



SPI Modified Impact Tester

Impact Test

Operating Manual

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1 Overview

SPI Modified Impact Tester
(Extra Heavy-Duty)



5513

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2 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 the operating 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 the operating 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**

Please note the following points:

- Familiarize yourself with the layout and operation of the instrument.
- Ensure the operator has no loose clothing, hair or jewelry which could become caught in the moving parts.

Repetitive Stress Injuries

- The over use of muscles and tendons in the hands, arms and shoulders may cause soreness, numbness, weakness and pain in those areas.
- Certain repetitive hand activities may put the operator at a high risk for developing repetitive stress injury.

To reduce the risk, do the following:

- Avoid using your wrist in a bent, extended or twisted position, try to maintain a straight wrist position.
- Take periodic breaks to minimize repetition.
- Reduce the speed and force with which you do the repetitive movement.
- Do exercises to strengthen the hand and arm muscles.
- See a doctor if you feel tingling, numbness or pain in the fingers, hands, wrists, arms or shoulders.

**NOTICE**

The material contained within this manual is the proprietary information of BYK-Gardner and is to be used only for the purpose of understanding and using this product. Use or duplication of this manual is permitted, provided BYK-Gardner is credited with any such use or duplication.

3 Application

The **BYK-Gardner SPI Modified Impact Tester (5513)** was developed in co-operation with the Society of the Plastics Industry for evaluating plastic sheets too tough to be evaluated with the 160 inch-pound range of the **BYK-Gardner Heavy Duty Impact Tester (1120)**.

From its original use for testing polyvinyl chloride 30 to 60 mils thick, the applications of this 320 inch-pound range impact tester have spread to include many different rigid materials of thicknesses up to 2" and coatings of extraordinary toughness and thickness.

4 Test Methods

Various association and company test specifications define methods of testing and evaluation parameters.

Among these are ASTM D 2794, ASTM G 14, ASTM D 4226, ASTM D 5420, and D 3029.

Some published specifications may require minor modification to the standard **BYK-Gardner Impact Tester**.

5 Description

The **BYK-Gardner-SPI Impact Tester** shown in Fig. 1 consists of an aluminum base, a slotted vertical guide tube, a round-nosed punch (tip), a punch holder, 8-lb. weight, die and die support (anvil).

The nose of the punch is 0.500" (1.27 cm) in diameter. The inside diameter of the die is 0.640" (1.63 cm). The 40" (101.6 cm) guide tube slot has a scale graduated from 0 to 320 inch-pounds.

A slot near the base of the tube will support the weight while specimens are being changed. A stop position is on the upper portion of the tube in order to more accurately lift the weight to the desired height. A cleanout port through the anvil facilitates removal of debris from the die hole.

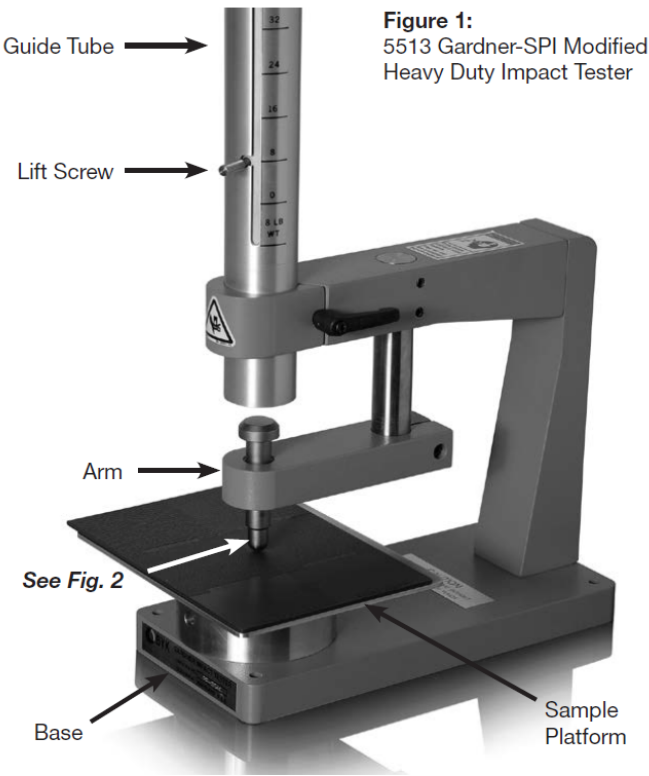
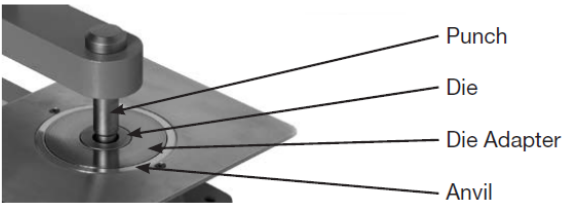


Figure 1:
5513 Gardner-SPI Modified
Heavy Duty Impact Tester

Figure 2:
Die and punch
details



6 Assembly

1. Place the instrument base upright.
2. Remove any plastic wrap around the guide tube and weight. Hold the tube vertical and upright. Place the weight into the base first. Make sure the lift screw hole is toward the bottom of the weight and facing forward.
3. Slide the guide tube over the weight and into the base and tighten just enough to prevent tube from slipping. Insert the lift screw through the slot in the tube and screw into the weight.
4. Adjust the punch holder height so that the tip of the punch protrudes about 1/4" (0.6 cm) into the die hole. To adjust the height use the allen wrench that is included.
5. With the punch in the punch holder and the die in the anvil (specimen platform), be sure the tip of the punch is in alignment with the center of the die. Adjust if needed. A calibration tool is available from BYK-Gardner to adjust the alignment.
6. Place a specimen on the platform. Rest the punch on the specimen and rest the weight on the punch. Loosen the guide tube and adjust it up or down to set the lift screw at the zero mark.
7. Gently tighten the guide tube in this position.

7 Principle

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 the 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 is marked with a linear scale of in-lbs 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 on 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.

8 Operation

The instrument should be bolted to a solid foundation such as a butcher block table or substantial laboratory bench per ASTM. A foundation which minimizes weight bounce or rebound on impact is recommended. This foundation should be equivalent to bolting the unit to a concrete slab (which is considered an infinite foundation).

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 stop position clamp is set to the desired height, using the bottom edge of the clamp to line up with the markings on the scale.

The weight is lifted to the desired height by touching the lifting screw to the stop position clamp and then dropping it. After impact raise the weight and place the lift pin into the slot in the tube. This will safely keep the weight off of the punch. The specimen may now be removed and evaluated.

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

9 Ordering Guide

Part No.	Description
5513	SPI Modified Impact Tester
1190	Calibration Alignment Tool

5513 Standard Components

1260	Weight, 8 lb.
1231	Lift Screw
1220	Ball Punch, 0.5 in.
5514	Anvil
1264	Die, 0.64 in. ID
5516	Platform
1266	Tube
1269	Base Plate (not shown in Fig. 1)
5515	Die Adapter
1271	Arm
5518	Base
1274	Stop Position Clamp

Optional Components

Kits

5519	ASTM G14 Kit
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Dies

1210	Die, 0.313 in. ID
1211	Die, 0.500 in. ID
1264	Die, 0.640 in. ID
1212	Die, 1.00 in. ID
1213	Die, Solid 1.25 in. diameter

Optional Components**Punches**

1243	Ball Punch, 0.625 in. diameter
1220	Ball Punch, 0.500 in. Diameter (aka. H.25 from ASTM D 4226)
1221	Ball Punch, 0.375 in. diameter
1222	Ball Punch, 0.250 in. diameter
1223	Ball Punch, 0.125 in. diameter
1224	20 Degree Punch, 0.125 in. (1/8 in.) radius (aka. C.125 from ASTM D 4226)
1225	1 in. Radius Detachable Tip Punch
1226	1 in. Diameter Detachable Tip Punch
1227	3 Sided Tip Punch (Boeing BSS7271)

Weights

1207	Weight, 1/2 lb.
1208	Weight, 1 lb.
1201	Weight, 2 lb.
1209	Weight, 3 lb.
1202	Weight, 4 lb.
1214	Weight, 6 lb.
1260	Weight, 8 lb.
1215	Weight, 10 lb.
1204	Weight, 12 lb.
1206	Weight, 16 lb.

Labels

1230	0-160 in-lb, for use with 4 lb. weight
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10 ASTM Methods

The various ASTM methods for impact testers require punches and dies that may not be included with the impact testers. Please refer to the ASTM standards below to inquire about the parts needed to do the test.

ASTM D 2794 – Impact Resistance of Coatings

Method	Die	Punch	Additional parts needed to meet the method
ASTM D2794	0.64 in	0.500 in	No additional parts needed

ASTM D 3029 – Impact Resistance of Flat Rigid Plastic (Method G)

Note: This method was withdrawn by ASTM in 1995 – it is included for reference only.

Method	Die	Punch	Additional parts needed to meet the method
GA	3.00 in	0.625 in	1243 punch
GB	1.25 in	0.625 in	1243 punch
GC	0.64 in	0.625	1243 punch

Note: 2 lb (1201) and 4 lb (1202) weights are available.

ASTM D 4226 – Impact Resistance of PVC Building Products

Method	Die	Punch	Additional parts needed to meet the method
ASTM D4226	0.64 in	0.125 or 0.500 in	1223 punch if needed

ASTM D 5420 – Impact Resistance of Flat Rigid Plastic by Means of Gardner Impact

Method	Die	Punch	Additional parts needed to meet the method
GA	3.00 in	0.625 in	1243 punch
GB	1.25 in	0.625 in	1243 punch
GC	0.64 in	0.625	1243 punch
GD	3.00 in	0.500 in	No additional parts needed
GE	0.64 in	0.500 in	No additional parts needed

Note: 2 lb (1201) and 4 lb (1202) weights are available.

ASTM G14 – Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)

Method	Die	Punch	Additional parts needed to meet the method
ASTM G14	None	0.625 (part of weight)	5519 G14 Accessory Kit

11 Maintenance

Replaceable Parts

The instrument does not contain any operator serviceable parts. For all service and spare parts requirements, please contact your local BYK-Gardner office.

Cleaning Procedure

Do not use any acetone for cleaning the unit! The instrument housing is resistant to a number of solvents, but cannot be guaranteed to withstand all chemicals. You should therefore use a soft, moist cloth for cleaning. For cleaning excessive dirt, use propanol.

12 Declaration

We,

BYK-Gardner USA
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herewith declare that the product

- **SPI Modified Impact Tester**

complies with the requirements of the following EC directive:

- 2006/42/EU Machinery

April 7, 2025 BYK-Gardner USA



Timothy A. Cassell
President and General Manager



EC - Declaration of Conformity

A member of  **ALTANA**

Download your manuals from:
<https://www.byk-instruments.com/p/5513>

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