

Impact Tester Assembly and Operation

RET 2003 with Dr. Jed Lyons

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Introduction

An impact tester has been designed and constructed to create damage on a 6" concrete column. Impact is accomplished by dropping a weight from the second story breezeway in the concrete lab. The weight consists of a 10" long, 1-1/2 diameter steel pipe with end caps. To ensure that the weight hits the column, it is guided by two nylon ropes, which pass through eyelets on the weight. The weight is raised using a rope and pulley. The rope is connected to the weight using an electromagnet. Once raised to the top, the power to the electromagnet is turned off, releasing the weight. The current design requires two people to operate it.



Figure 1: Impact Tester Assembly

The following figures provide a better look at the upper assembly, weight with electromagnet, and the lower assembly.



Figure 2: Upper Assembly

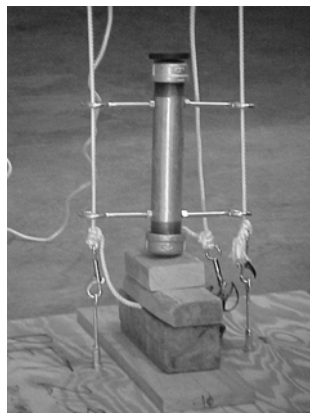


Figure 3: Drop Weight

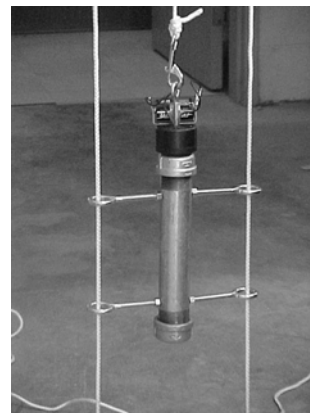


Figure 4: Drop Weight with electromagnet and lift rope

Assembly

The following provides instruction on the assembly and use of the impact tester.

Upper Assembly

The upper assembly is mounted to the railings on the breezeway of the concrete lab. Three ropes need to be attached to the upper assemble: 2 guide ropes, and 1 lift rope.

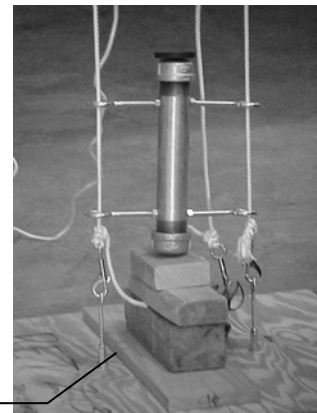
The guide ropes consist of a quick disconnect on a 25' long piece of 1/4" nylon rope.

1. Drop the quick disconnect end to the ground and thread the plain end through the bracket eyelet. The plain end is secured on the cleat provided next to the bracket.
2. Repeat for the second guide rope.
3. Lower the electromagnet on the lift rope gently to the ground level. Thread the plain end of the rope through the pulley on the center bracket. The plain end is also to be lowered to the ground level.

Lower Assembly

The lower assembly secures the guide ropes and holds the column specimen.

1. Raise the electromagnet a few inches above the ground by pulling on the plain end of the lift rope.
2. Position the center of the lower assembly under the electromagnet.
3. Attach the guide ropes.
4. Tighten the guide ropes until a slight tension is present by adjusting the ropes on the cleats at the upper assembly.
5. Place the striker board on the lower assemble.



Striker board at bottom

Figure 5: Striker board

NOTE: The striker board is present to protect the lower assembly from damage during testing. In the event that damage occurs, it will take place on the striker board, which is easily replaced.

Drop Weight

The drop weight, which provides the impact, is attached as follows:

1. Disconnect the guide ropes using the quick disconnect.
2. Place each guide rope through the guide eyelets on the drop weight.
3. Reconnect the guide rope to the lower assembly.

Operating the Impact Tester

Operating the impact tester requires two people: one to hoist the weight on the ground level, and a second on the upper level to release the weight using the electromagnet.

1. Position column specimen on the striker board.
2. Place the electromagnet over the flat yoke on the weight.
3. Connect the alligator clips to each lead on the battery.
Note: the battery case is not part of the circuit. You must connect the clips to the leads provided.
4. Hoist the weight to until it reaches the pulley and stops.
5. The upper level person will provide a count down (from 5) to inform all that a drop is about to occur. At the end of the count down disconnect one of the alligator clips from the battery. NOTE: It may take a few seconds before the weight releases due to residual magnetism.
6. After the drop, gently lower the electromagnet to the ground.



Figure 6: Hoisting the weight



Figure 7: Electromagnet on yoke

Comments

Currently no lead shot is present in the weight. Lead shot and an addition section of pipe can be added to increase weight.