

# 9400 Series

Impact Drop Tower System



**You need absolute confidence in your impact testing system - confidence in accurate, reliable, repeatable results, in the system engineering and the manufacturer behind it.**

Featuring future-proof high-speed and high throughout capabilities and user-friendly software based on the popular Instron BLUEHILL® platform, Instron Drop Towers give you the confidence you need in your results, time and time again.

INTRODUCING THE  
9400 SERIES



At Instron, we maintain our position at the leading edge of impact testing innovation through design and collaboration, both with our customers and leading university and industry researchers. We lead by example, by meeting customer testing needs across any application requirement. Our Sales, R&D, and Tech Support teams work together with you from initial enquiry through to delivery, offering full access to demonstration models at our design facilities around the world. We lead in calibration, with accredited certification available through our dedicated Service teams.

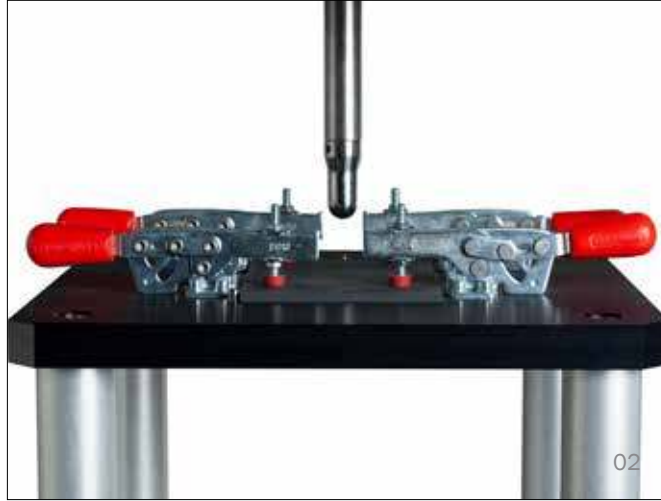
# HOW WILL THE 9400 MEET MY NEEDS?

Delivering Your Advanced Materials To Market Faster

Instron Drop Towers are used to develop, fine tune, and validate material models.

Testing materials under real impact conditions is a crucial step prior of product design. Using the characterization data obtained with the Instron 9400, coupled with customer supplied high-speed video, you can have confidence in your results and deliver new materials to your customers faster.

Our Drop Tower impact systems, fixtures, and tups are designed to meet a wide range of applications and testing standards including: ISO, ASTM, ANSI, Airbus, Boeing, BSI, DIN, EN, FDA, Ford, GM, JIS, NASA, GOST, and more.



### Range of Tests for your Application:

- 01 Pivoting System for High Throughput Puncture Testing
- 02 Compression After Impact on Composites
- 03 Tensile Impact on Plastic and Composites
- 04 Wedge Peel Impact Testing for Adhesives
- 05 Puncture Testing on Plastic Materials

## HOW WILL THE 9400 MEET MY NEEDS?

Right-First-Time Products And Continuous Process Improvement

Instron Drop Towers are designed to help you improve your product design process and minimize the risks of production. The 9400 produces reliable, repeatable results whether you are testing materials and components before production to improve product acceptance or testing during production to ensure continuous improvement.

Testing components under real life impact conditions helps you to recognize faults before production starts, reducing risk and cost while accelerating the time-to-market for your new products.

Including Impact Testing during production helps to prevent product recalls and maintain the highest possible quality levels.

Whether you need to test small or large parts, 9400 Drop Towers can be set up to meet your specific application requirements.



### Range of Tests for your Application:

- 01 Airbag Dashboard
- 02 Plastic Storage Containers
- 03 Car Bumper
- 04 LCD Screen
- 05 PVC Vinyl Material

The development of Instron Drop Tower Systems and Bluehill® Impact Software is based on a full understanding of customer needs for both an enhanced user-experience and outstanding productivity.

The Instron Drop Tower 9400 Series was developed to deliver faster results, fewer errors, and lower training costs for customers who are under pressure to deliver higher quality advanced materials for stronger yet lighter products.

This is achieved by simplifying workflows, providing preconfigured and prompted tests, streamlining data and exporting it for analysis, while providing advanced capability with high speed video and more.

These capabilities all make the 9400 Drop Tower Series:

**SIMPLER, SMARTER, SAFER**





# SIMPLER

Powered by Bluehill® Impact

Bluehill **Impact** is built from the ground up for touch interaction. The Operator Dashboard features large touchpoints to make the user experience simpler and smarter. Easy-to-understand icons and workflows make it easy to train new or experienced users, simplify operator training, and allow you to start testing even faster than ever before.



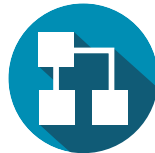
## Simple Setup

The easy set up of the carriage, masses, tups, and supports allow you to benefit from high testing capabilities. Easily switch from high to low loads and from coupon to component testing.



## Simple Test Procedures

Thanks to prompted tests and the integrated touch panel, setting up test procedures require just a few clicks. Users can be guided through the entire testing process with step-by-step instructions, ensuring tests remain repeatable, simple, and error-free. Prompts are fully customizable with bespoke text or messages.



## Smart Defaults

Bluehill Impact provides a set of pre-configured methods to cover the most common impact testing scenarios.



## Quicker Testing

Productivity is increased by 20% thanks to the combination of the new Dashboard and Bluehill Impact providing faster data acquisition and results.

# SMARTER

Integrated Innovations for Efficient Tests



## Flexible Data Analysis

Users can define unique data flow and procedures ensuring data processing flexibility. Bluehill Impact reports on anomalies and inconsistent results when they are outside set parameters.



## Sharing Results

Easily share test method and results within your company or directly with your customers with our new file management system.



## Calibration alert

Automatic alerts are generated when Tup calibration period is expiring. This feature helps to reduce the risk of invalid tests and protect your results against inaccuracies.





## High-Speed Camera Trigger

Increase your characterization data with the use of high-speed cameras. The 9400 Drop Towers are equipped with a high-speed camera connection to allow for a simultaneous and synchronized acquisition of high speed video with the Force profile.



## Transparent panel

View your test from any side and record for future reference. When using a high speed camera, you save time by not having to move accessories when you change specimens or test method.



## Tup Force Range Scale (%)

Our tups are calibrated over different percentages of the maximum capacity – this allows you to refine the force scale resulting in better load resolution as well as higher levels of system flexibility.

# SAFER

Safety Without Sacrificing Throughput



## Fully Enclosed

Integrated safety circuits to protect your operator by disabling the system when any enclosure door is open.

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## Your results Are Always Saved

Never lose your results, even if power is lost during the test or the operator completes an unscheduled shutdown.

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## Enhanced Security

Bluehill Impact security allows the Lab manager to configure permissions in the software, granting full permissions to super users and limiting access where needed.

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## Built-In Safety Notifications

The 9400 system is a fully enclosed system to conform with CE regulations. As an additional safety measure, the system gives clear visual information on the instrument status, so users always know when a test is in progress.



# SUPPORT FOR THE LIFE OF YOUR EQUIPMENT

Protecting Your Investment



Instron® is the largest supplier of materials testing systems in the world. Our reliable testing systems can run 24 hours a day, 7 days a week, 365 days of the year. However, if something does go wrong, or if you have a question, we offer a variety of resources to ensure you receive the assistance you need as soon as you need it.



## Training

Training courses available on-site or in one of our Regional Training Centers. Utilize our Applications Engineering Lab or Custom Solutions Group for the latest technological advances in materials testing.



## Advanced Support

Our Sales, R&D, and Tech Support teams work together with you from initial enquiry through to delivery, offering full access to demonstration models at our design facilities across the world.



## Calibration

Our state-of-the-art Calibration Laboratory offers a comprehensive range of accredited calibration and verification services complying with ASTM, ISO, and Nadcap standards for: force, speed, strain (extensometers), displacement, impact, temperature, torque, creep, strain gauge channel, and alignment.

# | 9400 SERIES SPECIFICATIONS

## 9440

Energy range	J	0.3 - 405
	ft-lb	0.22 - 299
Impact velocity	m/s	0.77 - 4.65
	ft/s	2.53 - 15.3
Drop height	m	0.03 - 1.10
	in	1.18 - 43.3
Mass range <sup>1</sup>	kg	1.00 - 37.5
	lbs	2.2 - 82.7
Mass increments	kg	0.5
	lbs	1.1
Force transducers	kN	0.45 to 90
	lbs	101 to 22000
Machine dimensions (w x d x h)	mm	985 x 610 x 2620
	in	38.7 x 24 x 103
With thermostatic chamber (w x d x h)	mm	985 x 695 x 2620
	in	38.7 x 27.4 x 103
Test area dimensions (w x d x h)	mm	490 x 450 x 565
	in	19.3 x 17.7 x 22.2
With thermostatic chamber (w x d x h)	mm	370 x 300 x 495
	in	14.6 x 11.8 x 19.5
Machine weight	kg	340
	lbs	749
With thermostatic chamber	kg	550
	lbs	1213
Load on slab in static condition <sup>2</sup>	kg/m <sup>2</sup>	1000
	N/m <sup>2</sup>	10000
Concentrated load on feet	kg/cm <sup>2</sup>	1.5
	N/cm <sup>2</sup>	15
Electrical supply	-	220-240V 50/60Hz
	-	100-120V 50/60Hz
Compressed air supply	bar	6 to 10
	psi	72.5



1 Includes an average tup weight of 0,5 kg (1,10lbs)

2 Load in dynamic conditions depends on the test type and impact forces

## 9450

<b>Energy range</b>	J	0,59 - 757
	ft-lb	0,44 - 558
<b>Impact velocity</b>	m/s	0,77 - 4,65
	ft/s	2,53 - 15,3
<b>Drop height</b>	m	0,03 - 1,10
	in	1,18 - 43,3
<b>Mass range<sup>1</sup></b>	kg	2,00 - 70,0
	lbs	4,41 - 154
<b>Mass increments</b>	kg	0,5
	lbs	1,1
<b>Force transducers</b>	kN	0,45 to 222
	lbs	101 to 50000
<b>Machine dimensions (w x d x h)</b>	mm	1015 x 866 x 2720
	in	40 x 34 x 107
<b>With thermostatic chamber (w x d x h)</b>	mm	1015 x 1015 x 2720
	in	40 x 40 x 107
<b>Test area dimensions (w x d x h)</b>	mm	700 x 720 x 570
	in	27,5 x 28,3 x 22,4
<b>With thermostatic chamber (w x d x h)</b>	mm	550 x 540 x 500
	in	21,6 x 21,3 x 19,7
<b>Machine weight</b>	kg	550
	lbs	1212
<b>With thermostatic chamber</b>	kg	700
	lbs	1543
<b>Load on slab in static condition<sup>2</sup></b>	kg/m <sup>2</sup>	1570
	N/m <sup>2</sup>	15402
<b>Concentrated load on feet</b>	kg/cm <sup>2</sup>	3,4
	N/cm <sup>2</sup>	33
<b>Electrical supply</b>	-	220-240V 50/60Hz
	-	100-120V 50/60Hz
<b>Compressed air supply</b>	bar	6 to 10
	psi	72,5



1 Includes an average tup weight of 0,7 kg (1,54lbs)

2 Load in dynamic conditions depends on the test type and impact forces

# | 9400 SERIES SPECIFICATIONS

## 9450 with High-Energy System

Energy range	J	0,59 - 1800
	ft-lb	0,44 - 1330
Impact velocity	m/s	0,77 - 24
	ft/s	2,53 - 78,7
Drop height	m	0,03 - 29,4 (equivalents)
	in	1,18 - 1160 (equivalents)
Mass range <sup>1</sup>	kg	2,00 - 70,0
	lbs	4,41 - 154
Mass increments	kg	0,5
	lbs	1,1
Force transducers	kN	0,45 to 222
	lbs	101 to 50000
Machine dimensions (w x d x h)	mm	1015 x 866 x 3180
	in	40 x 34 x 125,2
With thermostatic chamber (w x d x h)	mm	1015 x 1150 x 3180
	in	40 x 45,3 x 125,2
Test area dimensions (w x d x h)	mm	700 x 720 x 570
	in	27,5 x 28,3 x 22,4
With thermostatic chamber (w x d x h)	mm	550 x 540 x 500
	in	21,6 x 21,3 x 19,7
Machine weight	kg	775
	lbs	1708
With thermostatic chamber	kg	925
	lbs	2039
Load on slab in static condition <sup>2</sup>	kg/m <sup>2</sup>	2020
	N/m <sup>2</sup>	19816
Concentrated load on feet	kg/cm <sup>2</sup>	4,3
	N/cm <sup>2</sup>	43
Electrical supply	-	220-240V 50/60Hz
	-	100-120V 50/60Hz
Compressed air supply	bar	6 to 10
	psi	72,5



1 Includes an average tup weight of 0,7 kg (1,54lbs)

2 Load in dynamic conditions depends on the test type and impact forces

**9450**  
with Large Base

<b>Energy range</b>	J	0,59 - 757
	ft-lb	0,44 - 558
<b>Impact velocity</b>	m/s	0,77 - 4,65
	ft/s	2,53 - 15,3
<b>Drop height</b>	m	0,03 - 1,10
	in	1,18 - 43,3
<b>Mass range<sup>1</sup></b>	kg	2,00 - 70,0
	lbs	4,41 - 154
<b>Mass increments</b>	kg	0,5
	lbs	1,1
<b>Force transducers</b>	kN	0,45 to 222
	lbs	101 to 50000
<b>Machine dimensions (w x d x h)</b>	mm	1520 x 940 x 2870
	in	60 x 37 x 113
<b>With thermostatic chamber (w x d x h)</b>	mm	-
	in	-
<b>Test area dimensions (w x d x h)</b>	mm	1200 x 730 x 745
	in	47.2 x 28.7 x 29.3
<b>With thermostatic chamber (w x d x h)</b>	mm	-
	in	-
<b>Machine weight</b>	kg	1125
	lbs	2480
<b>With thermostatic chamber</b>	kg	-
	lbs	-
<b>Load on slab in static condition<sup>2</sup></b>	kg/m <sup>2</sup>	1200
	N/m <sup>2</sup>	11772
<b>Concentrated load on feet</b>	kg/cm <sup>2</sup>	3,4
	N/cm <sup>2</sup>	33
<b>Electrical supply</b>	-	220-240V 50/60Hz
	-	100-120V 50/60Hz
<b>Compressed air supply</b>	bar	6 to 10
	psi	72,5



- 1 Includes an average tup weight of 0,7 kg (1,10lbs)
- 2 Maximum parallelepiped inscribable in the base
- 3 Load in dynamic conditions depends on the test type and impact forces

# | 9400 SERIES SPECIFICATIONS

## 9450 with Large Base & High-Energy System

Energy range	J	0,59 - 1800
	ft-lb	0,44 - 1330
Impact velocity	m/s	0,77 - 24
	ft/s	2,53 - 78,7
Drop height	m	0,03 - 29,4 (equivalents)
	in	1,18 - 1160 (equivalents)
Mass range <sup>1</sup>	kg	2,00 - 70,0
	lbs	4,41 - 154
Mass increments	kg	0,5
	lbs	1,1
Force transducers	kN	0,45 to 222
	lbs	101 to 50000
Machine dimensions (w x d x h)	mm	1520 x 940 x 3330
	in	60 x 37 x 132
With thermostatic chamber (w x d x h)	mm	-
	in	-
Test area dimensions (w x d x h)	mm	1200 x 730 x 745
	in	47.2 x 28.7 x 29.3
With thermostatic chamber (w x d x h)	mm	-
	in	-
Machine weight	kg	1200
	lbs	2646
With thermostatic chamber	kg	-
	lbs	-
Load on slab in static condition <sup>2</sup>	kg/m <sup>2</sup>	1280
	N/m <sup>2</sup>	12557
Concentrated load on feet	kg/cm <sup>2</sup>	3,6
	N/cm <sup>2</sup>	35
Electrical supply	-	220-240V 50/60Hz
	-	100-120V 50/60Hz
Compressed air supply	bar	6 to 10
	psi	72,5



- 1 Includes an average tup weight of 0,7 kg (1,10lbs)
- 2 Maximum parallelepiped inscribable in the base
- 3 Load in dynamic conditions depends on the test type and impact forces

# | DROP TOWER SPECIFICATIONS

## Data Acquisition Rate and Points:

65'536 points acquired up to 4 MHz, simultaneous on Strain Gauge, Piezoelectric, and Analog channels.

## High Speed Camera trigger:

Guarantees simultaneous acquisition across HSC and data acquisition system. Output voltage: 0 to +12 V nominal (\*), positive polarity. Output current: maximum 10 mA.

(\* ) max value depends on absorbed current

## Testing Speed Accuracy:

Measured by optical detector  $\pm 1\%$ , repeatability  $\pm 2\%$  of set value.

## Drop Position Accuracy:

Measured by digital encoder  $\pm 1$  mm, repeatability  $\pm 0.5$  mm of set value.

## Load Measurement:

Piezoelectric and Strain Gauge sensors with selectable working ranges among 10-20-50-100% of the full scale. Traceable and accredited verification certificate can be released for the evaluation of measurement uncertainty.

## Overload Capacity:

From 160% to 600% depending on the transducer type.

## Force Measurement Accuracy:

Indicated error  $\leq 1\%$  of rated output at full scale and Resolution at zero force for all selectable working ranges 0.04%, both estimated according to ISO 7500-1 Annex C; Linearity  $\leq 1\%$  of the full scale (including charge amplifier for Piezoelectric load cells).

## Instrument Supplies:

Electrical 100-120 V, 220-240 V; 50-60 Hz; UL/CSA-ready option available.  
Compressed air 6 to 10 bar (72.5 to 145 psi)

## Touch Screen:

Flat screen, 21.5", industrially-rated touch monitor.

## Operative System:

Built-in computer is installed with Windows 10 LTSC

## Dashboard Overall Dimensions:

525 x 460 x 420 mm (W x D x H)

## Extras:

Compatible with Bluetooth/Wi-Fi keyboard and mouse.

## Dashboard Supplies:

2 Electrical electrical supplies are required.  
Multitension 50-60 Hz UL/CSA-ready.

## Notes:

These specifications were developed in accordance with Instron's standard procedures and are subject to change without notice.  
All systems conform to all relevant European standards and carry a CE mark.



*“True innovation occurs when product designers and developers show relentless curiosity towards the needs of their customers. This builds an understanding that allows them to anticipate and create a new suite of solutions that are Simpler, Smarter, and Safer.”*

Yahya Gharagozlou

Group President  
ITW Test & Measurement  
*(Instron is an ITW Company)*

## Motorized Pendulum Impact Testing System | MPX Series

The Instron® MPX Series of motorized pendulum impact testers are preferred for metals impact testing to Charpy and Izod standards. Available in capacities from 300 to 900 Joules, the MPX is efficient and easy to operate making it suitable for high-volume testing. The MPX includes an integrated guard and safety control system that meets the stringent requirements for the European CE mark and for ISO 13849.

Fracta™ Software comes standard with the MPX, allowing for simple data acquisition and reporting of absorbed energy. For advanced impact analysis and reporting, the MPX can be upgraded with Impulse™ Data Acquisition Software and instrumentation for direct measurement of impact force and striker velocity.

### Features and Benefits

- Standard capacities include 300, 450, 600, 750, and 900 Joules
- Automatic test start at door closure for efficient testing and adherence to standards for non-ambient specimen testing
- Optional interchangeable hammer weights conveniently adjust the system capacity without removal of the hammer shaft
- Motorized hammer lift and automatic return to start test position for increased productivity and operator safety
- Hammer brake, clutch, and latch mechanisms respond quickly for faster operation
- Safety enclosure with interlocks protects the operator by preventing the hammer from releasing when doors are open
- Adjustable latch height adds configurability for testing at lower energies and velocities
- Standard base design meets ASTM and ISO recommendations
- Charpy anvil inserts and striker are selectable to meet a range of international test standards

### Optional Accessories

- Interchangeable hammer weights
- Foundation preparation kit includes template and fasteners
- Instrumented Charpy tups and Impulse Data Acquisition Software
- Additional specimen tongs
- Izod striker and specimen vise
- Supports for testing sub-sized specimens
- Lateral expansion gauge
- NIST Charpy reference standards for ASTM E23



450MPX Impact System

### Standards

The MPX is designed to meet the following standards:

- ASTM E23
- ISO 148
- EN 10045
- GOST 9454
- AS 1544
- JIS Z 2242
- JIS B 7722

## MPX Specifications

Impact Energy	Joule lbf-ft	300 - 900 221.3 - 663.8
Release Angle (adjustable)	Degree	150
Pendulum Length	mm in	762 30
Maximum Hammer Speed	m/s ft/s	5.3 17.4
Encoder Resolution	Degree	0.036
System Dimensions (width × depth × height)	mm in	2200 × 1117 × 1990 86.6 × 44 × 78.3
Net Weight	kg lbs	1293 2850
Power		230 Vac, 1 Phase, 50/60 Hz, 15 Amp

## Software

Designed specifically for testing metals to Charpy and Izod standards, Fracta™ Software provides an easy-to-use method for calculating and storing impact test results.

The package includes:

- Angular encoder
- USB communication box
- Mounting hardware and interconnect cables
- Network connectivity
- Available in the following languages: English, Spanish, Russian, Romanian, French, Czech, Simplified Chinese, and Turkish

## Software Specifications

### Calculations

- Energy absorbed
- Elasticity/Resilience

### Data Collection Rate

- 1 kHz

### Reporting Capability

- Stores results as .csv files that can be opened in applications such as Microsoft® Excel®
- Ability to define 10 user-designated input fields

### Simple System Setup

- Hammer characteristics on single setup page
- Setup parameters stored to device

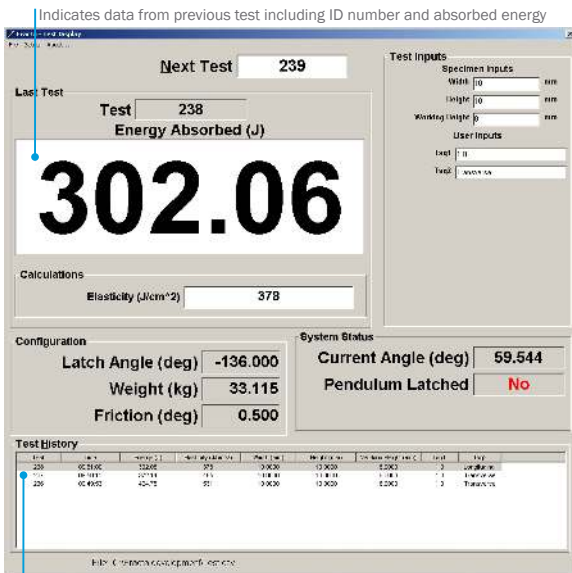
### Display Features

- Status of system limits
- Hammer setup and verification
- Potential/impact energy, velocity, and test history
- Modulus of Elasticity

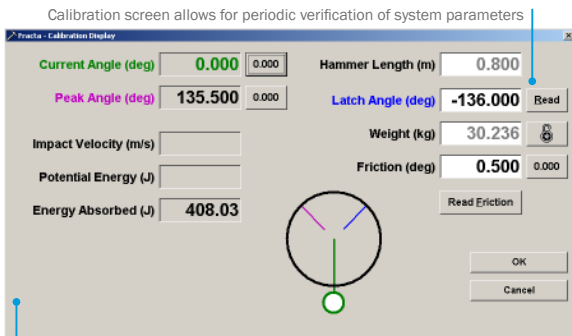
### Notes

1. Minimum screen resolution requirement: 1220 x 1080
2. Windows® XP and Windows 7 32-bit (x86) and 64-bit (x64)

[www.instron.com](http://www.instron.com)



Running log of results from previous tests



Graphical representation aids in understanding pendulum information

## ASTM E23 Usable Range of Each Hammer Capacity

Initial Potential Energy (Joules)	Resolution at 15 Joules	Lower Limit Usable Range
300	0.016	0.4
450	0.023	0.6
600	0.029	0.8
750	0.036	0.9
900	0.044	1.1

Reference ASTM E23-12c Section A2.4.3



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CEAST 9000 Series

Pendulum Impact Systems



**INSTRON**<sup>®</sup>



# CEAST 9000 Series

Pendulum  
Impact  
Systems



# Make A Swing

Impact resilience is one of the most important properties and cost-effective evaluations for material producers, both with respect to product development and quality control. As components could fail at stress levels well below the critical fracture stress, accurate determination of impact damage propagation is necessary. With the combined experience of CEAST, Instron® has more than 50 years experience in designing pendulum impact testing systems.

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p3

## What are you testing?

The CEAST 9000 Series is designed to perform your Charpy, Izod, Tensile Impact, and Dynstat tests on a wide range of samples, from bars/dumbbell to pipes, in accordance with specific standards.

p5

## What is your expected resilience?

It's critical to determine the energy value necessary to break the specimen under certain conditions, such as specimen size, notch shape, and hammer impact energy.

p7

## Notching your Specimens

Accurate notching is key for pendulum impact testing. Instron® has solutions to meet your requirements

p9

## Which model is right for you?

Our Pendulum series offers fully manual or pneumatic and motorized options. Chose the version that meets your needs.

p13

## Will you perform tests at different temperatures?

When choosing a pendulum impact system, comprehensive impact characterization with tests at different temperatures can be important for a material application.

p15

## What result do you need?

From quality control on resilience results to automated result calculation and visual curve displays, pendulum impact systems can be equipped with instrumentation to fit your needs.

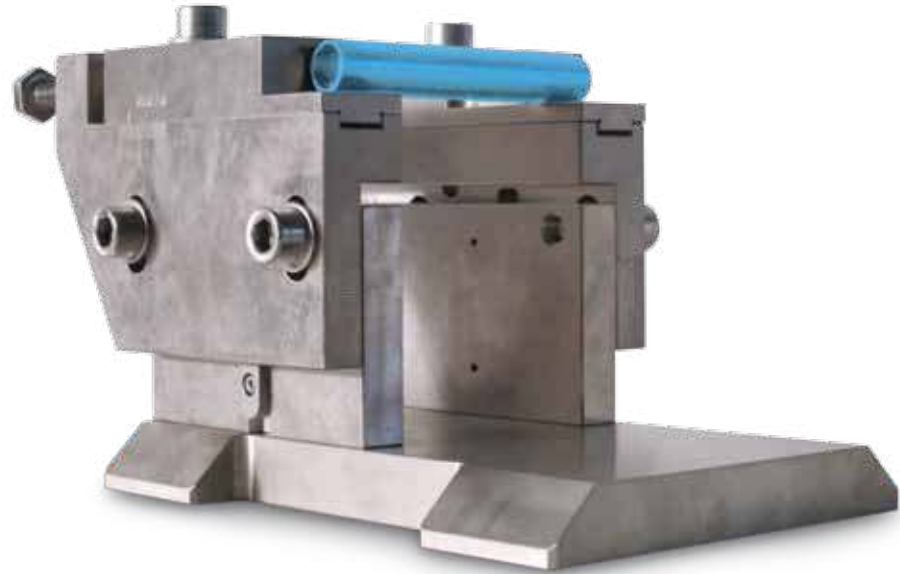
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# Test Types



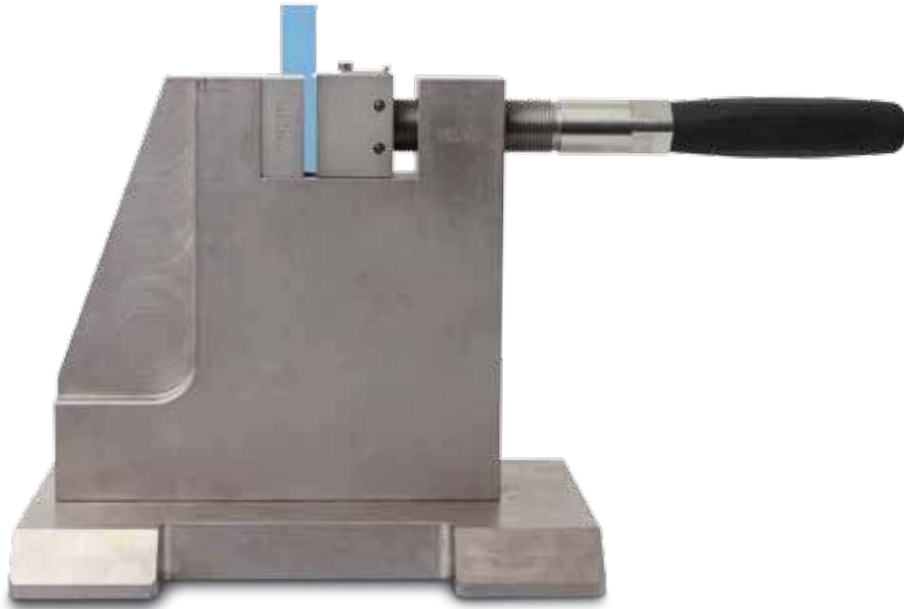
## Charpy

This 3-point bend test that requires a standard notched or unnotched bar is impacted on either the wide or narrow face of its cross-section. The energy required to break the specimen is recorded and the subsequent impact strength is calculated. Specimen and fixture dimensions, impact speed, and hammer dimensions are all defined in the test standard being followed, including ISO 179, ASTM D6110, DIN 53453, DIN 53753, and BS 7413. Metals can be tested according to DIN 50115 and ASTM E23 standards. Hammer energies are available from 0.5 - 50 J (0.37 - 36.9 ft-lbs). The Charpy vice can be fitted with alignment devices for notched, unnotched, and double notched specimens in either the edgewise or flatwise orientation.



## Pipe Testing

Scientific research on the material of pipes or the examination of pipe sections and tubing impact strength are suitable to yield information on the fracture behavior under service conditions. According to the ISO 7628 and ISO 9854, either complete segments or small sections of pipes tested on a pendulum in a 3-point bend configuration similar to the Charpy tests. Sample diameter dimensions up to 25 mm (0.98 in) can be tested with hammer energies of 7.5 - 15 J (5.6 - 11.1 ft-lbs) or 50 J (36.9 ft-lbs), as defined in the ISO standards.



## Izod

For the Izod test, the specimen is impacted in a cantilevered position with the fixed end clamped into the vice. This testing method generates a more severe stress test than the Charpy mode. Energy required to break the specimen is recorded and the subsequent impact strength calculated. Specimen dimensions, hammer geometry, and impact speed are defined by the test standards, the most common of which are ISO 180, ASTM D256, and ASTM D4812. To more accurately adjust and control the clamping force, the Izod vice can be used with a torque wrench or fitted with a foot-operated pneumatic clamping system. It may be necessary to control the clamping force.



## Tensile Impact

Tensile impact tests are conducted on materials that are either too thin or exhibit a high elongation before fracture. Hammer geometry, impact energy, specimen shapes, and dimensions are defined in test standards such as ISO 8256 Method A, ISO 8256 Method B, and ASTM D1822. The specimen is either held in the stationary anvil (ISO 8256 Method A) or attached directly to the pendulum hammer (ISO 8256 Method B and ASTM D1822). Hammer energies are available from 0.5 - 50 J (0.37 - 36.9 ft-lbs) depending on the type of the test. The Tensile Impact vice can be fitted in the crosshead with an optional device to ensure specimen alignment.

# Impact Testing is all About Energy

How much energy does it take to fully break a specimen?

How little energy does it take to begin a failure mode in the specimen?

How much energy did the specimen absorb during impact?

The CEAST 9000 Series tabletop pendulums offer impact energies up to 50 J with a range of options available from basic manual testers to semi-automatic systems that include pneumatic release of the hammer and motorized hammer re-positioning.

## CEAST 9050 | Manual Model

Energy Range: 0.5 - 50 J (0.37 - 36.9 ft-lb)

Hammer Positioning: Manual

Hammer Release: Manual (pneumatic optional)

Braking Mechanism: Manual



$$E = m \cdot g \cdot L (\cos \alpha_1 - \cos \alpha_0)$$

Energy is equivalent to the hammer's momentum per difference between impact and starting angle

The greater the mass the higher the impact energy. The lighter the mass the lower the impact energy. Our pendulum systems use hammer energies ranging from 0.5 - 50 J (0.37 - 36.9 ft-lbs) and velocities from 1 - 3.80 m/s (3.2 - 12.4 ft/s).

Regardless of your energy requirements, we have the system that meets your needs.

### CEAST 9050 | Motorized Model

Energy Range: 0.5 - 50 J (0.37 - 36.9 ft-lb)

Hammer Positioning: Motorized

Hammer Release: Pneumatic

Braking Mechanism: Pneumatic



# Notching Your Specimens

Proper preparation of the specimen is a critical process for accurate material characterization. An appropriate preparation of the specimen, as well as an adequate notching procedure affects the final test results, generating reliable outcomes in the finish product performances. This is accomplished by several specimen preparation techniques, making them particularly suitable to select the most appropriate material and failure results analysis.

## Why is the Notch Required?

- Notching of the specimen drastically reduces the energy loss due to the deformation
- It provides a stress concentration area which promotes a brittle rather than a ductile failure.

## Why is accurate notch preparation important?

The notch properties are effected by:

- A slight variation in the radius and depth affects the impact strength results;
- Cutting speed, sharpness of the knife, pass depth, quality of notching machine;

## Knives

The notching machines use interchangeable knives and are available to meet the following standards:

ISO 179	ASTM D256
ISO 180	ASTM D6110
ISO 8256	DIN 53435
BS 2782-359	DIN 53453

## Manual and Motorized Notching Machines

- The manual and motorized Notching Machines are designed to notch thermoplastic and reinforced thermo plastic specimens
- A notch, with dimension according to the requirement of the main international standards, is obtained by means of a constant profile knife with an alternating linear movement
- Choice of analog or digital depth measurement

### Manual Model

Manual knife movement, speed and cutting depth  
Up to 18 m/min cutting speed  
Analog or digital feed measurement  
Up to 4 specimens notched simultaneously

### Motorized Model

Motorized knife movement and speed  
Manual cutting depth  
Up to 12-42 m/min cutting speed  
Analog or digital feed measurement  
Up to 10 specimens notched simultaneously



## CEAST AN50 – Automatic Notching Machine

The CEAST AN50 is designed for laboratories which need to perform a large number of impact tests. Up to 50 specimens can be notched in a single cycle with the key parameters stored for later use. The optional knife cooling system, double notch loader and an adjustable cutting speed allow for consistent time saving and accurate notching operations at the same time.

### Features

Programmable motorized knife movement and speed from 1 to 21m/min

Single pass depth, programmable from 0.01 to 0.25mm

- Up to 50 specimens notched simultaneously
- Optional slicing device for cutting dumb-bell specimens to a rectangular shape
- Optional knife cooling system
- Option to double notch specimens for Charpy or Tensile Impact applications



# CEAST 9050

The CEAST 9050 is an advanced pendulum tester that performs uninstrumented to semi-automatic instrumented tests. Hammer energies range from 0.5 - 50 J (0.37 - 36.9 ft-lbs) and are available for Charpy, Izod, Tensile Impact, Dynstat, and Pipe testing standards.

Standard features include:

- Monolithic cast iron frame
- Intuitive touch panel operation
- Automatic hammer identification and verification
- Angular encoder measuring to 0.05° resolution
- Quick-change hammers and specimen supports
- Hammer disc brake system

Optional features include:

- Increased height safety enclosure for Manual Model
- Slip ring and Trigger for instrumented hammer data acquisition
- Accessories to facilitate operations

Tests to the following standards:

ISO 179	ASTM D6110	DIN 53453
ISO 180	ASTM D256	DIN 53753
ISO 8256	ASTM D1822	DIN 50115
ISO 9854	ASTM E23*	
ISO 7628	BS 7413	

*\*For indirect verification to ASTM E23 only low energy reference specimens may be used.*



## Manual Model

The CEAST 9050 manual model has manual hammer repositioning and disc braking. The hammer release has a two-handed operation that is standard but can be specified as pneumatic

## Features

### Standard Safety Guards

A fully protective safety guard on both sides of any pendulum version allows safe operation according to the compulsory CE directive.

### Hammer Brake System

The hammer disk brake is characterized by a double braking surface that assures high-braking torque with low effort and smooth operation, even for the heaviest hammers. The brake is manually operated on the Manual Model or pneumatically operated in the Motorized Model.

### Hammer Angle Measurement

Using a non-contacting magnetic encoder allows for virtually zero friction and a resolution of 0.05°.

### Hammer Identification System

This system automatically recognizes the mounted hammer and retrieves all the relevant data (code, test standard, nominal energy, and impact speed) from the internal database. Repetitive data input and the risk of error is completely eliminated.



## Motorized Model

The CEAST 9050 motorized model is equipped with a pneumatically operated hammer release and disc braking system that is standard. The hammer repositioning eases use and increase the output in tests. A data acquisition trigger is included.

### Touch Panel

A high-resolution 6.5-inch color display with touch-screen technology allows the most flexible and intuitive use of the instrument.

### Embedded-PC Technology

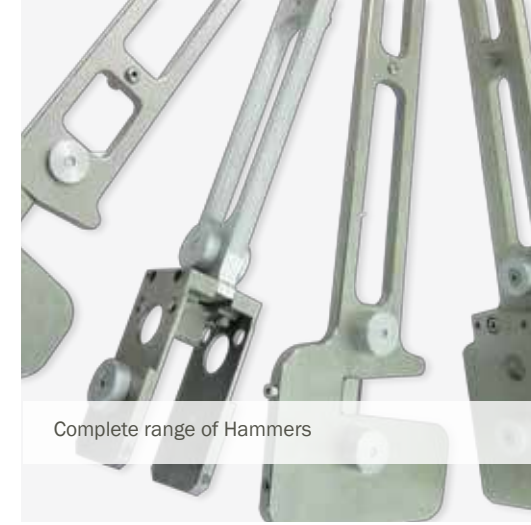
Allows an Ethernet connection to PC Networks (LAN), data exchange through a removable USB stick, and direct printing on standard USB printers

### Quick Change Hammers

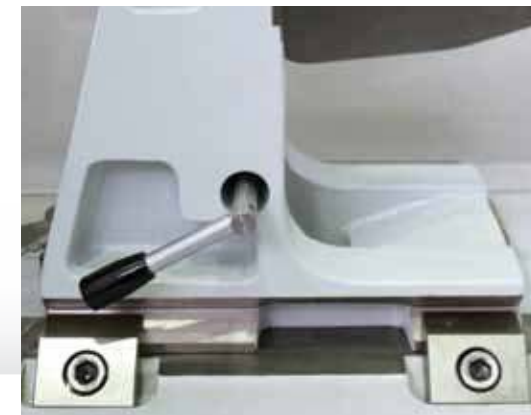
Equipped with an ergonomic quick-change mechanism, the hammers can be easily changed without the use of tools or screws and the innovative wedge system assures a firm fixing.

### Quick Change Supports and Fixtures

Through an ergonomic fixing system, vices for all test types, can be easily and quickly changed and positioned.



Complete range of Hammers

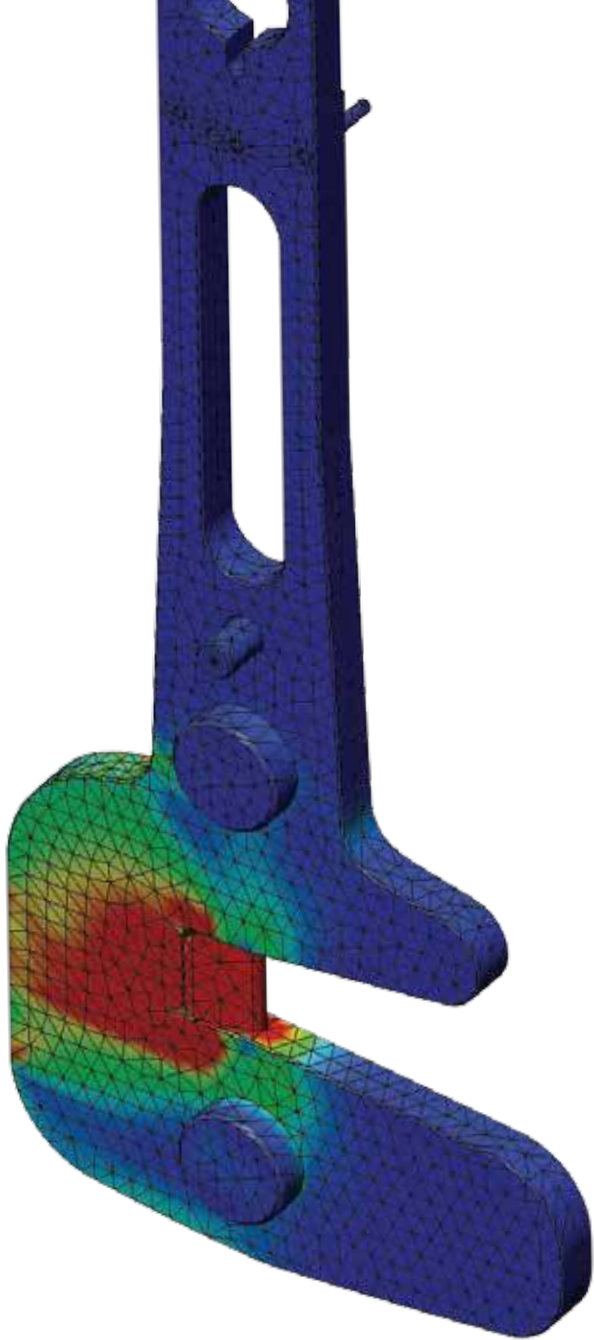


Quick Change Supports/Fixtures



Monolithic Cast Iron Frame





## Hammers

This innovative hammer line evolved from two primary needs: accuracy and rigidity. The patented\* hammer structure, machined from one piece of metal alloy plates, ensures incomparable rigidity, a solid connection to the encoder shaft, and negligible vibrations. Furthermore, the flattened shape minimizes energy lost due to wind friction.

3D CAD design and Finite Element Modeling (FEM) calculations have been employed for the optimal arrangement of mass, position of the center of gravity, and reduced length. Due to this solid design the manufacturing accuracy is by far the best with respect to traditional hammers made of several assembled parts.

Each hammer is equipped with a system that allows fine adjustments of the reduced length, of its weight at 90°, and of its vertical position during the calibration process.

The auto-recognition is the most innovative feature of the hammer and ensures no operator error. This system consists of three pins that are positioned on the hammer and are read by the photocell system of the instrument. The hammer is recognized during calibration and throughout the test.

\*Covered by US Pat. No. 7726173, owned by Illinois Tool Works Inc.

To view our range of accessories please visit: [www.instron.com/accessories](http://www.instron.com/accessories)

# Touch-Screen Interface

Windows® based

The instrument is equipped with an advanced interface, based on a powerful embedded-PC with a high-resolution, 6.5-inch color display. The touch-screen technology allows the most flexible and intuitive use of the instrument, while the embedded-PC technology provides an open architecture, allowing Ethernet connection to PC Networks (LAN), data exchange through a removable USB and direct printing on standard USB printers. Through the LAN connection hundreds of results can be stored and easily exported to LIMS systems.



N	Brk	Width [mm]	Abs.en. [%]	▼Re [kJ/m <sup>2</sup> ]	▼Energy [J]
1	N	8.00	51.71	177.50	5.680
2	P	8.00	43.91	151.11	4.836
3	C	8.00	48.26	166.07	5.314
4	H	8.00	45.04	154.97	4.959
5	H	8.00	45.46	156.42	5.005
X		8.00	46.88	161.21	5.159
σ		0.00	2.81	9.52	0.305

Options ▶



Parameter	Value
Laboratory	CEAST
Operator	AC
Temperature	003 °C
Material code	PP 284
Supplier	CEAST
Conditioning	No cond
Comment	None

More than 100 sets of test parameters and 100 test results can be saved together with additional comment on the test.



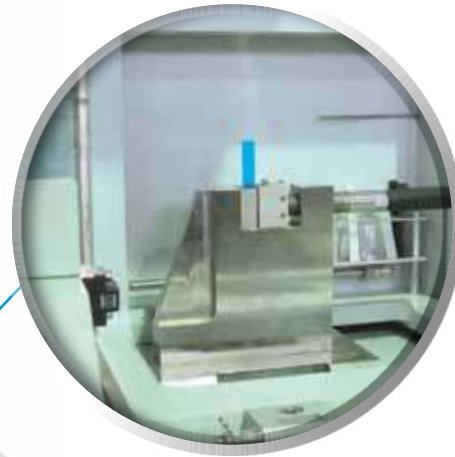
Parameter	Value
Angle	150.0 °
Load energy	0.007 J

The instrument checks whether the hammer is correctly calibrated and used according to the current test parameters.



# Testing at Non-Ambient Temperatures

Impact properties are dramatically influenced by temperature. Plastic materials usually show a brittle behavior at low temperatures and a more ductile behavior as the temperature increases. Finding a brittle-ductile transition temperature can be of critical interest for many polymer applications. Comprehensive impact characterization with tests at different temperatures becomes possible with a series of options for the CEAST 9050 pendulum.



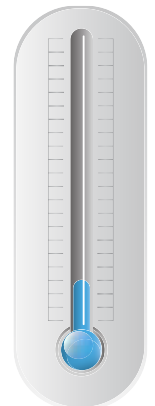
## Cryobox

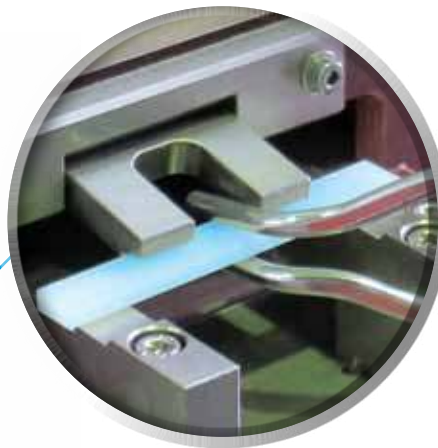
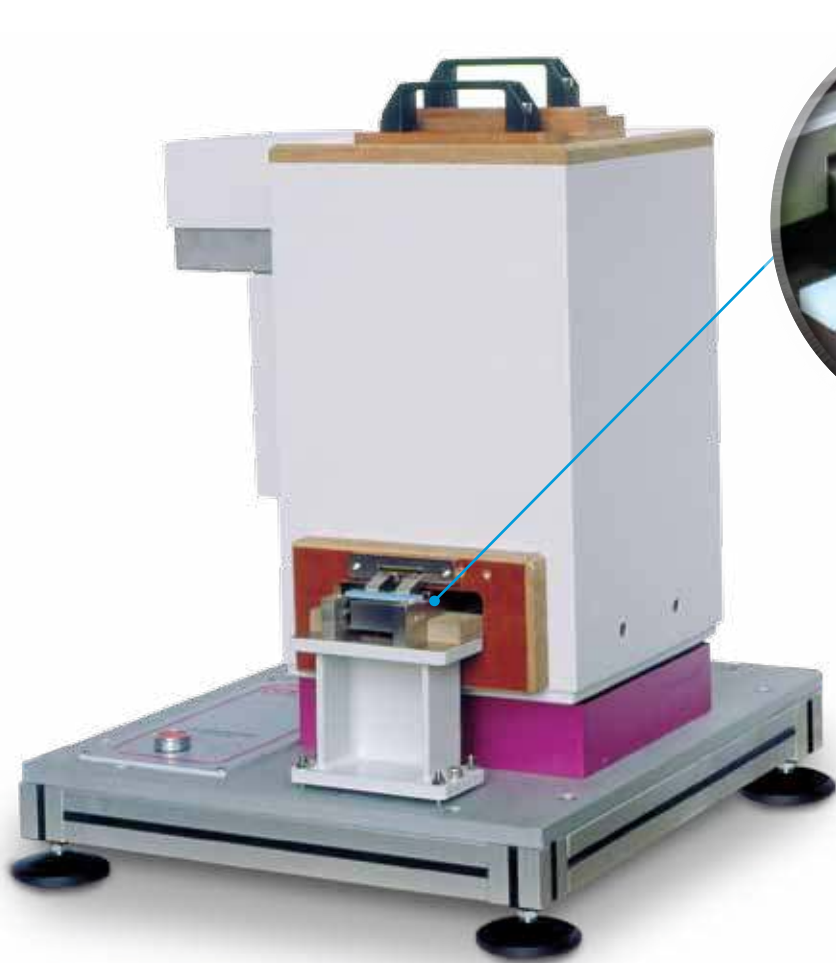
Cooling system: Liquid Nitrogen  
Temperature range: Ambient to  $-60^{\circ}\text{C}$  ( $-76^{\circ}\text{F}$ )

Suitable for cooling specimens to the following standards:

ISO 179	ASTM D6110	DIN 53453
ISO 180	ASTM D256	DIN 53753
ISO 8256	ASTM D1822	DIN 50115
ISO 9854	ASTM E23	
ISO 7628		

The Cryobox is a thermal conditioning cell mounted directly onto the CEAST 9050 and positioned to enclose the specimen vice. This optional system is able to condition up to 11 specimens for below-zero tests. Izod, Charpy, or Tensile Impact vice and clamped specimens are jointly conditioned. Through a separate electrical cabinet for temperature control, it's possible to set the cryobox inside temperature before impact.





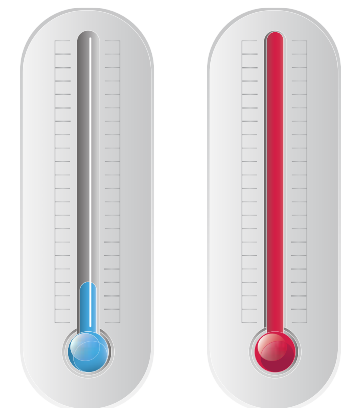
## Cryodispenser

Cooling system: Liquid Nitrogen  
Temperature range: -70 to 100 °C (-94 to 212 °F)  
Number of Specimens: Up to 100 over 2 loaders

Designed to hold sample from the following standards:

ISO 179	ASTM D6110	DIN 50115
ISO 180	ASTM D256	
	ASTM E23	

The Cryodispenser is a manual device designed to condition many specimens at different temperatures. Two removable loaders can hold up to 50 specimens each. The automatic specimen ejecting system allows the operator to remove the specimens, one by one, out of the environmental chamber. Once out of the chamber, the specimen is manually positioned on the vice by special pliers. A separate electrical cabinet for temperature regulation and control displays the thermal impact conditions.



# The Results Are In...

Do you need to know more than the absorbed energy for your pendulum test?  
Would seeing the load-time curve help understand your results?



## Uninstrumented

Uninstrumented pendulum tests provide the energy taken to break the specimen and allow the impact resistance to be calculated. Different materials may have the same absorbed energy while failing in different ways. This information can only be collected by instrumenting your test.

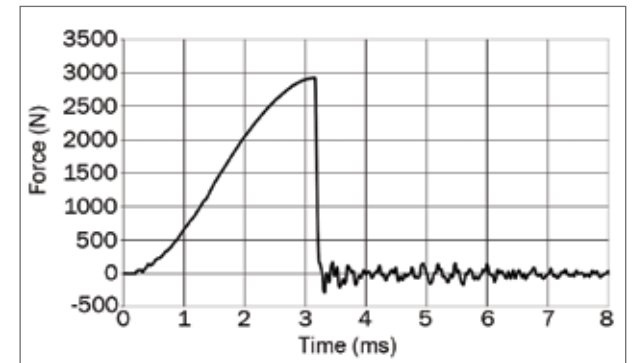
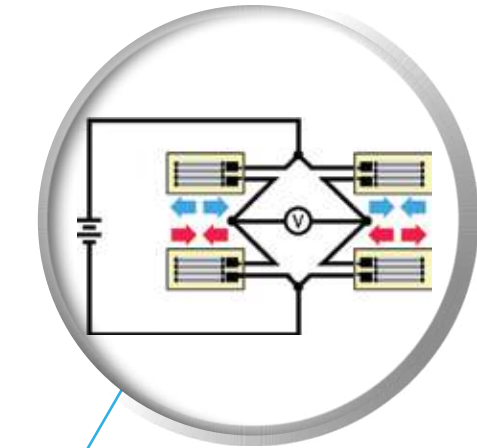
VS

## Instrumented

The addition of an instrumented hammer and Data Acquisition System (DAS) allow the engineer to “see” types of information that were previously unknown, including failure type and ductile-brittle behavior. With instrumentation, the load on the specimen is continuously recorded as a function of time and gives a more complete representation of the test than a single energy value collected during uninstrumented tests.

## Instrumentation

To acquire the force signal during impact, a strain-gauge sensor bridge is placed inside the striker body. The deformation acting on the striker during impact will be acquired by a separate Data Acquisition System (DAS) as an electric signal, which is directly transformed into a force value. The instrument can be equipped with a miniaturized slip ring to transmit the electric signal with the lowest friction and easiest connection.



# Support For The Life Of Your Equipment



## When You Need Us, We're There

Operating with 25 offices in 18 countries and more than 1,200 employees, Instron® has a global infrastructure that is local to you. When you need service and support for your CEAST 9000 Series equipment, we'll be there. We remain committed to advancing materials and components testing techniques.



## Maximize Uptime

The Instron world-class service organization is committed to delivering high-quality installation, calibration, training, maintenance, and technical support throughout the life of your CEAST pendulum impact system. We help to ensure that your impact system is working when you need it.



## Quality Standards You Can Trust

Operating under ISO 9001 quality standards and with an extensive list of accreditations, Instron employs a product design philosophy where our customers' data integrity, safety, and protection of investment are paramount. CEAST pendulum impact systems are designed in accordance with the ISO 13802 standard. We strive to ensure that our customer satisfaction is second to none.

# CEAST 9000 Series Specifications



CEAST 9050 Manual

CEAST 9050 Motorized

Hammer Energy Range	J ft-lb	0.5 - 50 0.37 - 36.9	0.5 - 50 0.37 - 36.9
Hammer Release	-	Manual (Pneumatic Optional)	Pneumatic
Hammer Braking	-	Manual	Pneumatic
Hammer Recovery	-	Manual	Motorized
Hammer Identification	-	Automatic	Automatic
Electrical Supply	-	100 - 240 V 50 - 60 Hz	100 - 240 V 50 - 60 Hz
Compressed Air Supply	bar psi	5 72.5	5.5 79.8
Machine Dimensions (w × d × h)	mm in	1035 × 430 × 880/1190 40.8 × 16.9 × 34.6/46.9	1035 × 510 × 1190 40.8 × 20.1 × 46.9
Machine Weight	kg lbs	220 (330 with 50 J Plate) 485 (725 with 50 J Plate)	270 (380 with 50 J Plate) 595 (838 with 50 J Plate)
Safety Guards	-	Standard (Full Enclosure Optional)	Full Enclosure

## Americas

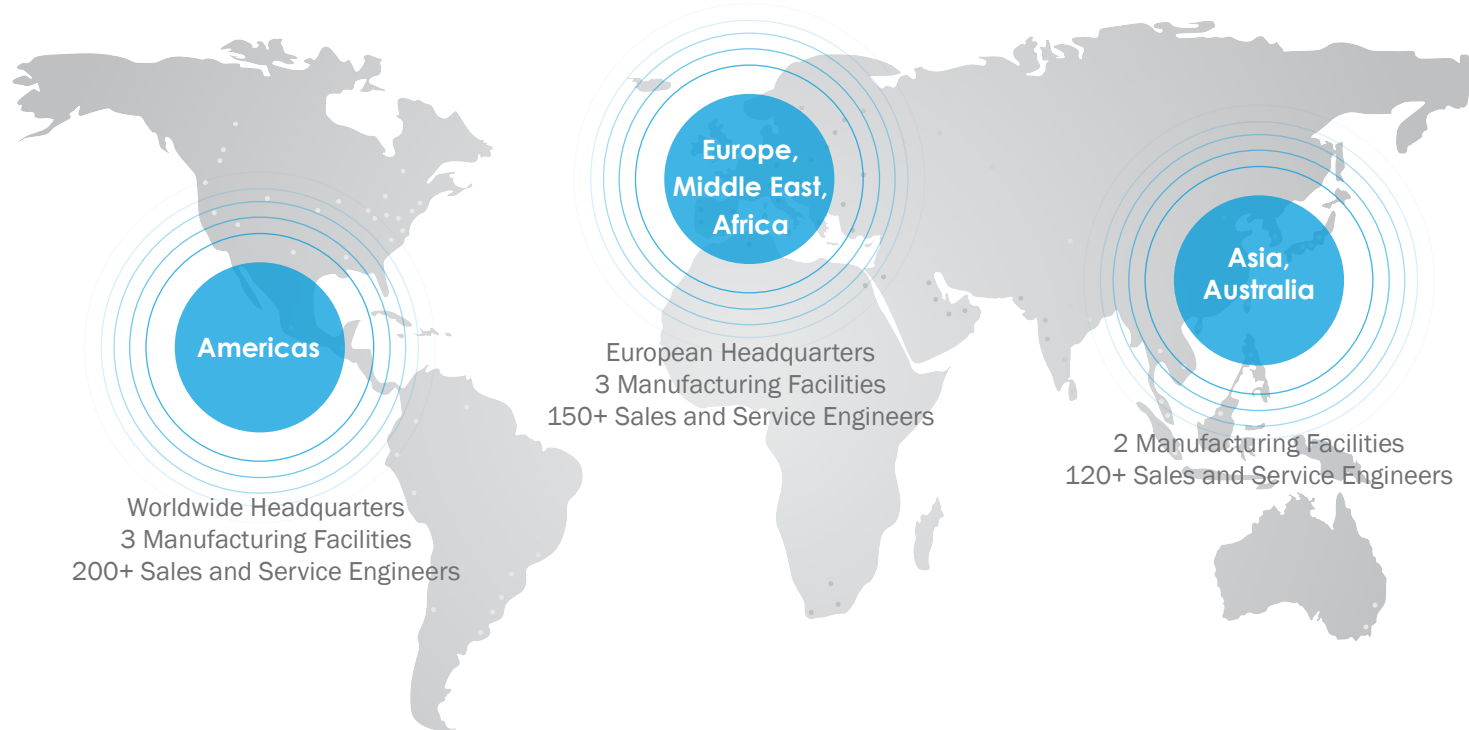
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