



Continuous Load Concrete Beam Testers

Introduction

These self-contained portable concrete beam testers accurately and easily determine flexural strengths of 6 x 6" cross-section test beams. By adding a micro-pump to these Beam Testers allows the user to put a continuous load pressure to the beam, which complies with the ASTM Standards. According to ASTM, a load can be rapidly applied to the beam up to 50% of the expected maximum load. Then, by using the micro-pump, the rest of the load can be applied continuously until failure. The range of the micro-pump allows it to add up to 10,000 lbf pressure. Hydraulically-driven, these Beam Breakers use a center-point loading method with continuous readings to the break. The gauge resets to zero (0) for repeat tests. These lightweight aluminum units have dual registration of modulus of rupture between 10,000 lbf. and 0-4,500 kgf. Shipping weight of each is 65 lbs. (29kg)

Product Description— H-3030CL

The Humboldt Manufacturing Co Model H-3030CL, Concrete Beam Tester, is a lightweight portable unit designed to easily determine the flexural strength of up to 6 x 6 x 30" test beams. Hydraulically driven and assisted by a micro-pump to provide a continuous and accurate load, it uses the center-point loading method defined in ASTM C293 and AASHTO T177 with continuous dial gauge readings. Support rollers for this model are set to a 16" distance, center-to-center.

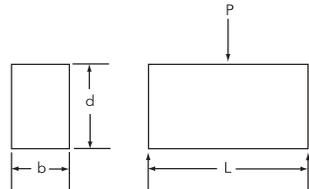
Physical Specifications:

Function	Modulus of rupture of concrete beams using center point loading
Range	0 - 1,666 lbf/in ² 0 - 15,000 lbf
Shipping weight:	lb
Overall height:	"
Base dimension:	"

Theory Of Operation

The modulus of rupture¹ is defined as:

$$R = \frac{3PL}{2bd^2} \quad (1)$$



where:

R = modulus of rupture in lbf/in²

b = average specimen width in inches

P = maximum applied load in lbf d = average specimen depth in inches

L = span length in inches

¹ R is actually the stress in lbf/in² of the outer fibers of the beam (in compression at the top, in tension at the bottom).

$$S = \frac{Mc}{I}$$

Where: S = stress at top or bottom of the beam in lbf/in²
M = bending moment (P/2 x L/2)
c = distance from centroid to top of beam (d/2)
I = Inertia about the centroid (bd³/12)

The most common usage of this unit will be to test 6 x 6" beams over a 16" span. For this geometry:

$$R = \frac{3 \times P \times 16}{2 \times 6 \times 6^2} = \frac{P}{9} \quad \text{or} \quad P = 9R \quad (2)$$

The gauge measures in pounds force. It must be corrected for calibration error and beam dimensions.

When beam and span dimensions vary from those in equation (2), the calibration correction may be obtained from:

$$R = \frac{3PL}{2bd^2} \times (1.00 + \text{error}) \quad (3) \text{ Where P is the gauge reading}$$

Operation²

1. Center the test beam on the rollers.
2. Leave the valve on the hand pump and the valve on top of the instrument open and back the micro-pump load screw all the way out by turning the crank handle counter-clockwise.
3. To Start the test, close the valve on the hand pump and the valve on top of the cylinder. Use the hand pump to load the beam to approximately half its breaking point, then, continuously load the beam by turning the crank handle on the micro-pump clockwise. The flexibility of your beam will determine how many turns per minute it will take to load the beam 125 to 175 psi per minute or 1000 lbf to 1400 lbf per minute as per the ASTM spec.
4. Record the gauge reading at break.
5. Measure the beam dimensions at the section of failure.
6. Calculate the modulus of rupture using equations (2) and (1) or (3).

Example: The gauge reads 5,400 lbf at break.

This corresponds to a modulus of rupture of $5,400/9 = 600 \text{ lbf/in}^2$

Per the calibration, the meter error at 5,400 is +0.5%.

The corrected load is 5,427 lbf.

The beam calipers as 6.1" deep, and 5.95" wide.

The modulus of rupture is:

$$R = \frac{3 \times 5,427 \times 16}{2 \times 5.95 \times 6.1 \times 6.1} = 588.3 \text{ lbf/in}^2$$

Calibration

The unit is calibrated by measuring the load applied on a calibrated load cell. The factory calibration is supplied at gauge readings of 10% FS, FS and 3 readings in between. Three load cell readings are averaged at each point to establish the correction for each point.

This unit is in compliance with ASTM C293 since it uses the micro-pump to apply the load continuously.

²Specific operation should follow the applicable specifications (e.g. ASTM C293). These operation procedures are supplied as a guideline.

Testing Equipment for



Construction Materials

HUMBOLDT

www.humboldtmg.com

CONCRETE BEAM TESTER CALIBRATION REPORT

CUSTOMER:

INSP. DATE: 5/6/2009	TEMP: 68
TESTER I.D.: B. LEATHERMAN	
<i>B. Leatherman</i>	
MODEL: H-3030 SERIAL NUMBER: 376	

TESTER READING	LOAD CELL READING			AVERAGE READING	ERROR (%+/-)
	1	2	3		
1500	1498.3	1498.3	1498.3	1498.3	-.1
4500	4505.1	4513.6	4496.6	4505.1	+1
7500	7542.5	7559.5	7542.5	7548.2	+6
11000	11025.5	11017.0	11017.0	11019.8	+2
15000	14966.0	14957.5	14949.0	14957.5	-.3

CALIBRATION EQUIPMENT USED
HUMBOLDT H-4454.200 SER. #708 0-15000 LBF.
CALIBRATED BY: HUMBOLDT DATE: 2 FEB. 2009

DIRECT READING GAUGE READS POUNDS FORCE
DIVIDE BY 9 TO GET FLEXURAL PSI.

Product Description— H-3032CL

The Humboldt Manufacturing Co Model H-3032CL, Concrete Beam Tester, is a lightweight portable unit designed to easily determine the flexural strength of up to 6 x 6 x 30" test beams. Hydraulically driven and assisted by a micro-pump to provide a continuous and accurate load, it uses the center-point loading method defined in ASTM C293 and AASHTO T177 with continuous dial gauge readings. Support rollers for this model are set to a 18" distance, center-to-center.

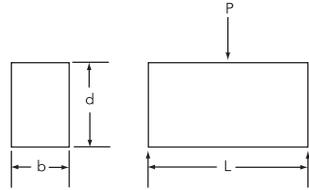
Physical Specifications:

Function	Modulus of rupture of concrete beams using center point loading
Range	0 - 1,875 lbf/in ² 0 - 15,000 lbf
Shipping weight:	lb
Overall height:	"
Base dimension:	"

Theory Of Operation

The modulus of rupture¹ is defined as:

$$R = \frac{3PL}{2bd^2} \quad (1)$$



where:

R = modulus of rupture in lbf/in²

b = average specimen width in inches

P = maximum applied load in lbf d = average specimen depth in inches

L = span length in inches

¹ R is actually the stress in lbf/in² of the outer fibers of the beam (in compression at the top, in tension at the bottom).

$$S = \frac{Mc}{I} \quad \text{Where: } S = \text{stress at top or bottom of the beam in lbf/in}^2$$

M = bending moment (P/2 x L/2)

c = distance from centroid to top of beam (d/2)

I = Inertia about the centroid (bd³/12)

The most common usage of this unit will be to test 6 x 6" beams over a 18" span. For this geometry:

$$R = \frac{3 \times P \times 18}{2 \times 6 \times 6^2} = \frac{P}{8} \quad \text{or} \quad P = 8R \quad (2)$$

The gauge measures in pounds force. It must be corrected for calibration error and beam dimensions.

When beam and span dimensions vary from those in equation (2), the calibration correction may be obtained from:

$$R = \frac{3PL}{2bd^2} \times (1.00 + \text{error}) \quad (3) \text{ Where P is the gauge reading}$$

Operation²

1. Center the test beam on the rollers.
2. Leave the valve on the hand pump and the valve on top of the instrument open and back the micro-pump load screw all the way out by turning the crank handle counter-clockwise.
3. To Start the test, close the valve on the hand pump and the valve on top of the cylinder. Use the hand pump to load the beam to approximately half its breaking point, then, continuously load the beam by turning the crank handle on the micro-pump clockwise. The flexibility of your beam will determine how many turns per minute it will take to load the beam 125 to 175 psi per minute or 1000 lbf to 1400 lbf per minute as per the ASTM spec.
4. Record the gauge reading at break.
5. Measure the beam dimensions at the section of failure.
6. Calculate the modulus of rupture using equations (2) and (1) or (3).

Example: The gauge reads 5,400 lbf at break.

This corresponds to a modulus of rupture of $5,400/8 = 675 \text{ lbf/in}^2$

Per the calibration, the meter error at 5,400 is +0.5%.

The corrected load is 5,427 lbf.

The beam calipers as 6.1" deep, and 5.95" wide.

The modulus of rupture is:

$$R = \frac{3 \times 5,427 \times 18}{2 \times 5.95 \times 6.1 \times 6.1} = 661.8 \text{ lbf/in}^2$$

Calibration

The unit is calibrated by measuring the load applied on a calibrated load cell. The factory calibration is supplied at gauge readings of 10% FS, FS and 3 readings in between. Three load cell readings are averaged at each point to establish the correction for each point.

This unit is in compliance with ASTM C293 since it uses the micro-pump to apply the load continuously.

²Specific operation should follow the applicable specifications (e.g. ASTM C293). These operation procedures are supplied as a guideline.

Testing Equipment for



Construction Materials

HUMBOLDT

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CONCRETE BEAM TESTER CALIBRATION REPORT

CUSTOMER:

INSP. DATE:08/25/2008 TEMP:75
TESTER I.D.: B. LEATHERMAN <i>B. Leatherman</i>
MODEL: H-3032 SERIAL NUMBER:370

TESTER READING	LOAD CELL READING			AVERAGE READING	ERROR (%+/-)
	1	2	3		
1500	1501.7	1501.7	1501.7	1501.7	+1
4500	4494.9	4494.9	4494.9	4494.9	-1
7500	7496.6	7496.6	7496.6	7496.6	-.05
11000	10979.6	10979.6	10979.6	10979.6	-2
15000	15018.7	15018.7	15010.2	15015.9	+1

<p>CALIBRATION EQUIPMENT USED HUMBOLDT H-4454.200 SER. #708 0-15000 LBF. CALIBRATED BY: HUMBOLDT DATE: 18 APR. 2008</p> <hr/> <p>DIRECT READING GAUGE READS POUNDS FORCE DIVIDE BY 8 TO GET FLEXURAL PSI.</p>

Product Description— H-3033CL

The Humboldt Manufacturing Co Model H-3030CL, Concrete Beam Tester, is a lightweight portable unit designed to easily determine the flexural strength of up to 6 x 6 x 30" test beams. Hydraulically driven and assisted by a micro-pump to provide a continuous and accurate load, it uses the third-point loading method defined in ASTM C293 and AASHTO T177 with continuous dial gauge readings. Support rollers for this model are set to a 18" distance, center-to-center.

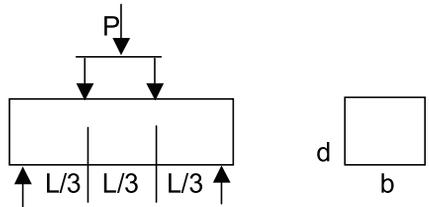
Physical Specifications:

Function	Modulus of rupture of concrete beams using third point loading
Range	0 - 1,250 lbf/in ² (for 6 x 6") 0 - 15,000 lbf
Shipping weight:	lb
Overall height:	"
Base dimension:	"

Theory Of Operation

The modulus of rupture¹ is defined as:

$$R = \frac{PL}{bd^2} \quad (1)$$



where:

R = modulus of rupture in lbf/in²

b = average specimen width in inches

P = maximum applied load in lbf d = average specimen depth in inches

L = span length in inches

¹ R is actually the stress in lbf/in² of the outer fibers of the beam (in compression at the top, in tension at the bottom).

$$S = \frac{Mc}{I}$$

Where: S = stress at top or bottom of the beam in lbf/in²
M = bending moment (P/2 x L/2 - P/2xL/6)
c = distance from centroid to top of beam (d/2)
I = Inertia about the centroid (bd³/12)

The most common usage of this unit will be to test 6 x 6" beams over a 18" span. For this geometry:

$$R = \frac{P \times 18}{6 \times 6^2} = \frac{P}{12} \quad \text{or} \quad P = 12R \quad (2)$$

The gauge measures in pounds force. It must be corrected for calibration error and beam dimensions. See the example in the **Operation** section below.

When fracture occurs in the tension surface outside of the middle third of the span length by not more than 5% of the span length, the modulus of rupture becomes:

$$R = \frac{3Pa}{bd^2} \quad (3) \quad \text{Where 'a' is the average distance between the line of fracture and the nearest support on the tension surface.}$$

Operation²

1. Center the test beam on the rollers.
2. Leave the valve on the hand pump and the valve on top of the instrument open and back the micro-pump load screw all the way out by turning the crank handle counter-clockwise.
3. To Start the test, close the valve on the hand pump and the valve on top of the cylinder. Use the hand pump to load the beam to approximately half its breaking point, then, continuously load the beam by turning the crank handle on the micro-pump clockwise. The flexibility of your beam will determine how many turns per minute it will take to load the beam 125 to 175 psi per minute or 1000 lbf to 1400 lbf per minute as per the ASTM spec.
4. Record the gauge reading at break.
5. Measure the beam dimensions at the section of failure.
6. Calculate the modulus of rupture using equations (2) and (1) or (3).

Example: The gauge reads 5,400 lbf at break.

This corresponds to a modulus of rupture of $5,400/12 = 450$ lbf/in²

Per the calibration, the meter error at 5,400 is +0.5%.

The corrected load is 5,427 lbf.

The beam calipers as 6.1" deep, and 5.95" wide.

The modulus of rupture is:

$$R = \frac{5,427 \times 18}{5.95 \times 6.1 \times 6.1} = 441.2 \text{ lbf/in}^2$$

Calibration

The unit is calibrated by measuring the load applied on a calibrated load cell. The factory calibration is supplied at gauge readings of 10% FS, FS and 3 readings in between. Three load cell readings are averaged at each point to establish the correction for each point.

This unit is in compliance with ASTM C293 since it uses the micro-pump to apply the load continuously.

²Specific operation should follow the applicable specifications (e.g. ASTM C78; AASHTO T97). These operation procedures are supplied as a guideline.

Testing Equipment for



Construction Materials

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CONCRETE BEAM TESTER CALIBRATION REPORT

CUSTOMER:

INSP. DATE: 2/5/2009 TEMP. 68
TESTER I.D.: B. LEATHERMAN <i>B. Leatherman</i>
MODEL: H-3033 SERIAL NUMBER: 371

TESTER READING	LOAD CELL READING			AVERAGE READING	ERROR (%+/-)
	1	2	3		
1500	1498.3	1506.8	1506.8	1504.0	+3
4500	4496.6	4496.6	4505.1	4499.4	-.01
7500	7500.0	7491.5	7508.5	7500.0	0
11000	10983.0	10983.0	10983.0	10983.0	-.2
15000	14966.0	14966.0	14966.0	14966.0	-.2

CALIBRATION EQUIPMENT USED
HUMBOLDT H-4454.200 SER. #708 0-15000 LBF.
CALIBRATED BY: HUMBOLDT DATE: 2 FEB. 2009

DIRECT READING GAUGE READS POUNDS FORCE
USE FORMULA TO GET FLEXURAL PSI.

Warranty

Humboldt Mfg. Co. warrants its products to be free from defects in material or workmanship. The exclusive remedy for this warranty is Humboldt Mfg. Co., factory replacement of any part or parts of such product, for the warranty of this product please refer to Humboldt Mfg. Co. catalog on Terms and Conditions of Sale. The purchaser is responsible for the transportation charges. Humboldt Mfg. Co. shall not be responsible under this warranty if the goods have been improperly maintained, installed, operated or the goods have been altered or modified so as to adversely affect the operation, use performance or durability or so as to change their intended use. The Humboldt Mfg. Co. liability under the warranty contained in this clause is limited to the repair or replacement of defective goods and making good, defective workmanship.

Humboldt Mfg. Co.

875 Tollgate Road
Elgin, Illinois 60123 U.S.A.

U.S.A. Toll Free: 1.800.544.7220

Voice: 1.708.456.6300

Fax: 1.708.456.0137

Email: hmc@humboldtmfg.com

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