

Measure what you see.

Heavy-Duty Impact Tester



Operating Instructions

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PF-1120

PF-5545

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Safety Instructions

Warning! This manual cannot address all of the safety considerations associated with its use. It is the responsibility of the user to consult this manual and establish appropriate safety practices for use with this equipment and the individual material being tested.



Warning! The impact test requires dropping heavy weights from significant height. The weight hits the sample with tremendous force. No portion of the operator's body or clothing should be in the impact area during a test.

Warning! Impact testing may cause the test material to shatter. It is the responsibility of the user to determine the hazards associated with the material being tested.

Warning! Test samples may explode when impacted. Eye protection must be worn while operating this device.



Warning! Impact testing may cause very loud noises at the moment of impact. These can be as much or greater than 95 dBA. Ear protection must be worn by all personnel in the testing area.

Warning! The impact tester is designed and intended for the use described in this manual. Using the impact tester for other purposes for which it was not designed may reduce or eliminate the protection offered by the features of the tester. Serious injury may result.

NOTICE

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Application 6

Test Methods..... 6

Description 7

Assembly 8

Principle of Operation..... 9

Operation..... 10

Ordering Information 11

Application

The **Gardner Heavy Duty Variable Height Impact Tester** is widely used to test the impact resistance of coatings and a variety of rigid materials including plastic sheet and molded plastics. Impact testing of coatings is considered a flexibility test. Test panels or coated parts may be struck on either the coated or the uncoated side. The latter is referred to as “reverse impact.” Examination may be done visually for signs of failure such as cracking or flaking, or instrumentally with a pinhole detector. When metal substrates are involved, rigid parts or sheets up to 2” thick are usually visually examined for type and extent of damage such as splitting, shattering, cracking or penetration.

Test Methods

Various association and company test specifications define methods of testing and evaluation parameters. Among these are **ASTM D2794**, **ASTM G-14**, and **ASTM D-4226**. Some published specifications require minor modification to the standard Gardner Impact Tester.

Description

The **Gardner Heavy Duty Variable Height Impact Tester** shown in Fig. 1 consists of a cast aluminum base, a slotted vertical guide tube, a round-nosed punch (tip), a punch holder, two cylindrical steel weights, a die, and a cylindrical die support. The punch is 5/8" (0.625" or 1.59 cm) in diameter. The inside diameter of the die is 0.640" (1.63 cm).

The PF-1120 is supplied with a 2 pound and a 4 pound weight. The 40" slot on the guide tube is marked in graduations of 2 or 4 inch-pounds of energy.

The PF-5545 is the metric version and includes a 1 kg weight and a 2 kg weight. The 100 cm slot on the guide tube is calibrated in kilogram-centimeters.

Punches, dies and weights other than those described above can be provided on special order.



Fig. 1 Gardner Heavy Duty Variable Height Impact Tester

Assembly

- 1 Insert guide tube into base of instrument and tighten set screw sufficiently to hold the tube in place.
- 2 Insert punch into punch holder.
- 3 Adjust punch holder height so tip of punch protrudes about 1/4" into die hole. Make sure punch is centered in die.
- 4 Insert either weight into the tube and insert knurled lifting screw through tube slot into the hole in the weight. The weight must be inserted with its rounded end facing downwards. Allow the weight to come to rest on the punch.
- 5 Place a specimen on the anvil. Rest the punch on the specimen and the weight on the punch. Loosen the guide tube and adjust it up or down to make the lifting screw protrude through the tube slot at the zero mark. This adjustment calibrates the instrument and minimizes the chances that the lifting screw will strike the bottom end of the tube slot. The lifting screw may still strike the bottom of the slot if sufficient impact is used to cause the punch to completely penetrate the specimen.

Since this condition can also lead to premature failure of other major components, care should be taken to design a test so complete penetration is the exception rather than the rule.

- 6 Gently tighten the set screw to secure the tube into this position.

Caution

VERY LITTLE FORCE IS REQUIRED TO PREVENT THE TUBE FROM SLIPPING DOWN. OVERTIGHTENING MAY CAUSE THE BASE TO CRACK.

Principle of Operation

The units used in measuring impact are units of energy. The energy possessed by the falling weight at the instant of impact is kinetic energy. This is equal to the energy used to raise the weight to the height of drop. It is the potential energy possessed by the weight the instant it is released. Since the potential energy is expressed as the product of weight multiplied by height, the guide tube can be marked with a linear scale showing the impact range of the instrument. It is assumed that any energy loss due to friction in the tube or to momentary acceleration of the punch at impact is negligible.

The purpose of impact testing is to find the amount of energy necessary to cause failure of a specimen type and to establish a standard for impact resistance and to test samples of a product against the established standard. The nature of, and the extent of, impact damage that constitutes failure must be established by the user. Such variables as material thickness, shape of specimen and end use of product are factors in this evaluation.

Once the failure point has been defined, the actual testing program can be developed, that is, how many specimens are to be impacted and what energy to use with each impact. These choices will depend upon the expendability of specimens and whether the objective is finding the average energy required to cause failure, or testing to assure the ability to pass a selected level of impact.

Caution

THE OPERATION OF THIS INSTRUMENT MAY INVOLVE HAZARDOUS PROCEDURES. THIS MANUAL DOES NOT PURPORT TO ADDRESS ALL OF THE SAFETY CONSIDERATIONS ASSOCIATED WITH ITS USE. IT IS THE RESPONSIBILITY OF WHOEVER USES THIS MANUAL OR THE EQUIPMENT DESCRIBED TO CONSULT AND ESTABLISH APPROPRIATE SAFETY PRACTICES AND DETERMINE THAT APPLICABILITY OF REGULATORY LIMITATIONS PRIOR TO ITS USE.

The instrument should be placed on a solid foundation such as a steel table or substantial laboratory bench. A foundation which minimizes weight bounce or rebound on impact is recommended. If results between two or more instruments are to be compared, they should be placed on similar foundations.

The specimen is firmly held against the top surface of the anvil by the weight of the punch, by hand, or by some improvised clamping. The punch is rested on the target point. The weight is lifted to the desired height, as indicated by the lifting screw, and dropped. The specimen is removed and evaluated.

Methods of reporting results vary with the test procedure being used.

	Catalog Number
Gardner Heavy Duty Impact Tester, English Scale	PF-1120
Gardner Heavy Duty Impact Tester, Metric Scale	PF-5545

