchor Test</td>
<td>For tensile strength of anchors. BS-5080 #5973</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>007 James Bond Tester</td>
<td>Overlay bond strength in construction materials. ASTM C-1583, ASTM D-4541</td>
<td></td>
</tr>
</tbody>
</table>

## Rebar Locators

<table>
<thead>
<tr>
<th>No.</th>
<th>Instrument</th>
<th>Description</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>R-Meter MK III</td>
<td>Advanced digital rebar locator. BS 1881 #204</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Mini R-Meter</td>
<td>Economical digital rebar locator. BS 1881 #204</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>HR-Meter</td>
<td>Economical analog rebar locator. BS 1881 #204</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Datascan MK II</td>
<td>GPR system for rebar and pipe location.</td>
<td></td>
</tr>
</tbody>
</table>

## Ultrasonic & Structural Analysis

<table>
<thead>
<tr>
<th>No.</th>
<th>Instrument</th>
<th>Description</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>V-Meter MK III</td>
<td>Ultrasonic pulse velocity for measurement &amp; flaw detection. ASTM C-597</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Transducers</td>
<td>Low frequency for testing concrete and other course grained materials.</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Vu-Con</td>
<td>Impact echo analysis of concrete and masonry. ASTM C-1383</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>E-Meter MK II</td>
<td>Determines resonant frequencies. ASTM C-215, C-666</td>
<td></td>
</tr>
</tbody>
</table>

## Corrosion

<table>
<thead>
<tr>
<th>No.</th>
<th>Instrument</th>
<th>Description</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Gecor 8</td>
<td>Advanced rebar corrosion rate field test.</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Gecor 6</td>
<td>Standard rebar corrosion rate field test.</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>Cor Map II</td>
<td>Advanced half-cell potential meter. ASTM C-876</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>Cor Map</td>
<td>Economical rebar corrosion analysis. ASTM C-876</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Ohmcor Meter</td>
<td>Resistivity assessment field test.</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Poroscope Plus</td>
<td>Air and water permeability of concrete field test.</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Chloride Test</td>
<td>Wet or dry chloride profile field test.</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>ASR Detect &amp; Carbo Detect</td>
<td>Alkali silica reaction field test/Carbonation field test.</td>
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</tr>
</tbody>
</table>

## Fresh Concrete

<table>
<thead>
<tr>
<th>No.</th>
<th>Instrument</th>
<th>Description</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td>M-Meter &amp; IQM-Meter</td>
<td>Maturity meters both single and multi channel. ASTM C-1074/C-918</td>
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<tr>
<td>77</td>
<td>IQT-Meter</td>
<td>Time &amp; temperature monitoring. ASTM C-1074/C-918</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Fresh Concrete Air Meter</td>
<td>ASTM C-173/C-231</td>
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</tr>
</tbody>
</table>

## Moisture

<table>
<thead>
<tr>
<th>No.</th>
<th>Instrument</th>
<th>Description</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>83</td>
<td>Trident</td>
<td>Moisture content in sand, fine, and coarse aggregates.</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>Cementometer</td>
<td>Instant water/cement ratio.</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>Humitest</td>
<td>Humidity test for hardened concrete.</td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>Moisture Master</td>
<td>Measure moisture content of solid materials.</td>
<td></td>
</tr>
</tbody>
</table>
James Instruments began in 1968 by supplying the now classic R-Meter for the location of rebar. The company has steadily expanded the product line as technology in the Non-Destructive Testing field has developed. In 1989, the company took over Windsor Systems and expanded on this line of resistance to penetration devices. James Instruments introduced the V-Meter MK II in 1993 as the first Ultrasonic Pulse Velocity device to electronically store and calculate data. In 1994, the company introduced the Gecor 6, the first commercially available corrosion rate system to the world wide testing community. The corrosion line of products was added and expanded in 1998. 2004 brought the Trident, the first hand held microwave moisture meter for sand & aggregates. We are excited to say that we have expanded on this line in the current catalog.

As time has passed, NDT has become not just the field we are committed to but a part of our quality policy: No Defects, Development of New Technology and Process, and Timely delivery of our products and support. Following this principle we not only manufacture high quality equipment but back it with high quality customer service and support. We regularly train customer personnel as well as our global sales network, at our facility in Chicago. James also sponsors the ACI scholarship for Non-Destructive Testing. This scholarship is provided as the best paper on non-destructive testing. This will help ensure the continued advances in the Non-Destructive Testing field. Finally, our highly trained technicians insure the quality of our systems again and again. This has allowed James Instruments to become known world wide as the leader in Non-Destructive Testing systems for construction and coarse grained materials.
The Windsor HP Probe System

For in-place strength testing of normal and high-performance concrete.

Features and Benefits

- New electronic measuring system enhances accuracy and efficiency.
- Measurement up to 17000 psi (110 MPa).
- Memory for data storage and uploading to PC.
- Safe: no accidental discharge and no recoil.
- Fast and economical use.
- Determines the developing strength of concrete; improves safety, ensures quality and reduces costs.
- Monitors the strength for rehabilitation as concrete ages.
- Conforms to ASTM C-803, ACI 347-78, BS 1881 #207, ANSI A. 10-3.

Applications:
Form Removal
Structural Analysis
Light weight concrete strength determination
Standard concrete strength determination
High strength concrete strength determination
High precision strength determination

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The Windsor HP System does not require great skill to use and consistent results can be obtained by construction site supervisory staff or field technicians. In fact, among its users are contractors, engineers, architects, testing laboratories, ready mix concrete producers, owners, managers and government authorities. This system has widespread use in testing concrete in-situ, on conventionally placed, sprayed or precast concrete; on horizontal or vertical slabs; on floors or overhead; on fresh or mature concrete.

The system is safe to use. The driver cannot be discharged unless it is fully depressed with some force against the actuating template which rests against the surface being examined.

**Probes**

There are two power settings available, low and standard power. The low power is used where concrete strength is less than 3000 psi (19.4 MPa). Standard power is for any strengths above that.

The newly designed silver probes can be used for high performance concrete with strength up to 17000 psi (110 MPa). The probes are made of a high strength alloy, specially heat treated and annealed to achieve a hardness of Rockwell C 48. Special machining of each probe eliminates stress concentrations.

The gold probe has a 56% greater cross-sectional area than the silver; it is recommended for light weight concrete — less than 125 lbs/cu. ft. (2003 Kg/m³) in density. The silver probe is used with concrete having a density greater than 125 lbs/cu. ft. (2003 Kg/m³).
Strength

Procedure
A. Actuating
Load the driver with a power load and probe suited for the type of concrete being examined. Place the driver firmly on the actuating template and fire. The locating template is then used to locate the probes at the corners of a fixed triangle. Normally, three measurements are required for consistent and statistically reliable results.

B. Measuring
The electronic measuring device is menu driven and programmed for selection according to the following parameters.

- Aggregate hardness
- Light weight, normal, or HP concrete
- American or Metric units

The three individual tests are automatically averaged and displayed on the LCD in accordance with ASTM procedure. This data together with time and date of the test are stored in the memory for subsequent uploading to a PC. An extractor is supplied to facilitate probe removal after the test.

The Standard Windsor Probe System includes a depth gauge and “Strength Chart” for determining the concrete strength. This is an economical alternative for many concrete test environments.
The Windsor HP Probe System

Technical Specifications

The Windsor HP Probe System is designed to evaluate the compressive strength of concrete in place. It is non-destructive and can be used with equal effectiveness on fresh and mature concrete. Equally accurate results are obtained on horizontal or vertical surfaces provided that the probe is perpendicular or at right angles to the test surface.

A hardened steel alloy probe is propelled at high speed by an exactly measured explosive charge into the concrete and its penetration measured. Each power load is guaranteed to have an energy level to give an exit muzzle velocity tolerance within ±3%. The compressive strength of the concrete is directly related to the resistance to penetration of the crushed aggregate and cement matrix: this is determined by the distance required to absorb the specific amount of kinetic energy of the probe. The compressive strength of the concrete is empirically related to the penetration that varies with the hardness of the aggregate. This relationship is recognized by determining the Moh’s scale of hardness of the aggregate and applying a correction factor to the penetration.

The combined contributions of both the aggregate and the cement paste to concrete strength are examined by the test. The accuracy of the inferred strengths has been examined in many independent tests and trials. The Windsor HP results correlate well with the concrete strength determinations obtained by conventional means.

For most accurate test results ASTM recommends that a correlation be developed for the particular mix design being tested. Exact duplication of cylinder test results should not be expected. The probes measure the strength of the actual concrete in a structure rather than that of a sample compacted and cured under strict and somewhat artificial conditions which do not necessarily represent those of the structure itself.

The Windsor Probe test has been approved by federal, state and municipal agencies as well as a number of foreign countries. It conforms to the following tests, specifications and practices:

- ASTM C803
- ACI 347
- ANSI A.10-3
- BS 1881 #207

Sales Numbers & Specifications

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-WP-1000 PSI</td>
<td>Complete Windsor HP System with readings in PSI</td>
</tr>
<tr>
<td>Z-WP-1000 MPA</td>
<td>Complete Windsor HP System with readings in MPA</td>
</tr>
<tr>
<td>Z-WP-534</td>
<td>Complete Windsor Probe Standard System</td>
</tr>
<tr>
<td>Z-WP-500</td>
<td>Driver Unit</td>
</tr>
<tr>
<td>Z-WP-700 PSI</td>
<td>Electronic Measuring Kit with readings in PSI</td>
</tr>
<tr>
<td>Z-WP-700 MPA</td>
<td>Electronic Measuring Kit with readings in MPA</td>
</tr>
<tr>
<td>U-PRS-01</td>
<td>Box of 75 Silver Probes and 75 Power Loads</td>
</tr>
<tr>
<td>U-PRS-03</td>
<td>Box of 75 Gold Probes and 75 Powder Loads</td>
</tr>
</tbody>
</table>
James Windsor Pin System

A unique instrument for measuring the strength of new or existing construction materials in situ utilizing the established principle of resistance to penetration.

Features and Benefits

- Portable and completely self-contained.
- Safe to use — non explosive.
- Economical — steel pin can be reused.
- Non destructive.
- Removable chuck facilitates testing of mortar strength in masonry.
- Conforms to ASTM C-803
- Test new concrete products and structures for early strength.
- Evaluate the in situ strength in existing structures, e.g., after suspected fire damage.
- Test strength of block, brick, and mortar joints within an existing structure, e.g., load bearing walls.
- Test polymer concrete and patching compound.
- Quality control of precast elements such as block, brick slabs and pipe.

Applications:

Low strength concrete (below 5000 PSI, 36 MPA)
Mortar joints of existing buildings
High precision strength determination

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**Pin Penetration Resistance Test Procedure**

Measure the Pin after each test if the pin is too blunt or too short the strength can be considerably overstated.

**New and used pins**

- Actual new pin length: 1.2 inches.

**Go/No-Go Gage**

- Used steel pin passing through the Go/No-Go gauge.

**Firing**

Windsor Pin with chuck on smooth surface.

**Cleaning**

Air blower cleaning out pin hole before measuring.

**Measuring**

Needle micrometer measuring depth of pin penetration in mortar joint.
With the chuck removed the pin driver is capable of accurately testing mortar joints. By inserting the V-barrel into the mortar joint the pin will directly penetrate at the center of the joint.
The principle of the Windsor Pin system is that a spring drives a steel pin into the surface of the material. Since the depth of penetration is inversely proportional to compressive strength, the device provides a fast and safe way of determining the in situ strength of material.

The spring is loaded by tightening the retraction nut until the trigger mechanism latch closes to hold the spring in place. With the spring loaded it is compressed to a distance of 0.8 inches. Thus once the trigger is pulled there is enough force to test compressive strength of concrete to a maximum of 5300 PSI (36.9 MPa). The pin is made of a special high strength steel specifically for building material penetration and can be used about seven times. It should be replaced if the length is reduced sufficiently for it to pass a go/no-go gauge. Not doing so will severely impact results.

With the chuck on both the micrometer and pin driver, flat surfaces can be easily and accurately measured. Simply make sure the chuck rests against the surface and pull the trigger. After the pin has penetrated the surface, clean the hole with the provided blower, measure depth of penetration and compare to the previously prepared chart for the compressive strength of your material. Charts for typical mortar and concrete is provided.

The recommended practice is to take seven readings discarding the two readings farthest from the mean. By doing this the possibilities of striking a flaw or near surface piece of hard aggregate and using the resulting penetration to calculate strength are sufficiently reduced. Grinding the surface flat before testing produces more consistent results.

With the chuck removed the pin driver is capable of accurately testing mortar joints. By inserting the V-barrel into the mortar joint the pin will directly penetrate at the center of the joint. By following a similar procedure as above the compressive strength of the mortar joint can be accurately and safely tested. A similar v-shape for the micrometer facilitates measurement.

Calibration
The spring of this instrument has been selected for its ability to undergo many compression cycles with no loss of energy. However, it is recommended that the instrument be sent back to James Instruments (or authorized distributor) for cleaning, recalibration, and replacement of the loading nut, at least once every year.

Sales Numbers
W-P-2000          Windsor Pin System
(Pins not included with system)
W-P-1040          Box of 40 pins with gauge for Windsor Pin system

Specifications
Weight          18 lbs. (8.1 Kg)
Dimensions      17 x 12 x 6 inches (43 x 30 x 15 cm)
James Concrete Test Hammers

Digital and manual hammers for the quick and easy determination of the strength of concrete

Features and Benefits

**Manual Model W-M-250**
- Easy to use manual calculation of the mean rebound number.

**Manual Model W-M-350**
- Records every test on chart paper. Easy to read and use.
- All James Test Hammers conform to ASTM C-805, BS-1881 #202 and other international standards.

Application:
*Rapid estimate of concrete strength*
Technical Specifications

Model W-M-350

The W-M-350 Recording Test Hammer gives you the same quality as the W-M-250 but with the added feature of a built-in automatic chart recorder. Every test you take is automatically recorded as a bar chart on a paper strip. This creates a field record to verify your findings. In addition to this paper record, you can see each test as it happens through the large easy to read window. The W-M-350 comes with two rolls of paper, each with a capacity to record over 4000 tests.

Model W-M-250

The W-M-250 Manual Test Hammer is the traditional instrument used for the non-destructive testing of hardened concrete. This easy-to-use instrument provides a quick and simple test for obtaining an immediate indication of concrete strength in various parts of a structure. The minimum verifiable strength is 1400 PSI (10 MPa).

Specifications

Manual Test Hammer W-M-350

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>3.2 lbs. (1.4 kg)</td>
</tr>
<tr>
<td>Size</td>
<td>5&quot; x 3&quot; x 14&quot; (127 x 76 x 355mm)</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>6 lbs. (2.7kg)</td>
</tr>
<tr>
<td>Carrying Case Dimensions</td>
<td>8&quot; x 7&quot; x 14&quot; (203 x 178 x 355mm)</td>
</tr>
</tbody>
</table>

Manual Test Hammer W-M-250

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>2 lbs (0.9 kg)</td>
</tr>
<tr>
<td>Size</td>
<td>10 1/2&quot; (267mm) (with plunger retracted)</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>6 lbs. (2.7kg)</td>
</tr>
<tr>
<td>Carrying Case Dimensions</td>
<td>15 1/2&quot; x 11 1/2&quot; x 2 1/2&quot; (394 x 292 x 64mm)</td>
</tr>
</tbody>
</table>

Calibration Anvil Model W-C-7312

It is recommended that calibration of the test hammers be checked regularly - usually after about 2000 strokes. The James Calibration Anvil (W-C-7312) has been designed for just that purpose. The Calibration Anvil weighs approximately 35 lbs. (16kg) and should be ordered separately.

NOTE: All Test Hammers shown here have an Impact Energy level of 1.6 ft. lbs. (0.225 kgn) and come complete with carrying case and carborundum stone.
James Digital Test Hammers

Digital hammers for the quick and easy determination of the strength of concrete

Features and Benefits

**Digital Model W-D-2000**
- Automatic calculation of mean rebound number, compressive strength and more;
- Field Printer, PC connection and software for downloading

**Digital Model W-D-1500**
- Automatic calculation of mean rebound number, compressive strength and more;

Application:
- Rapid estimate of concrete strength
- Simplifies data analysis and interpretation

www.ndtjames.com
Technical Specifications

James Instruments' digital test hammers are an advanced, completely automated system for estimating concrete compressive strength. Its calculation, memory and recording functions allow for quick, easy and accurate test results.

Discard values for multiple test results can be set; the mean, median and compressive strength can also be calculated. The addition of modern microprocessor technology allows the data to be stored, printed and transferred to a personal computer for further analysis, or inclusion in your reports.

The unit comes with an integrated alpha-numeric digital display, and control panel. You can switch between standard or metric units.

The field printer mounts on the belt for ease of use. Connection to a personal computer is via the RS-232 interface.

Sales Numbers

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W-D-2000</td>
<td>DIGITAL 2000 REBOUND HAMMER w/ Printer and Software</td>
</tr>
<tr>
<td>W-D-1500</td>
<td>DIGITAL 1500 REBOUND HAMMER w/o Software or Printer</td>
</tr>
<tr>
<td>W-D-1100</td>
<td>DIGITAL REBOUND HAMMER Software</td>
</tr>
<tr>
<td>W-D-1200</td>
<td>DIGITAL REBOUND HAMMER Printer</td>
</tr>
</tbody>
</table>

Specifications

**Digital Hammer**
- Display: 2x16 Trans – reflective
- Construction: All Aluminum for rugged construction environment
- Operating Temperature: 0° to 50° C (32° to 122° F)
- Batteries: 2 ‘AA’
- Ap. Size: 100mm x 100mm x 270mm (4” x 4” x 10”)
- Ap. Weight: 1.6 Kg (3.5 lbs.)

**Printer**
- Size: 64mm x 49mm x 31mm (2.5” x 1.9” x 1.2”)
- Weight: up to 0.270 kg (0.6 lbs) with paper
- Battery: Internal Lithium ion with 1 yr. approximate life
- Charger: 100VAC – 240VAC 5 VDC 3.0A
- Operating Temperature: 0° to 50° C (32° to 122° F)

**Software**
- Windows PC Compatible
- RS-232 interface required

It is recommended that calibration of the test hammers be checked regularly - usually after about 2000 strokes. The James Calibration Anvil (W-C-7312) has been designed for just that purpose.

The Calibration Anvil weighs approximately 35 lbs. (16kg) and should be ordered separately.

Calibration Anvil
Model W-C-7312
James Anchor Test System

Anchor testers measures a wide range of anchor strengths in construction materials.

Applications:
Scaffolding
Safety Harness
Repair and Rehabilitation
Rebar Strength

Features and Benefits

- Two models are available, each with two different gauge capacities for precision readings over a wide range of loads and applications.

- A load diffusion bridge and pyramid are available to keep loads away from anchor point.

- Gauges have maximum load indicator and viscose damping protection against sudden load release.

- Long Pull Stroke for complete extraction and efficient operation.

- A variety of adapters are available for different fixings.

- Compact mechanical design offers reliability and ease of use.

- Conforms to BS-5080 #5973 and other international standards.
James Anchor Test System

Four Basic Capacities

The James Anchor Test system is available in light to heavy duty versions as follows:

**Standard Anchor Test System**

- **Light Duty:** 0-1200 lbs. Force (0-5 kN)
  - 40 lbs. (0.2 kN) gauge division
- **Medium Duty:** 0-3600 lbs. Force (0-20 kN)
  - 100 lbs. (0.5 kN) gauge division

The tensile load is applied to the fixing mechanically; hydraulics are used to register the load only. This enhances the systems’ reliability as it is not prone to hydraulic leaks. Also, mechanical loading provides smoother operation, eliminating hydraulic backlash.

**Super Hydraulic Pump Anchor Test System**

- **Light Duty:** 0-26,000 lbs (0-123 kN)
- **Heavy Duty:** 0-52,000 lbs (0-255 kN)

The Load application is achieved via a hydraulic pump driving a 4:1 hydraulic multiplier; the applied load is recorded directly on a gauge mounted on the hydraulic pump assembly. This new and improved design allows for practical test of higher kN values.

An integral movement indication is provided allowing “first movement” to be identified as well as total displacement before failure.
Applications
- Expansion, resin and undercut anchors.
- Frames, anchors and screw fixings.
- Structural anchors for safety harness eyebolt.
- Scaffolding ring-bolt.
- Safety anchors for ladder restraints.

Reaction Load Diffusion
In order to test correctly and avoid damage to the host construction material, reaction loads must be absorbed by the structure well away from the fixing under test. This can be achieved by either a load diffusion bridge for verification testing or, if greater distance is required, by a load diffusion pyramid for testing to failure. Both of these optional accessories have large feet to minimize bearing pressure and are height adjustable to accommodate different adaptor.

Long Pull Stroke
The Standard Anchor System has a pull stroke of 4 inches (100mm). This longer stroke has the following advantages.

- Complete extraction of most fixings after test in one simple operation. When fixings are tested to failure, they usually need to be fully extracted from the base material. With plastics and other types of anchors, which fail by pulling from the base material, the extraction can be carried out without readjustment of the bridge legs.

- Faster set-up saves time on multiple testing projects. Initial adjustments of the height of the tester relative to the fixing can be made with the loading handle rather than moving the bridge legs.

Gauges
Each gauge has the following features:

- Maximum load indicator.
- Rubber casing for protection against shock.
- Shatter proof glass.
- Built-in protection against sudden load release.
- Quick release coupling.
- Calibration certificate.

Standard Anchor Test System with Load Diffusion Pyramid for Testing to Failure
**Technical Specifications**

**Sales Numbers**

**Standard Anchor Test System**

**Verification testing**

P-C-7280  Standard Anchor Test Kit for Load Verification
0-1200 lbs.force (0-5 kN) gauge.
0-3600 lbs.force (0-20 kN) gauge.
4” Stroke hydraulic system, load diffusion bridge, 2 gauges, required adapter type, carrying case, calibration certificate.
Please specify adapter type
Weight: 19 lbs. (7.7 kg)

**Testing for failure**

P-C-7281  Standard Anchor Test Kit for Testing Load Failure.
0-1200 lbs.force (0-5 kN) gauge.
0-3600 lbs.force (0-20 kN) gauge.
4” Stroke hydraulic system, Load Diffusion Pyramid, 2 gauges, Extension rod w/ required adapter, carrying case, calibration certificate.
Please specify adapter type.
Weight: 25lbs. (11.5 kg)

**Super Hydraulic Anchor Test**

P-C-7276L  Super Hydraulic Anchor Test Kit
Light Duty: 0-26,000 lbs.force (0-123 kN)
Super Hydraulic anchor unit/Load Diffusion Bridge, Pulling frame, Steel carrying case, calibration certificate.
Weight: 39lbs

P-C-7276H  Super Hydraulic Anchor Test Kit
Heavy Duty: 0-52,000 lbs.force (0-255 kN)
Super Hydraulic anchor unit/Load Diffusion Bridge, Pulling frame, Steel carrying case, calibration certificate.
Weight: 39lbs

P-C-7275  Rebar Pulling Frame

**Heavy Duty Adapters**

**Standard Anchor System:**

P-C-7216  Bolt Fixing Adapter Kit:
For testing fasteners up to 5/8” (16mm) diameter.

P-C-7212  M12 Ring Bolt Adapter Clevis:
For testing eye bolts and safety harnesses.

P-C-7265I  Imperial Threaded Adapter Kit:
For normal applications. Sizes available: 1/2”, 1/4”, 3/8”, 5/16”

P-C-7265M  Metric Threaded Adapter Kit:
For normal applications. Sizes available: M4,M5,M6,M8,M10,M12

P-C-7266I  Imperial Slotted Adapter Kit:
For torque anchors. Sizes available: 1/2”, 1/4”, 3/8”, 5/16”

P-C-7266M  Metric Slotted Adapters Kit:
For torque anchors. Sizes available: M4,M5,M6,M8,M10,M12

**Super Hydraulic Anchor Test**

P-C-7277I  Imperial Heavy duty adapters
For heavy duty applications. Sold individually.
Size available: 1/2”, 1/4”, 3/8”, 5/16”

P-C-7277M  Metric Heavy duty adapters
For heavy duty applications. Sold individually
Size available: M16-M20

---

**Testing Ring Anchors**

James Anchor Test System

**Technical Specifications**

**Sales Numbers**

**Standard Anchor Test System**

**Verification testing**

P-C-7280  Standard Anchor Test Kit for Load Verification
0-1200 lbs.force (0-5 kN) gauge.
0-3600 lbs.force (0-20 kN) gauge.
4” Stroke hydraulic system, load diffusion bridge, 2 gauges, required adapter type, carrying case, calibration certificate.
Please specify adapter type
Weight: 19 lbs. (7.7 kg)

**Testing for failure**

P-C-7281  Standard Anchor Test Kit for Testing Load Failure.
0-1200 lbs.force (0-5 kN) gauge.
0-3600 lbs.force (0-20 kN) gauge.
4” Stroke hydraulic system, Load Diffusion Pyramid, 2 gauges, Extension rod w/ required adapter, carrying case, calibration certificate.
Please specify adapter type.
Weight: 25lbs. (11.5 kg)

**Super Hydraulic Anchor Test**

P-C-7276L  Super Hydraulic Anchor Test Kit
Light Duty: 0-26,000 lbs.force (0-123 kN)
Super Hydraulic anchor unit/Load Diffusion Bridge, Pulling frame, Steel carrying case, calibration certificate.
Weight: 39lbs

P-C-7276H  Super Hydraulic Anchor Test Kit
Heavy Duty: 0-52,000 lbs.force (0-255 kN)
Super Hydraulic anchor unit/Load Diffusion Bridge, Pulling frame, Steel carrying case, calibration certificate.
Weight: 39lbs

P-C-7275  Rebar Pulling Frame

**Heavy Duty Adapters**

**Standard Anchor System:**

P-C-7216  Bolt Fixing Adapter Kit:
For testing fasteners up to 5/8” (16mm) diameter.

P-C-7212  M12 Ring Bolt Adapter Clevis:
For testing eye bolts and safety harnesses.

P-C-7265I  Imperial Threaded Adapter Kit:
For normal applications. Sizes available: 1/2”, 1/4”, 3/8”, 5/16”

P-C-7265M  Metric Threaded Adapter Kit:
For normal applications. Sizes available: M4,M5,M6,M8,M10,M12

P-C-7266I  Imperial Slotted Adapter Kit:
For torque anchors. Sizes available: 1/2”, 1/4”, 3/8”, 5/16”

P-C-7266M  Metric Slotted Adapters Kit:
For torque anchors. Sizes available: M4,M5,M6,M8,M10,M12

**Super Hydraulic Anchor Test**

P-C-7277I  Imperial Heavy duty adapters
For heavy duty applications. Sold individually.
Size available: 1/2”, 1/4”, 3/8”, 5/16”

P-C-7277M  Metric Heavy duty adapters
For heavy duty applications. Sold individually
Size available: M16-M20

---

**Testing Ring Anchors**
007 James Bond and Adhesion Tester

Measures bonding strength between two layers of material.

Applications:
Overlay testing during repair and rehabilitation

Features and Benefits

- Accurate bond strength of repair mortars, epoxy resin, laminates, overlays, and other coatings.
- Calibrated gauge with maximum load indicator.
- Viscose damping mechanism to protect against sudden load release.
- Adjustable alignment plate with built in leveling facility.
- Compact design.
- Easy to use.
Technical Specifications

Technical
Adequate direct tensile strength between two layers is important if repairs to concrete structures or additional overlays on existing concrete are to be structurally sound. The 007 James Bond Tester involves bonding a circular steel disc to the surface by means of an epoxy resin adhesive. A controlled tensile force is then applied to the disc and failure will occur at the weakest point: either in the host material, or in the bond between overlay and host material. Knowing the surface area of the disc and the force applied at failure, the tensile strength of the host material or bond can be calculated.

Method
1. Using a coring bit for either 3 inches or 2 inches cores, make a notch or kerf in the material to be tested, drilling through the bond interface. This exactly defines the area to be tested.
2. Using a standard quick epoxy adhesive (not supplied with the kit) attach a steel disc on the defined test area.
3. Set the bond test alignment plate over the defined test area and level the plate by adjusting the legs.
4. Attach the Puller and turn the hand operated ratchet wrench until failure occurs.
5. The steel discs can be reused and cleaned using a suitable solvent.

Equipment
The 007 James Bond Test Kit consists of:
- Hand operated Puller.
- 5K + 25K calibrated gauge with maximum load indicator and viscose damping to protect against sudden load release.
- Adjustable alignment plate with built in leveling facility.
- Pull bolt with coupling.
- 10 three inch (75 mm) diameter steel discs.
- 10 two inch (50 mm) diameter steel discs.
- Carrying case.

Sales Numbers
P-C-7256 James Bond Test System
P-054-10987-006 75mm (3inch) Diameter Steel Discs
P-054-10987-007 50mm (2inch) Diameter Steel Discs

Diagram of system in operation
R-Meter MK III

The re-birth of a classic rebar locator with the latest in sensing and microprocessor technology!

Features and Benefits

- Eddy current sensor design for greater accuracy.
- Single sensor for all depth ranges.
- Locates rebar, post tension cable, conduit, and copper pipe.
- Determine bar size up to 4.5" (115 mm) deep.
- Daylight visible display.
- Rugged and splash resistant case.
- Optional scan cart.
- Locates up to 8" (200 mm) deep.
- Conforms to ACI 318, BS 1881 #204, DIN 1045, CP 110, EC 2, SIA 162, DGZfP B2.

Applications:
- Structural Engineers
- Rebar Mapping
- Rebar Network Analysis
The James Instruments R-Meter MK III represents the re-birth of a classic rebar locator. It utilizes the latest in eddy current sensing and microprocessor technology to accurately locate, determine depth, and estimate diameter of metal objects in concrete.

The eddy current sensor is specifically designed to react to the outer surface of the metal object. It is uninfluenced by small metal particles in the concrete, whether the concrete is fresh or hardened, wet, or dry. The eddy current sensor also allows the unit to locate both ferrous as well as non-ferrous metals in concrete; thereby finding not only steel reinforcing bars accurately, but tendons, copper tubing, conduit, and more.

The latest in microprocessor technology not only conditions the signal from the sensor for more accurate and dependable results but provides the user with the information they need. Rebar diameter can be estimated by using a simple system of comparison all fully automated for consistent, repeatable results with increased resolution over previous models. The microprocessor can also statistically analyze the data, searching automatically for minimum cover points, and the least cover of a group of points. Cover points can be displayed as a symbolic map of a structure to assist the user in finding problematic areas. Built in memory can store over 80 thousand individual data points for processing.

The optional scan cart can be used to graphically...
Rebar Locators display a cross section of the concrete and the location of the metal objects within. With its built-in encoder objects can be located with both distance and depth recorded.

Fully integrated P.C. software allows the upload and storage of data points via RS-232.

The ruggedized R-Meter MK III provides the field engineer/technician with all the tools necessary to locate and determine what and where all metal objects are in the structure.

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**Metric Rebars Ranges**

**Imperial Rebar Ranges**

- **Deepmode**
- **Shortmode**
- **Bar Too Close**
Technical Specifications

R-Meter MK III

**Main Unit**
- **Weight:** 5.4lbs (2.5Kg)
- **Size:** 10.63” L x 9.68” W x 4.88” H
- **LCD Size:** 27cm x 24.5cm x 12.4cm
- **LCD Dim.:** 3.5” L x 4.65” H
- **Display:** 8.9cm x 11.8cm
- **Recharging Voltage:** 18v
- **Memory Capacity:** 80 thousand data points
- **Battery Life:** 4 – 6 hrs continues run time

**Probe Dimensions**
- **Weight:** 1 lb (0.45Kg)
- **Size:** 5” L x 2.4” W x 1.6” H
- **Probes:** 12.7cm x 6cm x 4.1cm

**Scan Cart Dimensions**
- **Weight:** 1 lb (0.45Kg)
- **Size:** 8.25” L x 5.6” W x 2.25” H
- **Maximum Scan Length:** 48 ft. 14.6m

**Sales Numbers**

**R-C-3000 BASIC UNIT**
includes the following: Main Unit, Probe, Coil Cable, Sizing Template, Charger, and Headphones

**R-C-3050 BASIC UNIT WITH SOFTWARE**
includes the following: Main Unit, Probe, Coil Cable, Sizing Template, Charger, Headphones, RS-232 Cable, and Basic Software.

**R-C-3100 COMPLETE SYSTEM**
includes the following: Main Unit, Probe, Coil Cable & 6ft Scan Cart Cable, Scan Cart, Headphones, Charger, Complete Software (Basic and Scanning Software), RS-232 Cable, Sizing Template, 2

**Individual Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
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</thead>
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<tr>
<td>R-C-3010</td>
<td>Main Unit</td>
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<tr>
<td>R-C-3015</td>
<td>Probe</td>
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</tbody>
</table>
The James Mini R-Meter

A rugged hand held field instrument for finding the location, depth and size of reinforcement rebar, post tension, copper and conduit in place.

Applications:
Rebar Locating
Concrete Drilling & Sawing
Repair & Rehabilitation
Contractors

Features and Benefits

• Eddy current design for greater accuracy.
• Single sensor for all depth ranges.
• Daylight visible display
• Locates up to 8” (200mm)
• Economical
The Mini R-Meter is a completely digital, rugged hand held field instrument for finding the location, depth, and size of reinforcement bars in place.

The Mini R-Meter is a completely digital, light weight and inexpensive, easy to use unit to locate and size rebars. Rebar detection of up to 10” (250mm) can be accomplished when locating large diameter rebar. An easy to read display, 4 hr battery life are just a few advantages that makes the Mini R-meter one of the most advanced handheld units in the field today. The sensor design allows the end user to quickly and accurately locate and determine concrete cover in corners or hard to reach areas. The system allows the user to select between Imperial and Metric units, and the data can be saved in the instrument for posterior uploading to a computer. The data is saved in the system with the date and time of the record to help identify prior test taken. The Mini-R-Meter rebar locator is also capable of locating non ferrous metals.

The eddy current sensor was specifically designed to react with the presence of currents on the outer surface of metal objects. It is uninfluenced by small metal particles in the concrete, whether the concrete is fresh or hardened, wet, or dry. The eddy current sensor also allows the unit to locate both ferrous as well as non-ferrous metals in concrete; thereby finding not only steel reinforcing bars accurately, but tendons, copper tubing, conduit, and more.

The latest in microprocessor technology not only conditions the signal from the sensor for more accurate and dependable results but provides the user with the information they need.

Built in memory can store over 150 individual data points for later processing.
**Detection and Orientation of Rebars**
The exact position and orientation of rebars can be measured quickly and accurately. Rebar-free areas can be identified for coring, grinding, resurfacing, or insertion of new machinery mountings. The instrument can be used to inspect new structures for compliance with specifications as well as old structures under modification.

**Measurement of Concrete Cover**
The exact position and orientation of rebars can be measured quickly and accurately. Knowing the size of the rebar, concrete cover can be detected and the distance between the concrete and the surface it will appear in the easy to read display.

**Location of Metals**
Locate any metals, as pipe, flues, wire, and sheets embedded in concrete, masonry, or wood. Identification is possible to a depth of 10 inches.

**Location of prestressed Cables**
Locates the position of cables and lost tendon splices in pre or post tension concrete products.
## Technical Specifications

### Sales Numbers
- R-HR-8000: Mini R-Meter unit
- R-HR-8100: Mini R-Meter w/software

### Specifications
- **Operating temperature range:** -5°C to 45°C (23°F to 113°F)
- **Bar Size Calibration:** 3/8” to 1-3/8”
  
  (10 to 36 mm)
- **Max. Detection Range:** 10” (No. 11 Bar) 250 mm
  
  (36 mm Bar)
- **Power Source:** Rechargeable Storage Battery
- **Battery Life:** 4 hours continuous operation

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**HR-8000 and HR-8100 only:**
- **Operating Weight:** Less than 3.5 pounds
  
  (1.60 kg)
James
HR Rebar Locator

A rugged field instrument for finding the location, depth, and size of reinforcement bars and post tension cables in place.

Features and Benefits

- Single unit construction; no physical strain for the operator and no probe cord to snag or break.
- Post-mounted sensor with meter mounted separately for convenient viewing by operator in stand-up position.
- Pin-point accuracy for precise rebar location from direct reading, stable analog meter.
- Detection up to 10 inches (250 mm) of cover with easy to read calibrated meter.
- Light operating weight—less than 3.5 pounds (1.6 kg.).
- Up to 8 hours continuous use between battery charges; improved electronic circuitry.
- Conforms to BS-1881 #204, ACI 318, DIN 1045, CP 110, EC2, SIA 162, DGZfP B2.

Applications:
Concrete Drilling & Sawing
Repair
Rehabilitation
Contractors

www.ndtjames.com
**Detection and Orientation of Rebars**

The exact position and orientation of rebars can be measured quickly and accurately. Rebar-free areas can be identified for coring, grinding, resurfacing, or insertion of new machinery mountings.

The instrument can be used to inspect new structures for compliance with specifications as well as old structures under modification.

**Measurement of Concrete Cover**

The amount of concrete cover over reinforcement bars is an important parameter on bridge decks, highways, columns, and slabs. Concrete cover can be determined with an accuracy of ± 1/8 inch. Concrete thickness can be measured in tanks, pipes, and other structures where the inner lining is steel and within 10 inches of the surface.

Reinforcement bar size can also be estimated.

**Location of Ferrous Metals**

Locate any ferrous base material such as pipe, flues, wire, and sheets embedded in concrete, masonry, or wood. Identification is possible to a depth of 10 inches.

**Location of prestressed Cables**

Locates the position of cables and lost tendon splices in pre or post tension concrete products.

**Sales Numbers**

R-HR-7000: US Scale Hand-held unit with charger in carrying case
R-HR-7500: Metric Scale Hand-held unit with charger in carrying case

**Specifications**

- **Operating temperature range:** -5°C to 45°C (23°F to 113°F)
- **Bar Size Calibration:** 3/8" to 1-3/8" (10 to 36 mm)
- **Max. Detection Range:** 10" (No. 11 Bar) 250 mm (36 mm Bar)
- **Power Source:** Rechargeable Storage Battery
- **Battery Life:** 8 hours continuous operation

**HR-7000 and HR-7500 only:**
- **Operating Weight:** Less than 3.5 pounds (1.60 kg)
- **Operating Dimensions:** 10" x 6" x 4" (19 x 18 x 10 cm)
- **Weight incl. carrying case:** 6 pounds (2.70 kg)
- **Dimensions of carrying case:** 7.5" x 7" x 14" (19 x 18 x 36 cm)
An unsophisticated ground penetrating radar system that allows the user to view structural features, such as; wire mesh, rebar, pipes (metal and fluid filled P.V.C.), asphalt, and concrete thickness.

**Applications:**
- Locate Steel
- Locate Plastic
- Estimate Thickness

**Features and Benefits**
- Creates images automatically allowing the user to evaluate data in the field.
- Unsophisticated operation rapidly allows the user to gather information.
- Displays both a cross section of the material under test and each individual scan.
- Maps and stores the location of the features for later reference with the optional P.C. Software.

www.ndtjames.com
The Datascan MK II represents the latest technological developments in object location within construction materials. Using the latest ground penetrating radar technology coupled with the latest developments in micro processing we are able to visually display a cross-section of the material under test and what lies within it.

By simply rolling the unit across the surface of the concrete, a variety of features inside the material can be found. Rebar from 5 mm (1/4”) to 200 mm (8”) depth can be located as well as pipe, wire, mesh, fluid filled P.V.C. and more... The Unit can store up to 16 meters of information. It can also measure asphalt and concrete thickness. Post processing algorithms within the unit allows these features to be graphically displayed in real-time on the built in LCD.

Visual analysis of the information can be done in three ways. The A-Scan mode which can be viewed on the LCD screen, can show the user relative signal strength as a function of time. The B-Scan mode, also available on the LCD screen, can show the user a cross-section of the material being tested and the features inside. Both of these displays can be printed in the field with the printer option. Finally in the advanced system with the accompanying windows compatible personal computer software a C-Scan mode is also available. This allows the user to display a map of the area under test and the appropriate features inside it.

**Specifications**

- **Dimensions:** 52 mm (6”) x 150 mm (5.8”) x 216 mm (8.5”)
- **Weight:** 2.5 lbs.
- **Display Type:** LCD, B & W with back light
- **Battery Life:** 2 hours
- **Range of Penetration:** 5 mm (1/4”) to 200 mm (8”)
- **LCD size:** 60 mm (2¾”) x 80 mm (3¼”)
- **Operating Frequency:** 1.5 GHz

**Sales Numbers**

- R-G-1000 Basic System
- R-G-1200 Complete System

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3727 North Kedzie Avenue, Chicago, Illinois 60618
1-800-426-6500 (773) 463-6565
FAX (773) 463-0009
e-mail: info@ndtjames.com
http://www.ndtjames.com

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**Example of field print out showing three bars of different diameters and different depths.**
The James
V-Meter Mark III

The most advanced ultra-sonic test system for accurately identifying basic characteristics of coarse grained materials.

Features and Benefits

- Direct digital read-out of transit time
- Built-in wave form display on LCD
- Daylight visible display
- Rugged and splash resistant case
- Flaw detection
- Simple calibration; no special bar required
- Portable, light weight with battery and A-C power
- Conforms to ASTM C-597, BS 1881-203 and other international standards
- RS-232 output for uploading to computer
- Direct reading of calculated P-wave velocity and S-wave velocity
- Direct reading of calculated modulus of elasticity
- Direct reading of Poisson's ratio
- Signal and trigger output

Applications:

- Locate Honey Combs & Voids
- Fire Damage
- Crack Depth Determination
- Young's Modulus
- Find Rotting Wood

www.ndtjames.com
The James V-Meter Mark III

Applications

Concrete

The V-Meter Mk III is widely used and accepted for quality control and inspection of concrete. It can measure and correlate concrete strength to standard strength measurement, permitting non-destructive testing of complete structures. It will identify honeycombs, voids, frozen concrete, cracks and other non-homogenous conditions in concrete. Ultrasonic testing can be applied to new and old structures, slabs, columns, walls, fire damaged areas, hydroelectric structures, pipe, prefab and pre-stressed beams, cylinders and other concrete forms. A wide range of transducers are available.

Typically, the 54 KHZ transducers are used for concrete testing – the signal wavelength is about 3 inches (75mm). Finer materials require higher frequencies for optimum resolution. The basic V-Meter Mark III contains a transmitter, a receiver and a very accurate high speed electronic clock. The transmitter generates an electrical pulse which when applied to a transmitting transducer, converts the electrical energy into a pulse of ultrasonic mechanical vibration. This vibration is coupled with the specimen under test by placing the transducer in contact with the specimen. At another selected point on the specimen another receiving transducer is coupled by mechanical contact. Each transmitted pulse of energy registers on the high speed clock. The first energy wave reaching the receiving transducer is converted back to an electrical signal and turns off the clock. The elapsed time is displayed on the LCD in 0.1 microsecond increments.

Wood

V-Meter Mark III, ultrasonic testing of wood can, nondestructively, detect knots, shakes, splits, grain orientation, windfall cracks and presence of decay and rot. Basic parameters such as modulus of elasticity and density can be calculated. Practical applications include field testing of utility poles and structures, grading in the manufacturing process, fire ladder inspection, examination of laminates and paper roll density. The velocity of ultrasonic energy pulses traveling in a solid material are related to the density and elastic properties of the material. The pulse velocity is thus a measure of density and elastic properties of the material. In transmitting ultrasonic energy through a coarse grained material such as concrete, ceramics or wood, it is necessary for the wave length of energy to be greater than the diameter of the largest grain particle. If it is not, all of the energy will be reflected back by the particles and none will reach the receiver.

Typically, the 54 KHZ transducers are used for concrete testing – the signal wave length is about 3 inches (75mm). Finer materials require higher frequencies for optimum resolution.
**Technical**

The instrument has an easy to view display (320 by 240 pixels). The backlit for daylight use, makes field work easier and faster, since the operator can identify good results in seconds without the problems related with the sun light reflection on the screen.

The signals can be recorded in the instrument for review on the screen or for transfer to a PC. A remote switch located on the sender transducer, instantly captures the signal on the display for viewing. Use of the remote switch facilitates field work and makes the V-Meter M III a very practical system. More than 200 readings can be recorded in the main memory and data can be transferred to a PC.
The James V-Meter Mark III

Technical Specifications

Methods of propagating ultrasonic pulses

Direct Transmission

Semi Direct Transmission

Indirect or Surface Transmission

Specifications

Instr. Weight: 6 lbs. (2.75 Kg)
Ship Weight: 17 lbs. (7.7 Kg)
Dimensions: 4.5" x 8.5" x 10.5"
(114.3mm x 223.5mm x 267mm)
Frequency range: 24 to 500 kHz, based on
transducers selected.
Receiver sensitivity: 250 micro volts, between
30 kHz and 100 kHz.
Receiver input impedance: approximately 100 kOhms.
Transit time measurement: 0.1 to 6553.5
microseconds, direct
digital display.
Measurement accuracy: 0.1 microseconds.
Transmitter output: pulse 1000V/500V, 2
microseconds.
Transmitter pulse group rate: selectable 1, 3 or 10.
Gain Selection: 1, 5, 10, 25, 50, 100, 250,
500
Battery: 14 Volt. 4-10 hours
continuous use
(lithium ion).
Display: 320 by 240; backlit for
daylight use.
Storage: 1800 plus readings
Software: Windows XP compatible.
Temperature: 0° - 50°C

Sales Numbers

V-C-9900: V-Meter MkIII Complete System
V-C-9901: V-Meter Mk III System w/o Software
V-C-9902: V-Meter Mk III Basic system
(everything but transducers)
The James Ultrasonic Transducers

The widest range of low frequency transducers available for ultrasonic testing of concrete and other coarse-grained materials.

Features and Benefits

General Purpose Compression Wave Transducers
- Robust PZT elements in stainless steel housing.
- Designed for maximum acoustic efficiency.
- Many transducers in use for over 35 years.
- The most experienced and expert support.

Table 1

| For Concrete | Model Number | Resonant Frequency | Diameter ins. mm | Length (w/conn.) ins. mm | Weight Lbs. | Weight gr. 
|--------------|--------------|--------------------|-------------------|--------------------------|-------------|-------------
| V-C-4891     | 24KHz        | 2.02 51            | 4.62 117          | 2.62 1188                | .92 417     |
| V-C-4898     | 54KHz        | 2.02 51            | 2.37 60           | .19 85                   |
| V-C-4894     | 150KHz       | 1.03 26            | 2.07 52           | .05 23                   |
| V-C-7217     | 500KHz       | .51 13             | 2.28 58           |                          |

For Ceramics
Technical Specifications

Shear Wave

V-C-7283 180 KHz: Length 2.37 in. (60 mm), Diameter 1.98 ins. (51 mm)
Weight .92 lbs. (416 gr.). Used in combination with compressional wave transducers, to calculate the Poisson’s ratio which in turn will facilitate a more accurate moduli.

Exponential

V-C-4911 50 KHz Transmitter: (Used without Pre-Amp)
Length 4.765 in. (121 mm) Diameter 1.49 in. (38 mm)
Weight .94 lbs. (425 gr.)
V-C-4905 50 KHz Receiver: (Used with Pre-Amp) Length 4.765 ins. (121 mm)
Diameter 1.49 in. (38 mm)
Weight 1.3 lbs. (590 gr.)
Eliminates the use of couplants on rough, uneven surfaces.

Underwater

V-C-4876 54 KHz Transmitter: Length 5.87 in. (149 mm)
Diameter 2.25 in. (57 mm) Weight 5 lbs. (2268 gr.)
V-C-4877 54 KHz Receiver: Length 6.87 in. (175 mm) Diameter 2.25 ins. (57 mm) Weight 6 lbs. (2722 gr.)
Each supplied with 50-ft. (16 m) underwater cable (V-C-4969-050) and connectors.
V-C-4969-xxx additional cable per foot (32 cm).

Accessories

V-C-4140 Preamplifier: For very coarse material and long path lengths with direct amplification, x 4 and x 7 using a Switch.
V-C-4874-GSO Clean in place gel couplant – For architectural concrete; can be cleaned
V-24145-000 Rubber couplant (10pc-80mmx75mm)
V-24145-001 Rubber couplant (50pc-25mm Diameter)
Couplant does not mar surface, reusable for 5-15 times.

Sales Numbers

V-C-7283 180 KHz Shear Wave
V-C-4911 50 KHz Transmitter Exponential
V-C-4905 50 KHz Receiver Exponential
V-C-4876 54 KHz Transmitter Underwater
V-C-4905 54 KHz Receiver Underwater
V-C-4891 24 KHz
V-C-4898 54 KHz
V-C-4894 150 KHz
V-C-7217 500 KHz

Accessories

V-C-4140 Preamplifier
V-24145-000 Rubber couplant (10pc-80mmx75mm)
V-24145-001 Rubber couplant (50pc-25mm Diameter)
The James Vu-Con System

Impact Echo System for measuring the thickness and quality of concrete

Features and Benefits

- Accurately determines concrete thickness without drilling cores or using similar destructive techniques.
- Quickly locates delaminations and voids in concrete slabs & structures where access is limited to a single side.
- Rugged design for field use.
- Rapid results within seconds at the jobsite.
- Large easy to view display for data analysis on site and in daylight.
- Data can be stored and uploaded to a PC for later analysis and inclusion in reports.
- Conforms to ASTM C-1383.

Applications:
- Runways & Roads
- Retaining Walls
- Bridge Decks
The James Vu-Con System uses the impact echo method to evaluate concrete and masonry structures. The impact echo method is based on the use of impact generated stress waves that propagate through the material and are reflected by both the material's external surfaces and internal flaws. This method can be used to make accurate non-destructive measurements of thickness in concrete slabs and plates and to locate internal flaws such as honey combing debonding, and delaminations. It can measure thickness, locate cracks, voids and other defects in masonry structures where mortar bonds the masonry together. Finally, the impact echo method is not affected by the presence of steel reinforcing bars.

The method works by creating a short duration mechanical impact on the surface of the material under examination. This is typically performed by small steel balls that produce low frequency stress waves that propagate through the material and reflect off of other surfaces and internal flaws back to the surface used for testing (See diagram, top of opposite page.) By recording and analyzing the vibration from the mechanical impact at the surface, thickness and other physical features (referred to in the preceding paragraph) can be determined. The advantage of using an impact rather than other more classic ultrasonic techniques is the low frequency and the long wave length of the stress waves that are produced. Low frequency stress waves treat concrete and masonry as a single elastic homogeneous material as they propagate through.

The resulting amplitude waveform from the transducer can be displayed for analysis both with respect to time and frequency. This is illustrated by graphs on the following page. The time domain waveform can be described as a sum of a series of different frequency waveforms.

This allows the user to:
• Analyze the dominant frequencies of vibration found from the impact and determine thickness as well as distance to features within the material.
• Compare the frequency spectra to obtain indications of homogeneity of the concrete.
• Calculate the rate of decay of the vibrations to glean information regarding the sub-grade.

The VuCon System represents the latest technology in concrete ultrasonic analysis, allowing the engineer to “see” into the concrete surface.
Diagram of VuCon System Test.

Display of Frequency Spectra for a single test.

Display of time domain waveform
Unit

The Vu-Con Analyzer provides the engineer with the sturdiest, most reliable system for impact echo analysis. No moving parts and implementation of the latest microcomputer technology has created a system that is both sophisticated and reliable. The unit comes with a 90 mm (3.5”) by 115 mm (4.5”) graphic display screen that is easily viewed in daylight. This allows rapid analysis of results in situ. It may store more than 200 individual tests with time and date indication. The data is easily uploaded to a PC for inclusion in reports and data analysis. Data communication takes place via the RS-232 port and Windows compatible PC software. The unit allows the user to select sensitivity levels to adapt to varying conditions in the field.

The built-in menu system has provisions for determining all the parameters for the material under test. The thickness menu allows rapid display of the frequency spectra of an impact. Peaks are automatically found and highlighted for a given test. The velocity menu, for use with the dual transducer set, facilitates determination of the stress wave speed in a given material. This allows the operator to gather and analyze data quickly and easily in the field. Finally, the user can select from multiple gain settings for various material dimensions. There is also a selection of multiple data sampling rates and an adjustment for different trigger levels which help the user produce accurate and reliable results.

Specifications

Instr. Weight: 6 lbs. (2.75Kg)
Ship Weight: 17 lbs. (7.7 Kg)
Dimensions: 4.5” x 8.5” x 10.5” (114.3mm x 223.5mm x 267mm)
Freq. Range: 50KHz
Impactor Sizes: 6, 8, 10, 12, 14, & 16mm
Gain Selection: .5, 1, 1.5, 25, 50
Battery: 12 Volt. 4-10 hours continuous use
Display: 320 by 240; backlit for daylight use
Storage: 200 plus readings
Software: Windows compatible 9x/me 32MB Ram, 100MB Ram
Temperature: 0° - 50°C

Sales Numbers

V-V-100: VuCon Complete System
The James E-Meter Mk II™

For the determination of the resonant frequency of materials.

Applications:
Freeze Thaw Analysis
Young's Modulus Determination
Damping
Coefficient Analysis

Features and Benefits

- Conforms to ASTM C-215 and C-666.
- The easiest method of calculating the following material parameters non-destructively:
  
  Young's Modulus of Elasticity,  
  Modulus of Rigidity,  
  Poisson's Ratio,  

- Available for specimen sizes up to 6 inches (150mm) cross section dimension and from 1.75 inches (45mm) to 28 inches (700mm) in length.

- Automatic identification of the resonance frequency. Large easy to view display for data analysis of time domain and frequency spectrum signals.

- Data can be stored and uploaded to a PC for further analysis and inclusion in reports.

- Fast and easy to use system.

www.ndtjames.com
**The James E-Meter Mk II™**

**Principle**

The principle used in the E-Meter Mk II™ is based upon the determination of the fundamental resonant frequency of vibration of a specimen generated by an impact and sensed by an accelerometer. The frequency spectrum is computed and displayed by the meter.

For the determination of the resonant frequency of materials.

The E-Meter Mk II™ measures the resonant frequencies of the three different modes of vibration – Longitudinal, transverse (Flexural) and torsional.

From these the following material characteristics can be calculated – Young’s Modulus of Elasticity, Modulus of Rigidity and Poisson’s Ratio.
For the determination of the resonant frequency of concrete.

E-meter Mk II time domain signal allows to visualize the vibration of the specimen.

E-meter Mk II frequency domain spectrum.
The James E-Meter Mk II™

Technical Specifications

System
The E-Meter™ MK II has an automatic feature that computes the maximum amplitude, which eliminates cumbersome frequency scanning. Frequencies are automatically shown in the display and a cursor allows the user to move along the frequency spectrum. Also the time domain signal and the frequency spectrum can be stored and uploaded to a PC for further analysis and inclusion in reports.

Resonance Frequency
The E-Meter™ MK II performs a Fast Fourier Transform that allows the identification of the resonance frequency in the Frequency Spectrum.

Durability of Concrete
The determination of flexural resonance is very important when studying the degradation of concrete under accelerated freezing and thawing cycles and aggressive environments on concrete specimens. The advantage of resonance methods are:
1. Tests can be repeated over a very long period on the same specimen; the number of test specimens required is therefore greatly reduced.
2. The results obtained with the resonance method on the same specimen are more reproducible than those obtained with destructive tests and groups of specimens.

Specifications

Frequency range: from 10 Hz to 40 kHz
Sampling frequency: 10, 20, 40 or 80 kHz
Frequency resolution: from 4.9 to 78.1 Hz
Record length: 1024 or 2048 points
Output bias level: 9.2 V
Accelerometer sensitivity: 9.60 mV/g (0.979 mV/m/s²)
Battery: 12 Volt. 4-10 hours continuous use
Display: 320 by 240; backlit for daylight use
Storage: 200 plus readings
Software: Windows compatible
9x/me 32MB Ram
Impactors: Set of 6 hardened steel balls.
Operating Temperature Range: 0°C to 40°C

Sales Numbers
V-E-1000
V-E-1010
V-E-1020

E-MeterMkII
Complete system
E-MeterMkII Instrument
Accelerometer
James Instruments
Gecor 8

World’s most advanced system for analyzing corrosion of concrete reinforcing steel in existing structures.

Applications:
Corrosion Rate Analysis
Structure Service Life Analysis
Repair Cost Estimation

Features and Benefits

• "...giving the corrosion rate most closely matching the true values." (from the US Strategic Highway Research Program.)

• Rapid mapping capabilities for analysis of large structures.

• Advanced method for more accurate corrosion rate determination.

• New sensor design for analysis of wet or submerged structures.

• New method for analysis of cathodic protection systems while the system is running.

• Personal computer software for data analysis and report generation.

• Graphical user friendly interface to facilitate measurements.
Corrosion of steel reinforced concrete affects the safety and durability of concrete structures in the following ways:

A. The steel cross section is reduced, weakening the concrete strength.
B. The concrete is cracked due to the increased volume in the rust.
C. The steel to concrete bond is reduced when cracking and spalling are initiated.

A true measure of the corrosion rate is possible by the polarization resistance technique. It has been well established by Stern and Geary that corrosion current is linearly related to polarization resistance. This gives a direct quantitative measurement of the amount of steel turning into oxide at the time of measurement. By Faraday's equation, this can be extrapolated to direct metal sectional loss.

James Instruments Gecor 8 represents the latest technology in steel reinforcing bar corrosion rate determination. It combines state of the art embedded microprocessor systems and computerized flash technology with the world's leading research in reinforcing bar corrosion rate analysis.

The Gecor 8 features:

1. A rapid mapping technique that allows the engineer to quickly classify areas of a structure. Both the classical corrosion potential as well as the resistivity of the concrete can be measured. Each individual parameter can be mapped in a multi-color contour graph. The built-in programming also analyzes this data and the two parameters can be combined to reliably determine areas of highest corrosion.

2. Our advanced modulation confinement technique precisely measures the true polarization resistance of the steel reinforcing bar. Utilizing the information obtained by the two reference electrodes in a feed-back network, the unit automatically adapts the electrical field produced by the guard ring to the conditions of the concrete. This allows the Gecor 8 to reach a quasi steady-state condition for the 30 to 100 seconds required for determining the polarization resistance through a galvanostatic pulse. This advanced technology provides the most accurate field test currently available for the determination of corrosion rate.

3. The Gecor 8 also has the ability to measure corrosion rate in submerged or very wet structures. An optional sensor has been designed to measure corrosion rate in extremely wet environments, eliminating the need for an external guard ring. The sensors measure polarization resistance through the use of Feliu's formula, using three aligned field-follower electrodes.

4. Another optional feature is a technique to measure the cathodic protection efficiency by analyzing the electrical impedance obtained from an alternating current applied with modulated confinement. This method provides a relative index of the cathodic protection performance as a percentage.

5. PC software assists the user to graphically interpret, collate, organize and generate reports with the data generated from the device. It allows the user to set up the Gecor 8 for more rapid testing later in the field, and will automatically link to the PC for data collection.

Complete implementation of these options provides an unprecedented system for corrosion rate analysis of steel reinforced concrete structures. Combined with the latest advances in interface systems and database storage technology, Gecor 8 is an easy to use, reliable, automatic and intelligent corrosion rate analysis system. A system that can save an engineer time, money and effort in evaluating corroding structures for subsequent rehabilitation.
Corrosion

Resistivity vs Corrosion Current Density

Contour Map of Risk Levels
Technical Specifications

Sensor “C” for Very Wet Submerged Structures

Sales Numbers
C-CS-8300: Complete System
(Cu/CuS04 or Ag/AgCl)
C-CS-8000: Basic System with
(Cu/CuS04 or Ag/AgCl)

Specifications
CORROSION RATE METER C-CS-8010
Weight: 9 lbs. (4 Kg)
Dimensions: 12 x 8 x 6.5 in.
(300 x 200 x 360 mm)
Batteries: Rechargeable nickel hydride
LCD Display: 320 x 240 1/4 VGA

SENSOR A C-CS-8020C / C-CS-8020A
Weight: 2 lbs. (0.9 Kg)
Dimensions: 7 x 0.8 in. (180 Dia x 20 mm)

SENSOR B C-CS-8030C / C-CS-8030A
Weight: 0.6 lbs. (0.3 Kg)
Dimensions: 1.4 x 5 in.
(35 mm Dia x 130 mm)

SENSOR C C-CS-8040C
Weight: 2 lbs. (0.9 Kg)
Dimensions: 8.2 x 1.2 in.
(210 mm Dia x 30 mm)

SOFTWARE C-CS-8232
OP System: Microsoft Windows Me/XP
Processor: Pentium 166 MHz or better
Hard Disk: 100 Mb
RAM: 32 Mb
James Instruments
Gecor 6

A unique patented field system for measuring the rate of corrosion and other parameters of reinforcement bars.

Features and Benefits

- The U.S. Strategic Highway Research Program (SHRP) describes the system as “giving the corrosion rate most closely matching the true values.”

- The system gives important complementary measurements for the interpretation of corrosion rate results.

- The “A” sensor measures the corrosion rate and half cell potential.

- The “B” sensor measures concrete resistivity, ambient temperature and relative humidity.

- Corrosion rate measurement time is 2-5 minutes and up to 100 readings can be stored in the memory for later downloading to a PC.

- Weighing only 9 lbs., the system is easy to use, portable, and menu driven.

Applications:
- Corrosion Rate Analysis
- Structure Service Life Analysis
- Repair Cost Estimation

www.ndtjames.com
Corrosion of reinforcement concrete affects the safety and durability of concrete structures in the following ways:

A. The steel cross section is reduced, weakening the structure.
B. The concrete is cracked due to the volume increase in rust.
C. The steel to concrete bond is reduced when cracking and spalling are initiated.

Corrosion is worsened where there is low concrete cover over the steel, high relative humidity and increased moisture present.

A true measure of the corrosion rate is possible using the polarization resistance technique. It has been well established in the laboratory by Stern and Geary that corrosion current is linearly related to polarization resistance.

Over a period of four years GECOR 6 was developed by several research organizations. The polarization resistance is measured with a central reference electrode, surrounded by an external counter electrode. A unique guard ring and external electrode system confines the area of the rebar tested. This makes the GECOR 6 the only field method for determining polarization resistance that is verifiable with proven laboratory techniques.

GECOR 6 gives the corrosion rate (I_corr) which is a quantitative measurement of the amount of steel turning into oxide at the time of measurement. The current can be converted into metal section loss by Faraday’s Equation.

Corrosion rate values measured by GECOR 6 give precise information on the risk of corrosion and the following broad criteria have been established:

- $I_{corr} < 0.2 \mu A/cm^2$ Passive condition
- $0.2 \leq I_{corr} < 0.5 \mu A/cm^2$ Low corrosion
- $0.5 \leq I_{corr} < 1.0 \mu A/cm^2$ Moderate corrosion
- $I_{corr} > 1.0 \mu A/cm^2$ High corrosion rate

Corrosion rate measurements with GECOR 6 should be taken at strategic locations. Other data such as chloride concentration, carbonation depths or half cell potentials and resistivity that can also be measured with GECOR 6, should be considered.

Corrosion rates vary during the life of the structure, depending on the variations in concrete moisture content, chloride concentration and temperature. Measurements at different intervals should be carried out in order to get average $I_{corr}$ values.
Complementary Measurements

Corrosion potentials can be taken, and interpreted to give a probability of corrosion. However, these half cell potential values do not give precise information on the risk of corrosion. A direct relationship between corrosion rate and corrosion potential has not been established.

Concrete resistivity of the area around the sensor is defined from the formula:

\[
\text{RESISTIVITY} = 2 \times R \times D
\]

Where R is the resistance of a pulse between the sensor electrode and the rebar network.
D is electrode diameter and the sensor.

Concrete resistivity measured by GECOR 6 is useful in the interpretation of corrosion rate because it is related to the moisture content.

- >100 to 200\(\Omega\) cm: Very low corrosion rate even with high chloride concentration or carbonation.
- 50-100\(\Omega\) cm: Low corrosion rate
- 10-50\(\Omega\) cm: Moderate to high corrosion rate where steel is active
- <10\(\Omega\) cm: Resistivity is not the controlling parameter of the corrosion rate

Since the rate of oxidation is directly related to the amount of heat energy available, temperature has a direct effect on corrosion rate. Relative humidity decreases with increasing temperature and resistivity increases with increasing temperature.

Relative humidity influences the amount of moisture in the pores of the concrete to sustain the corrosion reaction as well as water run off, dew formation, etc.
Technical Specifications

**Specifications**

1. **Meter**
   - **Dimensions**: 12 x 8 x 6.5 inches (30 x 20 x 16cm)
   - **Weight**: 9 lbs. (4kg)
   - **Batteries**: 4 “D” type alkaline (24 hours operation)
   - **Power**: 1 Watt
   - **Consumption**: LCD Screen
   - **LCD Screen**: 2 line 16 character display
   - **Memory**: up to 100 corrosion rate readings
   - **Accessories**: 100ft (30m) cable for sensor to meter connection
     - Verification box
     - RS-232 interface cable
     - Software for downloading to PC
   - **Constant for Stern and Geary Equation**: 26mV

2. **Sensor “A”**
   - **Dimensions**: 7” diameter x .8” (18 x 2cm)
   - **Weight**: 2 Lbs. (0.9kg)
   - **Components**:
     - 1 copper/copper sulphate central reference electrode
     - 2 copper/copper sulphate confinement sensor electrodes
     - 3 copper sulphate solution reservoirs
     - 2 concentric stainless steel counter electrodes
     - 1 sponge pad
   - The meter with “A” sensor will measure and store:
     - Corrosion rate (Stern & Geary law).
     - Corrosion potential
     - Concrete Polarization Resistance
     - Date, time and location of reading

3. **Sensor “B”**
   - **Dimensions**: 10.2” x 1.4” diameter (26 x 3.5cm)
   - **Weight**: 0.6 Lbs. (0.3kg)
   - **Components**:
     - 1 copper/copper sulphate reference electrodes
     - 1 copper sulphate solution reservoir
     - 1 stainless steel counter electrode
     - 1 solid state temperature probe –10°C to 80°C
     - 1 Capacitance relative humidity probe 3 to 95%
   - The meter with “B” sensor will measure and store:
     - Concrete resistivity
     - Relative humidity
     - Temperature (°C)

**Sales Numbers**

C-CS-5000  GECOR 6 (complete system)

US Patent No. 5,259,944 and other patents pending
James Cor-Map II

Advanced System for corrosion potential data acquisition and analysis, allowing the user to quickly identify areas of probable corrosion in the field.

Application:
Locate corroding steel reinforcement
Repair cost estimation

Features and Benefits

- Ruggedized Electronics allows rapid analysis of data in the field or office.
- Electrode is designed for use on horizontal, vertical and inverted positions.
- Temperature and humidity sensors facilitate inclusion of environmental conditions in data analysis.
- Conforms to ASTM C-876, SIA 2006, BS 1881 #201, DGZfP B3, UNI 10174.
For steel reinforcing bars in concrete, corrosion is an exchange of ions from the steel to the concrete. This chemical exchange of ions produces rust (FeO₂). It also produces areas of concrete where there is a larger concentration of negative ions due to the corrosion process of the steel reinforcing bar than areas where there is no corrosion. This larger concentration of ions creates a small electric voltage potential. By measuring and mapping the voltage potential found in the concrete we are able to determine rapidly the presence of corroded steel reinforcement without costly and time consuming demolition of the concrete.

This is done by recording the voltage between the rebar and a half cell, which is mapped across the surface of the concrete. Areas of rust with high corrosion will exhibit significantly lower voltages than areas without corrosion. There is no need to know the exact position of the steel reinforcing bar or the amount of cover, the presence of the steel is all that is required. However, the voltmeter has to be connected to an exposed piece of the rebar network.

**Half Cell Reference Electrode:**

The Cor Map Mark II system comes complete with rugged half - cells designed for the tough construction environment. Porous ceramic tips are used in order to provide long life and eliminate problems from clogs in the Cu/CuSO₄ half - cell. The specially shaped tip has also been designed to allow the half cell to take readings in the vertical, horizontal or inverted position. They also have a semi transparent full view window, that allows liquid level observation without removal of sealed ends and still protects the half cell from damage by sunlight.

**Instrumentation Unit:**

The fully integrated data acquisition and analysis unit has been designed for the rapid analysis of data in the field or office. As large amounts of data are normally generated, interpretation of this information can be very difficult. Employing the simple to use menu driven CorMap main unit, data can not only be collected quickly and easily, but it can also be analyzed directly in the field on the graphic display. The unit produces a symbolic map of the structure, where symbols represent various half -cell potential voltage levels previously acquired. This symbolic map can then be interpreted like a contour map where areas of high potential represent areas most likely to be corroding. 

Not only can this information be acquired and analyzed but the unit will also read the general environmental parameters of temperature and relative humidity.

All this data can also be stored and uploaded to a P.C. This allows the user to include the data in subsequent reports and spreadsheets for further analysis.

**Specifications**

**Instrument Weight:** 6 lbs. ( 2.75 Kg )

**Ship Weight:** 15 lbs. ( 6.8 Kg )

**Instrument Dimensions:** 4.5” x 8.5” x 10.5” (115mm x 225mm x 267 mm )

**Battery:** 12 Volt 4 - 10 Hours Continuous Operation

**Display:** 320 x 240 pixels backlit for daylight use

**Storage:** Over 5000 readings

**Operating Temperature:** 0 - 50 C

- **Temperature Reading Range:** -273 - +130 C
- **Temperature Accuracy:** +/- 0.5%

- **Humidity Reading Range:** 0 - 100%
- **Humidity Accuracy:** +/- 5%

**Sales Numbers**

C-CM-5000-CU Cor-MapII Complete System (Cu/CuSO₄)
James Cor Map

A simple economical method for identifying areas of probable rebar corrosion.

Features and Benefits

- Detachable electrode extension pieces facilitate measurements in hard to reach locations.
- High impedance digital meter is designed for tough field conditions.
- Economical and easy to use.
- Conforms to ASTM C-876, BS 1881 #201, SIA 2006, DGZfP B3.

Application:
Locate corroding steel reinforcement

www.ndtjames.com
Technical Specifications

Technical

Corrosion, which is an electrochemical process, occurs in concrete when oxygen and moisture are present. The actual corrosion is an exchange of energy within different sections of the uncoated reinforcing steel. The relative energy levels can be determined in relation to a reference electrode with a stable electrochemical potential.

By connecting a high impedance voltmeter between the reinforcing steel and a reference electrode placed on the concrete surface, a measurement can be made for the half cell potential at the location of the reference cell. This then is a measurement of the probability of corrosion activity in the steel in the vicinity of the reference cell.

The reference cell is copper in copper sulphate solution.

By taking half cell potential measurements a fixed distance apart a grid of half cell potentials can be quickly made and thus areas delineated with a high probability of corrosion of the reinforcing steel.

To analyze the results, the measurements made with Cor Map can be plotted on a grid and lines of equipotential contours drawn, highlighting areas of possible corrosion activity.

For example the following guide is listed in ASTM C-876 using a copper/copper sulphate half cell:

- For readings of –350mV and greater there is a 95% chance of active steel corrosion
- For readings –200 to –350mV there is a 50% chance of active steel corrosion
- For readings less than –200mV there is only 5% chance of active steel corrosion

The method is particularly useful for:

- Bridge Decks
- Parking Garages
- Concrete Piers & Docks
- Substructure
- Tunnel Lining
- Foundations

Sales Numbers & Specifications

C-CM-4000 Complete system

The CorMap System

CorMap in use, taking corrosion potentials of parking deck

NDT JAMES INSTRUMENTS INC.
NON DESTRUCTIVE TESTING SYSTEMS

3727 North Kedzie Avenue,
Chicago, Illinois 60618
1-800-426-6500 (773) 463-6565
FAX (773) 463-0009
e-mail: info@ndtjames.com
http://www.ndtjames.com
James RM-8000 OHMCorr

Resistivity meter to assess corrosion currents in concrete.

Applications:
Confirm readings made with either Cor Map System

Features and Benefits

• Assesses damaging corrosion currents in concrete.
• Economic and easy to use.
• Direct digital readout of resistivity. Measuring from two small holes avoids the problems and errors of surface measurements.
• Used in conjunction with CorMap System to produce resistivity plots.
Technical Specifications

**OhmCorr Resistivity Meter**

**Technical**

The electrical conductivity of concrete is an electrolytic process that takes place by the movement of ions in the cement matrix. This ionic movement will occur when contaminants such as chloride ions or carbon dioxide are introduced into the cement mortar matrix.

A highly permeable concrete will have a high conductivity and low electrical resistance. Because resistivity is proportional to current flow, the measurement of the electrical resistance of concrete provides a measure of the possible rate of corrosion. Since carbonation seriously affects surface resistance, measurement on the concrete surface should be avoided.

The James resistivity meter, OHMCORR, has two probes spaced 5 cm (1.97 inches) apart which are placed in two holes drilled to a depth of 8 mm (3/8 inch) and filled with conductive gel. The concrete resistivity is displayed on an LCD when the control switch is activated.

The following table correlates a range of values vs. the possible rate of corrosion of the reinforcement bars.

<table>
<thead>
<tr>
<th>Resistivity Level (K Ohms cm)</th>
<th>Possible Corrosion Rate of Reinforcement Rebars</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>Very High</td>
</tr>
<tr>
<td>5 to 10</td>
<td>High</td>
</tr>
<tr>
<td>10 to 20</td>
<td>Moderate to Low</td>
</tr>
<tr>
<td>&gt;20</td>
<td>Insignificant</td>
</tr>
</tbody>
</table>

The James OHMCORR, when used in conjunction with the James CorMap System provides an economic and sound means of diagnoses of corrosion in reinforced concrete.

**Sales Numbers**

C-RM-8000 Complete System

**Specifications**

- Weight complete in carrying case: 8 lbs (3.6Kg)
- Display: 4¼” Digit in LCD
- Resolution: ± 0.1K ohms cm (± 1 Digit)
- Battery: 9 Volt
- Range: 0.5 - 20K ohms cm

**RM-8000 Components**

**James RM-8000 OhmCorr**

3727 North Kedzie Avenue,
Chicago, Illinois 60618
1-800-426-6500 (773) 463-6565
FAX (773) 463-0009
E-mail: info@ndtjames.com
http://www.ndtjames.com

62 NDT JAMES INSTRUMENTS INC.
The James Poroscopy-Plus

The field test for air and water permeability of concrete using the Figg technique.

Features and Benefits

- Both air and water permeability are measured by the same instrument.
- Permeability both at the concrete surface as well as within the concrete mass can be determined.
- Porosity in sealants and surface mortars can be checked.
- The test is non-destructive (only a small plugged hole required) and can be completely carried out on site.
- Each test can be completed in only a few minutes and gives reliable reproducible results.
- The test enables meaningful concrete durability predictions to be made.

Applications:
- Service life prediction
- Coating verification testing
- Determine susceptibility to chloride and carbonation penetration

www.ndtjames.com
Internal Test

A hole 10 mm diameter x 40 mm deep is drilled and plugged leaving a cylindrical test void 10 mm diameter x 20 mm high situated 20 mm below the concrete surface. The time required for air and water to permeate through the test material to the void is used as an index to determine the quality of the concrete under test.

Air Permeability

The air permeability test is always done first since moisture has a large effect on permeability. Connect the air outlet tube on the instrument to the Luer connector on the top of the hypodermic needle. Connect the hand operated vacuum pump to the air connection on the top of the instrument and evacuate to greater than 55 kPa. The instrument timer and manometer will automatically show the time in seconds for the vacuum to fall from a – 55 kPa to a – 50 kPa. This time is the Figg number and is a measure of the air permeability of the concrete.

Water Permeability

Connect the water outlet tube to the Luer socket on the top of the hypodermic and ensure that the fine plastic inner tube is of sufficient length to reach the bottom of the test cavity. After filling the syringe with distilled water connect it to the water inlet on top of the instrument. The water is then forced into the cavity and the air displaced out through the outer tube through the overflow tube which is 4 inches (100 mm) above the surface of the concrete. The cavity is filled when water starts to flow out the overflow tube. The instrument flow sensor and timer then automatically measures the time taken for the water meniscus to travel a distance of 50 mm and this time in seconds is displayed on the LCD display of the instrument. The time in seconds is the Figg number for water permeability.
**Surface Permeability Test**

Measurements are carried out at the surface by clamping a stainless steel chamber on the smooth surface of the concrete. An exactly dimensioned cup grinding wheel is used to smooth the sealing surface of the concrete if necessary. A measurement of the time required for related amounts of air and water to permeate through the concrete is used as an index of the surface conditions. This time can then be used to determine the condition of any concrete sealant or surface mortar.

**Surface Test Details**

A stainless steel surface chamber with the same surface area and exactly twice the volume of the hole used in the internal test is now used as the void for this test.

The method of sealing the surface chamber to the concrete eliminates the possibility of variation in the test due to sealants seeping into the chamber, or voids along the sealing surface. The surface chamber is sealed to the concrete by grinding a smooth donut in the surface with the cup wheel provided. This cup wheel is sized to exactly match the dimensions of the surface chamber. A pair of o-rings mounted concentrically in the surface testers’ flange is then used to seal the chamber to the surface. The two o-rings eliminate the possibility of a surface void in the material being tested defeating the test. After clamping the surface chamber to the surface a strong seal is now provided with no variation in volume.

This surface chamber is now used as the void for testing porosity of the surface. Rather than the walls of the hole being the tested surface the surface that the chamber is sealed against is now the surface tested. This provides a check for water and air penetration through concrete sealants, surface mortars and any other methods used to seal construction material surfaces.

The surface chamber has been designed to easily accommodate attachment to the instrumentation. By first performing the air test as outlined in the internal test and then the water test the instrumentation will provide the time required for the chamber to lose 5 kPa vacuum or once filled with water, 0.01 ml water. With the surface tester attached to the instrument both a Figg number and direct indices for air and water surface permeability can be established.
The ingress of air and moisture into the concrete can cause corrosion of the steel reinforcement and lead to a deterioration in concrete strength. Therefore, a measure of the ease of movement of liquids and gases through the surface layer of the concrete is a better method of assessing the soundness and expected life of concrete than strength alone. Permeability is recognized as being the most important parameter in assessing concrete durability.

The air permeability test involves measuring the time taken for air to flow into a known volume of a sealed, evacuated chamber in the concrete, reducing the vacuum from—55 kPa to—50 kPa. This time is a measure of the air permeability of the concrete.

The water permeability test utilizes the same sealed chamber in the concrete which is completely filled with water and the total time in seconds for a volume of 0.01 ml of water to escape is taken as a measure of the water permeability of the concrete.

The moisture content of the concrete has a major effect on permeability. For example, fully saturated concrete is almost impermeable to air and results in extremely long times in the water permeability test. For effective testing the concrete should be dry and the near surface moisture content measured.

Permeability test results have show that there is a good correlation with both water/cement ratio and compressive strength of the concrete.

Specifications

Weight, complete in carrying case 12.0 lbs. (5.4kg)
Dimensions 17 x 12 x 6 inches
43 x 30 x 15 cm

Power Supply Standard 9V Battery
Grinding Wheel Rpm 12000 max

Sales Numbers

C-P-6000 Poroscope original system for internal permeability
C-P-6060 Pack of twenty-five test plugs
C-P-6050 Poroscope Plus complete system
CL-2000 Chloride Field Test System

A chloride laboratory in a briefcase for wet or dry concrete.

**Features and Benefits**

- **Fast**—Results within minutes at the site.
- **Economical**—Low cost per sample compared to laboratory testing.
- **Accurate**—Results are comparable to laboratory testing.
- **Covers wide range from 0.002% to 2% chloride by weight.**
- **Automatic compensation for changes in ambient temperature.**
- **Digital display for direct reading of lbs./cu. yd. and percentage of chloride by weight.**
- **Conforms to AASHTO-T 55-98. With optional kit.**

**Applications:**
- Service life prediction
- Corrosion analysis
The determination of the chloride ion concentration in concrete is essential in assessing the need for maintenance on, for example, bridge decks and parking structures. The test can also be used to ensure that materials used in new construction are free from potentially harmful chloride ion levels.

With this method, the concentration of acid soluble chlorides is measured. In most cases, this is equivalent to total chloride concentration. A sample of powder is obtained by drilling and careful quartering. Then an accurately weighed 3 gr. (0.1 oz) sample is dissolved in 20 ml (0.67 fl. oz.) of extraction liquid which consists of a precise, measured concentration of acid. For sampling wet concrete a 3 gr. (0.1 oz.) sample of mortar (i.e. without coarse aggregate) is used.

The chloride ions react with the acid of the extraction liquid in an electrochemical reaction. An electrode, with integral temperature sensor, is inserted into the liquid and the electrochemical reaction measured. A uniquely designed instrument converts the voltage generated by the chloride concentration. The instrument automatically applies the temperature correction and it shows the chloride concentration on a LCD display in either lbs. per cu. yd. or percentage by weight.

Once the sample is obtained, test results can be determined and read in less than five minutes.

To avoid contamination, the electrode should be thoroughly washed with deionized water after each test.

Replacement packs, containing twelve bottles of extraction liquid, each for one time use, are available. Five calibration liquids each with known concentrations are supplied with each pack.

These liquids are used to establish the calibration curve, and to check that the system is functioning correctly. Calibration is not required for each use. The calibration liquids are colored to avoid confusion between them and with the extraction liquid.

All equipment necessary to complete the chloride test is supplied in a standard size carrying case.

Sales Numbers & Specifications

C-CL-2000 Chloride Test System
C-CL-2012 Replacement pack of 12 jars each with 20 ml (0.67 fl. oz.) of extraction liquid and 5 jars of colored calibration liquid.
C-CL-1030 Bottle of electrode wetting agent.
C-CL-2096 Bulk pack of 100 jars extraction liquid and 20 jars of colored calibration liquid.
C-CL-2050 Optional system for compliance with AASHTO-T 55-98.

To meet AASHTO’s specification the 3 gm (0.1 oz.) sample is digested in sufficient extraction liquid to bring the volume to 20 ml (0.67 fl. oz). After 24 hours digestion period this is titrated with 80 ml (2.7 fl. oz.) of solution. The C-CL 2020 electronic meter, in AASHTO mode is then used with chloride electrode to read the concentration of chloride.
James ASR & Carbo Detect*

Simple colored dye field test to detect Alkali Silica reaction (ASR) Carbo Detect—simple colored dye field test for carbonation

Features and Benefits

- Test can be carried out completely on site.
- Utilizes only two environmentally safe dyes.
- Identifies ASR in concrete and differentiates ASR from other causes of degradation.
- Results obtained in less than five minutes are easy to interpret.
- Economic, fast and easy to use.

*US Patent No. 5,739,035 and other patents pending. Trademark of Los Alamos National Laboratory
**ASR Detect**

**Method**

Simply apply each of the two reagents to the broken surface of a concrete core drilled in a suspect structure and rinse off the excess. On ASR contaminated concrete, the resultant stains reveal the presence of ASR.

The stain’s distribution shows the extent of ASR in the concrete, and their proximity to different components of the aggregate gives clues to the source of trouble. The two gels that are identified—one staining yellow, the other pink—indicate the stage of ASR’s progression. Yellow signals that degradation has begun. Pink warns that degradation is advancing.

Typically, ASR occurs in cracks and these cracks often cut through the aggregate and usually do not follow the aggregate-paste boundaries. ASR tends to fill air voids.

**Applications**

ASR Detect is both a practical and a scientific tool. It’s principal application is analyzing existing concrete structures. By identifying ASR deterioration in its earliest stages, ASR Detect facilitates the problem being identified when remediation techniques can be applied; for example, treating the concrete with a lithium-bearing solution to inhibit further deterioration. Where deterioration is advanced, ASR Detect provides a clear picture of the extent and depth of the damage.

As a scientific tool, ASR Detect can be applied to improving the understanding of where, how and why ASR occurs. That understanding is basic to developing ASR preventatives that allow high-alkali cements or poor-quality aggregates to be used in concrete mixes without risking the development of ASR.
Carbo Detect

Technical
Carbonation is one of the two main causes of corrosion of steel in concrete, the other is chloride attack. The result of the interaction of carbon dioxide gas in the atmosphere with the alkaline hydroxides in the concrete, the carbonation process effectively drops the pH of the concrete to a level where the steel will corrode. The carbon dioxide dissolves in water to form carbonic acid, which can migrate to the reinforcing steel if the concrete cover is low or if the concrete is of poor quality (open pore structure, low cement content, high water cement ratio, or poor curing of the concrete). Carbonation is more common in old structures, particularly buildings.

Method
Carbo Detect reagent is a type of pH indicator which will indicate the change of pH on a freshly exposed concrete surface. The indicator is simply sprayed on the surface to be checked. The indicator will change to pink in uncarbonated concrete and remain colorless when sprayed on carbonated (low pH) concrete. If the concrete test area is very dry, a light misting with water will help show the color.

By spraying the indicator along a core drilled from the top surface down to the reinforcement bar it can be readily seen how far the carbonation has progressed and therefore the outlook for corrosion, which will only occur after carbonation reaches the reinforcement bar.

Care should be taken to prevent drilling and coring dust from contaminating the surface to be tested.
Technical Specifications

**Technical**

One of the primary causes of premature concrete deterioration is alkali-silica reaction (ASR). ASR causes concrete to deteriorate when sodium and/or potassium from the cement attacks silica rich components in the aggregate, producing gels that expand and eventually crack the structure.

ASR Detect was developed by Los Alamos National Laboratory as part of its ongoing effort to characterize concrete degradation mechanisms and to improve concrete durability.

ASR Detect exploits the cation-exchange and compositional properties of ASR gels to pinpoint ASR degradation in a chemically specific way. Most gels contain cations (positively charged atoms or molecules) that readily exchange with other cations in solution. ASR Detect’s two reagents react with cations found in the two gels associated with ASR. The first reagent exchanges sodium with the potassium found in some ASR gels and then reacts to form a bright yellow precipitate. The second reagent reacts with calcium-rich ASR gel to form a bright pink stain. In concrete containing ASR, the result is a brightly colored surface showing the presence of the targeted gels; concrete with no ASR is unaffected.

**Sales Numbers**

I-AS-3000  ASR-detect System

I-CB-6000  Carbo-detect System

200 ml of reagent — sufficient for approximately 100 tests

Sprayer Carrying Case
The James IQM & M-Meter System

The James IQM System enables fresh concrete to be easily and completely monitored in the field for improved safety, quality assurance and optimum setting time.

Features and Benefits

**IQM System**
- Modular design facilitates optimum number of monitoring locations.
- A visual indicator shows field personnel that the required maturity is reached at each location.
- Construction personnel with minimal training can easily implement monitoring function.
- Multiple use thermocouple sensor lowers costs.
- Documented quality control of each pour.
- Faster and safer form stripping.
- ASTM C-1074 & ASTM C-918.

**M-Meter**
- Six channels recorded
- Display of current maturity
- Optional field printer for results

Application:
Premature form stripping in cold weather can be avoided. Excessive summer heat exposure is controlled. Loading, prestressing or post tensioning as well as lifting and/or form removal can be done safely.

Large difference in concrete strength caused by variations in temperature during curing, can be eliminated and uniformity of concrete strength achieved. Maturing concrete strength can be monitored continuously, and documented.

Optimum scheduling of form removal, prestressing, post tensioning and highway loading achieved. Artificial heating or cooling minimized. Rework due to concrete not being cured to specified strength reduced. Costly cylinder testing reduced.

Conforms to ASTM C-1074 & C-918, SHRP C625.

www.ndtjames.com
The IQM System

Temperature history is recorded by the IQM-4010 K Thermocouple Module, which can store over eight thousand temperature readings. Intervals between readings are specified by the user and can vary from one minute to twenty-four hours. Designed with the latest in microcomputer technology, the module is rugged enough for the harshest construction environments.

The module is programmed with the required Equivalent Age of the concrete under test. The red light on the module will flash continuously once this number has been reached. This provides a simple and effective automatic indication that the concrete has reached the desired level of maturity at that location.

Generally, sensors are inserted at critical points subject to the most extreme temperatures. Using the modular IQM Meter System, there is no limit to the number of sensors that can be embedded in the wet concrete. The sensor giving the lowest maturity number indicates the area with the lowest strength, and this sensor will be the last to signal that the desired maturity has been reached.

The economical M-IQM-4040 PC Software and cable interface allow direct uploading of the data to a Windows environment P.C. The data, then, can be easily imported into any spreadsheet, word processor, or graphing software package for further analysis. Temperature history can also be graphically displayed with respect to time. The IQM software will create maturity indices from the more complex Arrhenius equation according to ASTM procedure. Strength gain can also be calculated via accepted methods. All of these parameters can be graphically displayed with respect to time.

Theory

The maturity method is a technique for predicting strength based on the temperature history of the concrete. The extent of the cement hydration depends on how long the concrete has cured and at what temperature. Maturity is a measure of how far the hydration has progressed.

The equation developed by Arrhenius allows for greater variation in cement types. It assumes a non-linear relationship for the determination of a maturity index and is suitable for a wide range of temperatures. The mathematics of the Arrhenius equation is more complex but it gives more accurate strength predictions over a variety of cement types. The maturity index is expressed as equivalent age in hours referred to a specific temperature, and is a function of time, temperature and the activation energy of the cement.


**The M-Meter System**

**Measures the developing strength of maturing concrete (ASTM C-1074 & C-918)**

The JAMES M-METER, using modern microprocessor technology, applies the proven relationship of time and temperature to concrete strength for monitoring poured concrete at the site. This improves safety, ensures quality and reduces cost.

The James M-Meters are microprocessor based multichannel instruments that measure the actual temperature of the maturing concrete with a disposable sensor inserted into the freshly placed concrete. Lapsed time is measured internally and integrated with the temperature reading to express the “maturity number” on the M-Meter display panel.

The maturity number is calculated every six minutes automatically (i.e. 10 “readings” per hour) and when the instrument is read the latest maturity number from each of the six channels is displayed in sequence. One reading per hour (i.e. every tenth reading) is stored in the nonvolatile memory. This reading consisting of maturity number, temperature, elapsed time in hours from the sensor connection and sensor identification. This information is available for later transfer to hard copy by a printer that can be attached to the M-Meter.

Generally the sensors are inserted at the most critical points subject to the most temperature extremes. Using the multi-channel M-Meter, the sensor showing the lowest maturity number indicates the area containing the least matured concrete.
Computer display of maturity - time calculated with the Arrhenius equation.

Specifications

Model M-IQM-4010:
- K-Thermocouple Module
- Memory Size: >8000 Data Points
- Memory Type: Non-Volatile
- Battery Type: 1-9 V Battery
- Battery Life: @20°C: 30 Days recording every 30 Minutes

Interval Between Readings:
- From 1 Min. to 24 hrs. in Minute Increments

Recording Temperature Range:
- ~20 to 100°C

Operating Temperature Range:
- 0°C-70°C

Dimensions:
- 1.5 x 2.5 x 5 inches (38mm x 63 x 127mm)
- 10 oz (280 grams)

Model M-IQM-4011:
- 3 ft (1 m) “K” Thermocouple sensor (included with every M-IQM-4010 System accuracy ±1°C

Model M-IQM-4040:
- Software to calculate maturity & strength

Operating System:
- Windows ME/XP

Processor:
- 166 MHz Pentium or faster

RAM:
- 32 MB

Hard Disk Space:
- 8 MB

M-Meter

M-M-3056
- System Accuracy ±2% of maturity number
- Max Maturity Number 15000
- Power Source Rechargeable 6V Battery
- Battery Life - 20 days at +20°C continuous operation
- Activation Energy Level 22000 to 56000 J/Mol. in increments of 2000

Operating Temperature Range
- O°C to 55°C

Instrument Case Size
- 8.5 x 7.75 x 7 inches

Instrument Weight
- 7 lbs.

M-M-3009 Sensor
- 10 K Ohm NTC Thermistor with 10 ft. of 18 GA STP-1 lamp cord
- Temperature Range: -10°C to 80°C
- Accuracy: ±0.2%

M-M-3010 Printer
- Type Impact Dot Matrix - 6 x 8
- Power Source - Rechargeable Battery

Sales Numbers

IOM System

Model M-IQM-4010: Single Channel Maturity meter (IQM)
Model M-IQM-4011: 3ft. “K” Thermocouple sensor
M-Meter
M-M-3056: 6 Channel Ruggedized Maturity Meter Sensor
M-M-3009: 

ICP Systems

Model M-IQM-4040: Software to calculate maturity & strength

Operating System:
- Windows ME/XP

Processor:
- 166 MHz Pentium or faster

RAM:
- 32 MB

Hard Disk Space:
- 8 MB

M-Meter

M-M-3056
- System Accuracy ±2% of maturity number
- Max Maturity Number 15000
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- Accuracy: ±0.2%

M-M-3010 Printer
- Type Impact Dot Matrix - 6 x 8
- Power Source - Rechargeable Battery

76 NDT JAMES INSTRUMENTS INC.
The James IQT System

A flexible and economical temperature monitoring system with extensive memory

Features and Benefits

- Modular design facilitates optimum number of monitoring locations.
- Ruggedized Data Analyzer shows graphic display of temperature history.
- Interval between readings from one minute to 24 hours.
- Memory capacity is over eight thousand readings.
- Multiple use thermocouple sensors lower costs.

Application:
Quality Control
Mass Concrete Pours
The IQT System

Temperature history is recorded by the IQT 4020 K Thermocouple. With a reusable K thermocouple, the module can store over eight thousand temperature readings. Intervals between readings, which can be set by the user, can vary from one minute to twenty-four hours.

To analyze the readings the user can upload the data to a PC.

The economical IQT Software (IQT 4050) allows simple uploading of the data to a Windows environment personal computer via the serial port. The data can then be imported into any spreadsheet or word processor. Also, the temperature history can be graphically displayed with respect to time.

Specifications

Model M-IQT-4020: K-Thermocouple Module

| Memory Size: | >8000 Data Points |
| Memory Type: | Non-Volatile |
| Battery Type: | 1 9v Battery |
| Battery Life: | @20°C: 30 days recording every 30 minutes |

Interval Between Readings: From 1 min. to 24 hrs. in minute intervals

Recording Temperature Range: –20 to 100°C

Operating Temperature Range: 0°-70°C

Dimensions: 2.5 x 2.75 x 0.5 inches (63.5 x 70 x 13 mm)

Weight: 6 oz (180 grams)

Model M-IQM-4011: 3 ft (1 m) “K” Thermocouple

System accuracy ±1°C

Model M-IQT-4050: PC Software

Battery Type: 9 volt

Battery Life: 1 Year

Cabel Length: 6 ft

PC Conn Type: DB9

Dimensions: 2.5 x 2.75 x 0.5 inches (63.5 x 70 x 13 mm)

Weight: 6 oz (180 grams)

Sales Numbers

Model M-IQT-4020: Single Channel Temperature meter (IQT)

Model M-IQM-4011: 3ft. “K” Thermocouple sensor
James Fresh Concrete Air Meter

A complete line of air entrainment meters for determination of percent entrained air in freshly mixed concrete.

Features and Benefits

- Light weight.
- Superior rugged design.
- Easy to read gauges insure consistency.
- Three popular models to choose from.
- Conforms to ASTM C-173, C-231.

Applications:
- Roads
- Bridge Decks
- Cold Whether Concrete
Air content plays an important role in such factors as freeze thaw, permeability, and workability of concrete. It is essential to test every batch of concrete to insure consistency, especially when air entraining admixtures are used.

A-AB-1200 ASTM Type ‘B’ pressure air meter (most popular design)

The James Instruments’ ASTM Type ‘B’ Pressure Air Meter is manufactured to the highest standards in the industry. It is the most precise air measuring device available for concrete. Utilizing a heat treated aluminum body and cast in handles on the base the A-AB-1200 is a light weight, durable, and easy to use piece of equipment.

The James Instruments’ Pressure Air Meter features a large number of mechanical improvements over previous designs. The unit uses the latest technology available in clamping systems. It uses large stainless steel clamp levers, each with a holding capacity of 2500 lbs. These clamps provide the user with dependable operation every time. It also features innovative sealing technology for accurate readings and long life. Ruggedness has also been improved by using full welds on critically hardened seams rather than spot welds. The A-AB-1200 also comes with a durable, advanced, high volume pump as well as a large easy to read gauge, and bourdon tube. These features makes the James ASTM Type ‘B’ Pressure air meter the most durable, accurate, rapid and easy to use meter on the market. The pressure gauge is color coded for entrained and entrapped air. The system meets ASTM C-231 & AASHTO T152.

The A-AB-1200 James Instruments’ ASTM Type ‘B’ Pressure Meter comes with Air Meter, carry case, calibration vessel, inside calibration vessel, outside calibration vessel tube, 3 oz syringe, strike off bar, 24” tamping rod, 16 oz rubber mallet.
A-AV-1300 James Instruments’ ASTM Volumetric Air Meter

Easily measures entrained air in any type of concrete.

It has a state of the art design where there are no threads to strip, an easy to use expansion plug top and an all stainless steel V clamp that securely holds the top and bottom together. The unit also has a leak proof O ring design, as well as improved clamp system so that it can easily and smoothly roll on the clamp.

This light weight unit weighs 1/3 of its brass counter part and about 1/2 the weight of an aluminum unit. Easy to clean, the unit is made of reinforced fiberglass and PVC. The system conforms to ASTM C-173.

The A-AV-1300 James Instruments’ ASTM Volumetric Air Meter comes with Meter, Funnel, Syringe, Tamper, Calibrated Cup, Mallet, Strike off Bar, Plastic Carry Case.

A-AA-1100 ASTM – Type ‘A’ Pressure Air Meter Model (not pictured)

The James Instruments’ ASTM Type ‘A’ Air Meter is used to determine the amount of entrained air in freshly mixed concrete.

The A-AA-1100 Type ‘A’ Pressure Air Meter needs little or no maintenance and is the meter of choice in certain regions. The measurements are displayed on the graduated cylinder attached to the meter after the sample base has been pressurized.

This light weight aluminum design conforms to ASTM C-231 and the complete systems comes with Meter, Calibration Vessel, Rod, Scoop, Strike off Bar, Mallet, Instructions and Steel Carry case.
Technical Specifications

**Specifications:**
A-AB-1200: Meter Net Wt. 21.5lbs. (9.7kg)
Height 22in. (56cm)
Diameter. 9in. (23cm)

**Sales Numbers:**
A-AB-1200 Type B Complete System

**Specifications:**
A-AV-1300: Meter Net Wt. 5.5lbs. (2.5kg)
Height 24.25in. (61.5cm)
Middle Dia. 7.25in. (18.4cm)
Volume 2200ml. 134cu.in.
Sight Tube 0-6%

**Sales Numbers:**
A-AV-1300 Volume Metric Meter Complete

**Specifications:**
A-AA-1100: Meter Net Wt. 30lbs. (13.6kg)
Height 24.3in. (61.7cm)
Diameter. 12in. (30.5cm)

**Sales Numbers:**
A-AA-1100 Type A Meter Complete
The James Trident T-90 Moisture Meter

A microwave meter for rapid determination of moisture content in sand and other fine and coarse aggregates.

**Features and Benefits**

- Fast and easy to use: Simply insert the prongs into the sand or aggregate.
- Accurate.
- Completely portable.
- Easy to read display.
- Instantaneous readings.

**Applications:**

- Aggregate suppliers
- Ready mix producers
- Asphalt plants

www.ndtjames.com
The James Trident represents a break-through in modern moisture measurement technology. By utilizing the latest microwave and microprocessor technology, the Trident can determine the moisture content of sand, gravel, crushed stone and other fine and coarse aggregate. Simply insert the prongs of the probe into the material to be measured and instantaneously the percentage of moisture content is shown on the easy to read display.

The Trident Microwave moisture meter uses a five prong sensor to measure the complex dielectric constant of the material encompassed by the outer four prongs. As the dielectric constant of water is four to eight times greater than most aggregates, changes in water content directly effect the sensor output. An average of five to ten readings is normally taken in order to ensure a valid reading. This output is then converted by the integrated microprocessor and moisture content is displayed directly as a percentage of dry weight.

The unit comes calibrated for both sand and aggregate. It can also be programmed with up to ten different materials by the user. For highest accuracy, the unit should be programed for the material being tested. Simple to use WINME/XP software is provided for calibrating the unit to the various materials.

Finally, the Trident can store over 150 readings. Storage is complete with the time and date for future reference. Data can be recalled via RS-232 interface to a personal computer running WINME/XP.

**Specifications**

- **Moisture Range:** 0 - 20% by Dry Weight
- **Frequency:** 50 Mhz
- **Power:** 4 AA Batteries
- **Display:** 4 x 16 Char. Trans - reflective
- **Data Link:** RS - 232
- **Weight:** 4 lbs. (1.8kg)

**Sales Numbers**

- **T-T-90:** Trident Microwave Moisture Meter Complete System (includes sensor, meter, and more)
- **T-T-065-10880-004:**

Accuracies can achieve +/- 0.2% with user calibrated mode for sands. Accuracies will vary with particle size and material type.

Note: Maximum aggregate particle size is approximately 3/8" (12.5mm) in diameter.
James Cementometer

A microwave meter for rapid determination of water/cement ratio content in fresh concrete.

Features and Benefits

- Fast and easy to use; simply insert the prongs into the material being tested.
- Accurate.
- Completely Portable.
- Full range of water cement ratio's.
- Instantaneous readings.

www.ndtjames.com
The James Cementometer represents a break-through in modern moisture measurement technology. By utilizing the latest microwave and microprocessor science, the Cementometer can determine the moisture content of freshly mixed cement, concrete, and mortar. Simply insert the prongs of the probe into the material to be measured and instantaneously the water/cement ratio is shown on the easy to read display.

The Cementometer Microwave moisture meter uses a two prong sensor to measure the complex dielectric constant of the material in contact with the prongs. As the dielectric constant of water is four to eight times greater than most aggregates and cements, changes in water content directly effect the sensor output. An average of five to ten readings is normally taken in order to ensure a valid reading. This output is then converted by the integrated microprocessor and moisture content is displayed directly.

Two units are available to encompass the full range of water cement ratio's found in wet concrete. The Cementometer Type R handles normal water cement ratio's with its two prong probe. The range of this instrument is approximately 0.35 to 0.65 water/cement. Cementometer Type L handles low water/cement ratio's with its five prong probe. The range of this instrument is approximately 0.25 to 0.5 water cements.

The units come calibrated for standard type I, II, and III cements. It can also be programmed with up to ten different mix design by the user. For highest accuracy, the user should program the unit for the material being used. The Cementometer Type R has simple to use calibration process that rapidly creates the user programs without the need for external computing devices.

Finally, the Cementometer can store over 150 readings. Storage is complete with the time and date for future reference. Data can be recalled via RS-232 interface to a personal computer running WIN95/WINNT.

**Specifications:**

**T-C-10**
- Cementometer Type R for regular water cement ranges
- Water Cement Ratio Range: approximately 0.35 – 0.7
- Power: 2AA Batteries
- Display: 2 x 16 Char. Trans - reflective
- Data Link: RS-232
- Weight: approximately 4 lbs (1.8 kgs)

**T-C-20**
- Cementometer Type L for low water cement ranges
- Water Cement Ratio Range: 0.25 – 0.5
- Power: 2AA Batteries
- Display: 2 x 16 Char. Trans - reflective
- Data Link: RS-232
- Weight: approximately 4 lbs

**Sales Numbers**
- T-C-10 Cementometer Type R for regular water cement ranges
- T-C-20 Cementometer Type L for low water cement ranges
Humitest System

The tailor made solution for measuring bore hole humidity in hardened concrete.

Applications:
Floor Coating
Concrete Overlays

Features and Benefits

- Ensures Structure is dry before starting next construction phase.
- Uniquely designed system to handle concrete bore hole humidity measurements.
- Re-usable Probe for improved economics.
- Rapid Response Time of Probe.
The James Instruments Humitest System allows the concrete practitioner to monitor and ensure that a new structure is dry enough to proceed with the next phase of construction. This is especially critical for concrete structures requiring a coating, carpeting or similar floor or covering treatment. Installing such treatments before the concrete is sufficiently dry will typically cause expensive failures in the covering treatment. The only accurate way to ensure that the concrete is sufficiently dry enough to safely avoid expensive re-work is via a bore hole humidity test system, such as the Humitest System™.

The system works by first boring a hole into the concrete and inserting a plastic tube in the hole. The plastic tube is then plugged and the system is set to stabilize and the humidity to reach equilibrium. The probe is then inserted into the plastic tube, left to stabilize for 72 hours, and then a reading is taken. The sleeve is recommended to give readings at various depths in the concrete. As concrete moisture distribution is typically very uneven it is recommended to take readings at different depths depending on the structures exposure.

A number of other features have been included with the Humitest system to improve its use. The unit can display relative humidity as well as temperature at the probe in either Fahrenheit or Celsius. It can also store data for later upload.

### Specifications

#### Probe
- **Measurement Range**: 0…100% RH
- **Accuracy**
  - 0…90%: +/-2%RH
  - 90…100%: +/-3%RH
- **Long Term Stability (1 Year)**: 1%RH
- **Response Time (90% of Reading at 20°C)**: 15 S
- **Response Time (Stabilized Hole, full reading)**: 30min
- **Temperature Range**: -20°C…+60°C
- **Sensor Diameter**: 12mm
- **Cable Length**: 0.3m
- **Probe Length**: 69mm
- **Housing Material**: ABS Plastic
- **Sensor Protection Membrane Filter**: Membrane Filter
- **Bore Hole Diameter**: 16mm
- **Measurement Depth**: min. 30mm

#### Meter
- **Calculated Quantities**: Dewpoint
- **Temperature**: Absolute
- **Wet Bulb**: 0.1%RH / 0.1°C
- **Power Supplies**: 4 AA Batteries
- **Display**: 2 line LCD
- **Approximate Weight**: 300 g.

### Sales Numbers

- **T-HT-1000**: Complete System consisting of Meter, Probe, 3pcs. Protective Cover with Lid, 12 pcs. Rubber Plugs, 12 pcs. Plastic Tube, carry case, instruction manual, calibration certificate
- **T-HT-1300**: Protective Cover with lid
- **T-HT-1301**: Rubber Plugs
- **T-PHT-1000**: Paper Humitest Complete System
- **T-PHT-1100**: Meter
The James T-M-170 Moisture Master


Features and Benefits

- Direct read out of moisture content, no charts or tables required.
- Separate modes for concrete, brick, different woods, and gypsum.
- Measures moisture in most solid materials.
- Color coded LED indicates moisture condition of material
- Alarm values can be set by user.
- Pin mode for low density materials, capacitive mode for high density materials.

Applications:
Locate leaking pipes in walls & floors
Locate seeping water in basements & masonry tanks
Check moisture level of material before applying coatings or adhesives
Curing condition of wood, stucco, and other construction materials

www.ndtjames.com
Technical Specifications

The James Instruments Moisture Master utilizes the latest electronic technology to measure the quantity of water within its sensing field. The unit has two modes of operation: the pin mode, and search mode. In the pin mode, two pins are pushed into the material and a high frequency field is created between these two pins. In the search mode the unit uses a high frequency capacitive sensor to sample a large volume of the material, instantaneously. Changes in this electromagnetic field are directly proportional to the dielectric constant of the material through which it passes. As the dielectric constant of water is almost two orders of magnitude greater than most non-metallic materials, variations in this parameter can be correlated to the moisture content. After extensive testing of various materials, relationships between the change in this field and moisture content have been determined. These relationships have been digitized and implemented using the latest in micro-computer technology, thereby allowing the user the direct readout of moisture content for concrete, masonry, hard wood, soft wood, gypsum, and brick. The pin method has been found to be most effective in low density materials such as fir wood or pine wood. The search mode has been found to be most effective for higher density materials such as brick, masonry, gypsum and concrete.

Sales Numbers

T-M-170 Moisture Master

Specifications

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<tr>
<th>Size:</th>
<th>165mm x 62mm x 26 mm (6.5 x 2.4 x 1 in)</th>
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</thead>
<tbody>
<tr>
<td>Weight:</td>
<td>4 x 175 gr (6 oz)</td>
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<tr>
<td>Measurement Range:</td>
<td>0 – 80.0%</td>
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<tr>
<td>Resolution:</td>
<td>0.1%</td>
</tr>
<tr>
<td>Battery:</td>
<td>4 x 'AAA'</td>
</tr>
<tr>
<td>Temperature Range:</td>
<td>0°C to 50°C</td>
</tr>
</tbody>
</table>
Terms and Conditions

United States | Canada | International

CATALOG LISTINGS
Everything listed in this catalog is available, and all specifications and descriptions are current, as of the time of publication. Product listings, specifications, availability, and pricing are subject to change without notice.
To verify the most current information, contact James Instruments directly or your representative.

TO PLACE AN ORDER
- Contact us by fax, phone, mail, or Internet e-mail. There is a minimum order amount of $35.00.

METHOD OF PAYMENT
- We will take your order on major credit card, by C.O.D., on an open Account, letter of credit, or direct wire transfer.

Credit Cards
- James Instruments accepts American Express®, MasterCard®, and VISA®.

C.O.D.s
- If your C.O.D. order total is over $1000, you may be asked to pay with certified funds (certified check, money order, or cashier’s check). Please be aware that most carriers will not accept cash and require payment by check for all C.O.D. orders, regardless of the order total. If you wish to pay cash for your C.O.D. order of $1000 or less, please contact James Instruments to determine whether your shipment is being delivered by a carrier who will accept cash.

Open Accounts
- If your business, institution, or government agency wishes to open an account with us and is located within the United States, call James Instruments sales office. Open account status is normally granted to well-rated organizations with three appropriate credit references and a banking history. Terms of payment are net 30 days. A complete open account credit verification form will need to be completed. Please allow 24 hours to process open account applications. There will be a $20.00 service charge on all returned checks.

Letter of Credit
- Letter of Credits must be drawn on a US Bank
- Opening charges are to be paid by consignee
- All amendments and bank charges are consignee’s responsibility
- $500.00 processing fee applies
- Must be opened for at least 120 days
- Shipment date should coincide closing of Letter of Credit
- Customer is expected to advise James Instruments of Letter of Credit prior to opening of the letter
- Shipments must be made only thru James Instruments freight forwarder
- Import duties and licensing is the expense of the opener

Direct Wire Transfer
- Call for direct wire account information.
  Phone 773.463.6565 | Toll-Free 800.426.6500

HANDLING
- James Instruments and carrier handling charges will apply, depending on dimensional weight, size, order amount, and whether the product is a restricted article.

SALES TAX
- We are required by law to charge and collect state and local sales tax.

RETURNS
- Returns must be made within 30 days of the original invoice date and must be accompanied by a Return Materials Authorization. Authorization may be obtained by calling James Instruments. Returns without this authorization may not be accepted. Returns may also be subject to a minimum 20 percent restocking charge.

PRICING
- Every effort has been made to be sure the prices in this catalog reflect the latest information available. However, prices in the catalog are subject to change without notice. Prices in this catalog are in U.S. dollars.

SHIPMENT DAMAGE
- Our merchandise is carefully packed for shipment. In the event an item is damaged in shipment, you must submit a claim to the carrier within 15 days of delivery. We advise that you unpack and inspect all merchandise immediately upon receiving it. If damage does not become apparent until the shipment is unpacked, make a request within 72 hours for inspection by the carrier’s agent and file with the carrier. Any external evidence of loss or damage must be noted on the freight bill or carrier’s receipt and signed by the carrier’s agent.
- Failure to do this will result in the carrier refusing to honor the claim. For your protection, our billings include insurance for damage or loss in transit.

DELIVERY
- Items are generally shipped ex-works Chicago. You can choose from a variety of shipment methods. For details, contact James Instruments.
- International repair shipments must contain a commercial invoice listing the instrument being returned and must contain the words:
  - Country of manufacture: USA
  - Instrument being returned to manufacturer for repair – no value for customs, value for carriage only
Courteous Professional Service Guaranteed!

Speak to an expert technician live, no touch tone run around.
Our multilingual personnel are ready to assist you.
8am - 5pm central time Mon-Fri

Free Technical Support From Experts That Know!

Professional Training available.
Learn to use your instrument to its full potential.
Training classes are available at our facility.

Please contact one of our friendly sales representatives for further information.

1-800-426-6500
Factory Certified Repair and Calibration Services: Contact your distributor.

Expedited Repair service available for critical jobs.

Protect your Investment Extended warranty and calibration plan available.