

# ERVIN TEST MACHINE



**YOUR SOLUTION FOR EVALUATING  
METAL ABRASIVE QUALITY AND PERFORMANCE**

# ERVIN

## TEST MACHINE

### DESIGNED TO TEST METALLIC ABRASIVE PERFORMANCE

**THE ERVIN TEST MACHINE** was engineered and developed to provide a method to evaluate the quality of metal abrasives. This information can assist the abrasive user in making the best abrasive selection to ensure efficiency and the lowest possible cost in production use.

The Ervin Test Machine will measure both the Durability (life) and Transmitted Energy (impact energy) of the abrasive, which are the two key measures of the value and quality of a metal abrasive.

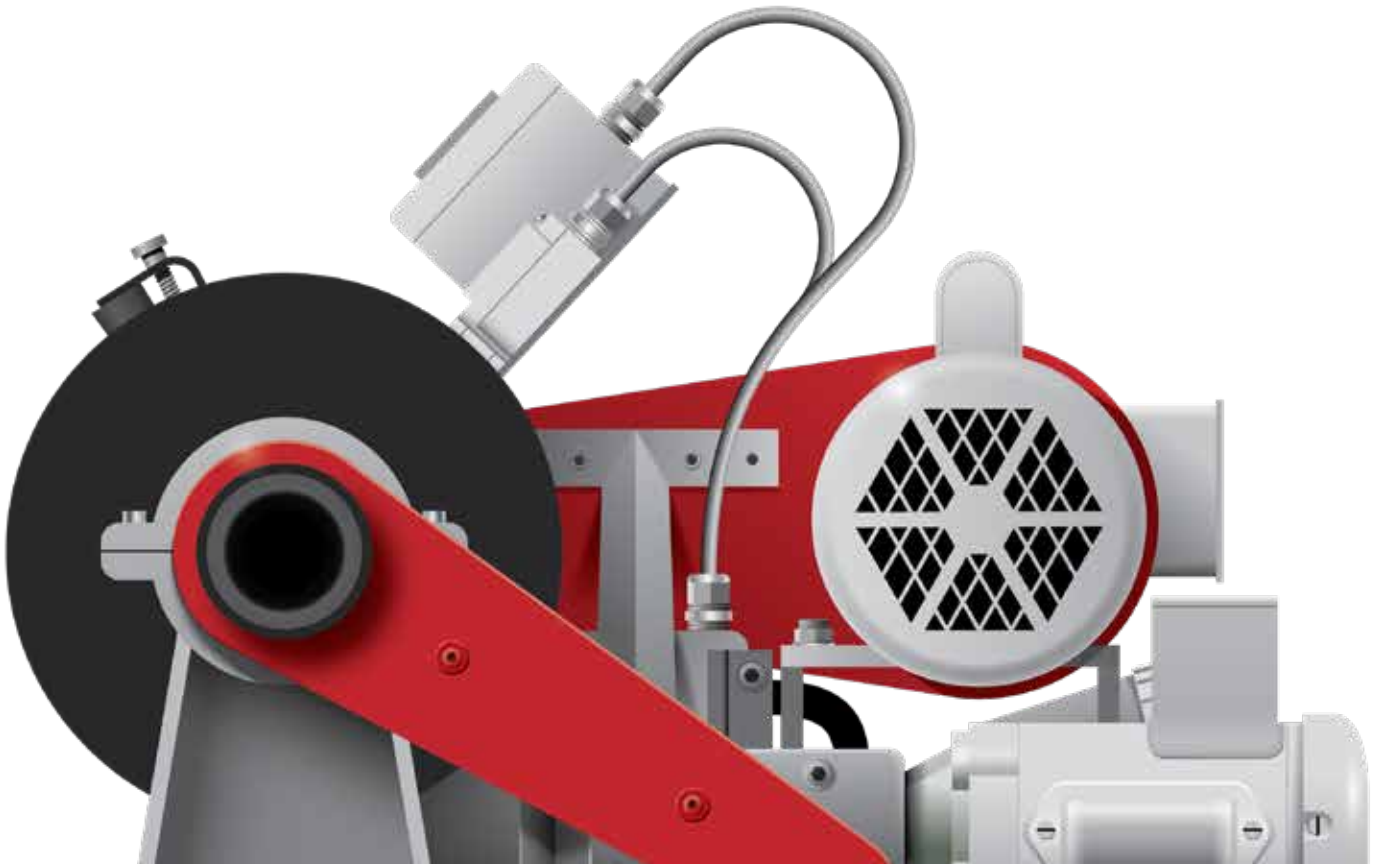
The Ervin Test Machine is portable and easy to use.

The Ervin Test Machine has become the standard measuring tool in the industry. It is used by most of the abrasive manufacturers in the world to assess the quality and consistency of the abrasive manufacturing

processes. Also, many large, metallic abrasive users have purchased Ervin Test Machines for their quality assurance laboratories to ensure that the quality of the abrasive is consistent and as specified when purchased.

Over 300 Ervin Test Machines have been sold and are in use all over the world. Widespread acceptance of the Ervin Test Machine centers around the fact that it gives consistent and reliable results in a relatively short time.

Ervin has a number of these machines available as loaners to be utilized by companies who may wish to evaluate the wide range of abrasive choices available to them and to assess the possible purchase of an Ervin Test Machine for their specific needs.



# Testing Shot and Grit

The Ervin Test Machine for abrasives was designed to simulate the action of a production blast cleaning and/or shot peening machine, and provide a laboratory tool to quickly test the performance of metal abrasives.

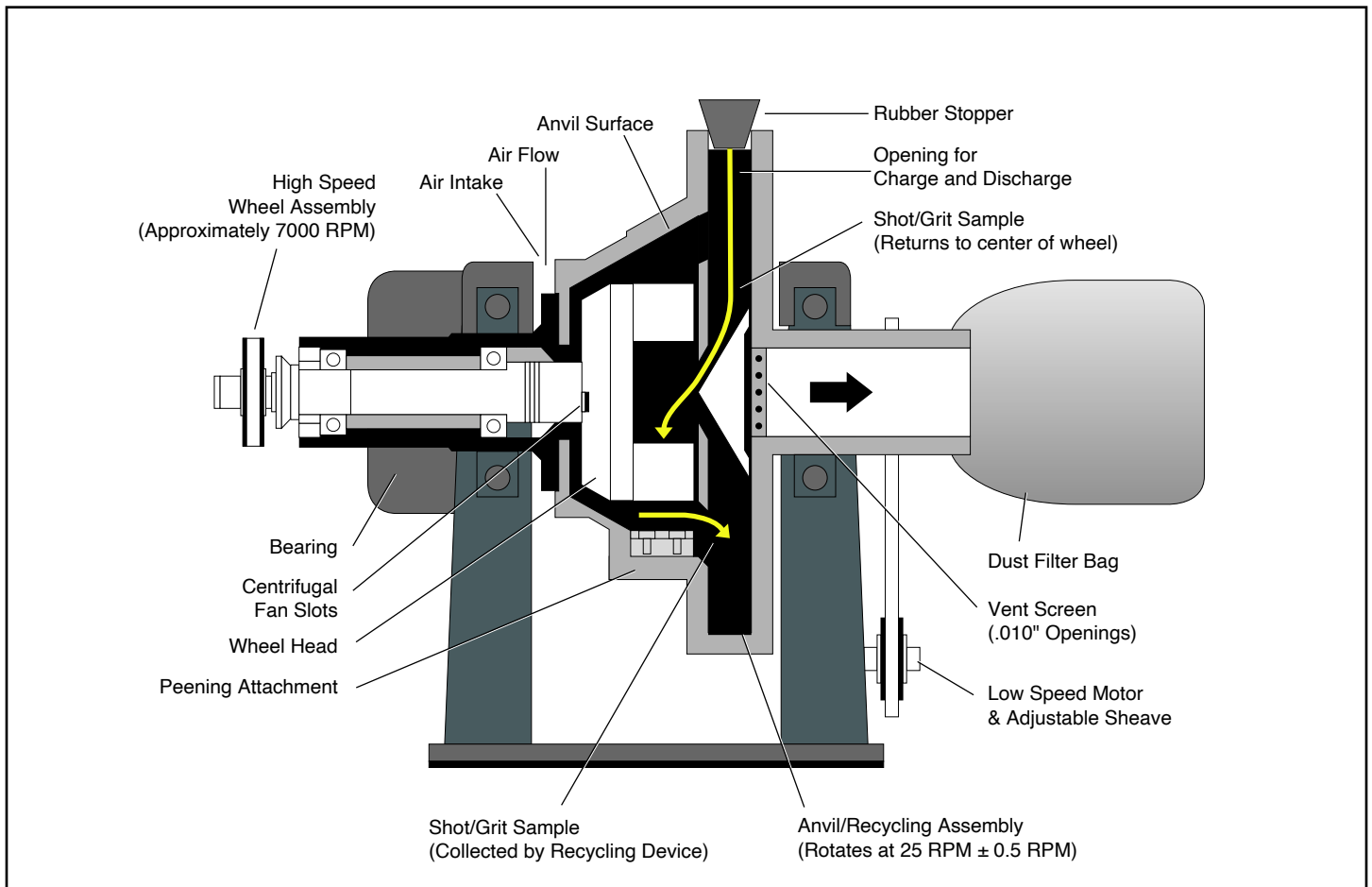
## How it Works

During testing, the abrasive is propelled by a centrifugal wheel or beater head rotating at approximately 7,000 RPM which accelerates the abrasive to a velocity of approximately 200 feet per second, comparable to the velocity of a production blast cleaning or shot peening machine. The abrasive is thrown against an anvil surface. After impact, the abrasive falls to the bottom of the rotating anvil recycling assembly which picks up the abrasive and returns it to the wheel where it is thrown against the anvil surface again. The anvil recycling assembly rotates at 25 RPM which means that the abrasive is recycled through the wheel 25 times per minute.

## Testing Durability and Transmitted Energy

The Durability Test described on the following pages establishes the conditions for measuring the durability or fatigue life of the abrasive. During Durability testing, the peening attachment is replaced by a plug that continues the curved surface of the anvil.

For the Transmitted Energy Test, the plug is replaced with the peening attachment which holds an Almen Strip in the path of the abrasive being tested.



# Ervin Test Machine Calibration

The Ervin Test Machine is offered in either 110 volt 60 Hertz, 220 volt 60 Hertz, 100 volt 50 Hertz or 200 volt 50 Hertz, depending on the customer's requirements.

All Ervin Test machines are calibrated at the factory using 110 volt AC 60 Hertz and converted to the power requirements of the customer. The Ervin Test Machine should be recalibrated after every 20 durability tests or after any mechanical changes (such as new V-belts) to maintain reliable test results.

An S-550 calibration shot, developed in the Ervin laboratory, is supplied with the machine. Additional supplies are available from Ervin as needed.



## CALIBRATION PROCEDURE

1. Check for worn or slipping drive belts. Replace drive belt(s) if necessary.
2. Make sure the set screws in the adjustable sheaves are tight.
3. Check the condition of the screen using a flashlight. Replace the screen if it has any holes worn through.

*NOTE: Keep a dust bag tied over the tubular opening of the anvil recycling assembly to capture any dust created when running the test.*

4. Start the Ervin Test Machine, bring it up to speed, and check the rotation speed of the anvil/recycling device by timing 25 revolutions with a stopwatch and calculate the RPM. The rotation speed of the anvil recycling device must be 25 RPM  $\pm$  0.5 RPM.
5. Adjust the speed of the anvil/recycling device by changing the setting of the adjustable sheave on the low speed drive motor and retest speed.
6. Repeat steps 4 and 5 until the speed is correct.
7. Check the RPM of the High Speed Beater Shaft with a tachometer.

*NOTE: Each Ervin Test Machine is an individual and may have different requirements for the beater shaft speed. The proper speed is determined using the S- 550 Calibration Shot.*

8. Place the 100 grams  $\pm$  0.1 grams of S-550 Calibration Shot into the anvil/recycling device through the charge/discharge opening and seal the opening with the rubber stopper provided.
9. Set the counter for 500 cycles.
10. Turn the machine on. The counter will stop the machine after 500 cycles.
11. Empty the Calibration Shot into the tray provided, making sure that all is removed by removing the rubber stopper and rotating the anvil/recirculating device several times while rapping it with the plastic faced hammer provided with the machine.

12. Place the sample on an 8 inch diameter, 40 mesh, 0.0165 inch opening test sieve, and screen the sample until all the fines are removed, about 3 minutes.
13. Weigh the amount of sample remaining on the test sieve and record as % Retained.
14. Calculate the Loss, 100% - weight from #13 and record.
15. Record as Accumulative % Loss. Replace lost material with new standard until you have 100  $\pm$  0.1 grams.
16. Repeat steps 10–15, adding the % Loss from each 500 pass test run to the Accumulative % Loss from the preceding step and recording as Accumulative Loss until the Accumulative % Loss exceeds 100%.
17. Determine the durability, or number of cycles or passes to cause exactly 100% replacement, by interpolation, using the following formula:

$$\text{Durability} = \text{Total Passes} - \left( \frac{a}{\% \text{ last lost}} \right) (b - 100)$$

- a. Divide 500 by the % loss from the last test run to determine the number of cycles required to give 1% loss.
  - b. Subtract the 100 from the last accumulative % loss.
  - c. Multiply a by b.
  - d. Subtract c from the total number of cycles to arrive at the final durability in cycles or passes.
18. The Durability of the S-550 Calibration Standard should be 2,870  $\pm$  100 passes.
  19. If the Durability is less than 2,770 passes, decrease the speed of the high speed beater by opening the adjustable sheave on the high speed beater motor.
  20. If the Durability is greater than 2,970 passes, increase the speed of the high speed beater by closing the adjustable sheave on the high speed motor.
  21. Repeat steps 1–20 until the Durability of the S-550 Calibration Standard meets the standard of 2,770 to 2,970 passes.

## Durability Test

The Durability Test is run exactly like the Ervin Test Machine Calibration Procedure above, using any shot or grit sample in place of the S-550 Calibration Standard.

The test conditions shall be as follows:

Abrasive Size	Hardness Rockwell C	Passes Per Test Run	Take Out Sieve Opening
<b>SHOT</b>			
S-660 – S-390	Up to 51 Rockwell C	500	0.0165 inches
S-330 – S-170	Up to 51 Rockwell C	500	0.0117 inches
S-660 – S-170	51–60 Rockwell C	250	0.0117 inches
S-660 – S-170	Over 60 Rockwell C	100	0.0117 inches
<b>GRIT</b>			
G-12 – G-18	Up to 51 Rockwell C	500	0.0165 inches
G-25 – G-40	Up to 51 Rockwell C	500	0.0117 inches
G-12 – G-40	51–60 Rockwell C	250	0.0117 inches
G-12 – G-40	Over 60 Rockwell C	100	0.0117 inches

A Durability Test on a typical 40-51 Rockwell C, S-460 shot is shown below:

Accumulative Passes	% Loss	Accumulative % Loss
500	7.0	7.0
1,000	16.9	23.9
1,500	21.5	45.4
2,000	21.9	67.3
2,500	19.6	86.9
3,000	17.6	104.5

2,872 Durability = Passes to Replace 100%

## Transmitted Energy Test

The purpose of this test is to evaluate the effectiveness of the transmission of the kinetic energy of the moving abrasive particles into useful shot peening or blast cleaning energy at the work surface. An Almen Test Strip is attached to the peening attachment, and the Almen Strip is peened with test abrasive under controlled conditions in the Ervin Test Machine. The curvature of the Almen Strip is developed when it is impacted by the abrasive being tested and is a measure of the energy transmitted to the Almen Strip by the abrasive being tested. The characteristics of the test machine are constant. Therefore, variations in the Almen Arc Height (energy transmission) result from variations in the characteristics of the abrasive being tested.



Almen A Strip fastened to peening test strip holder.

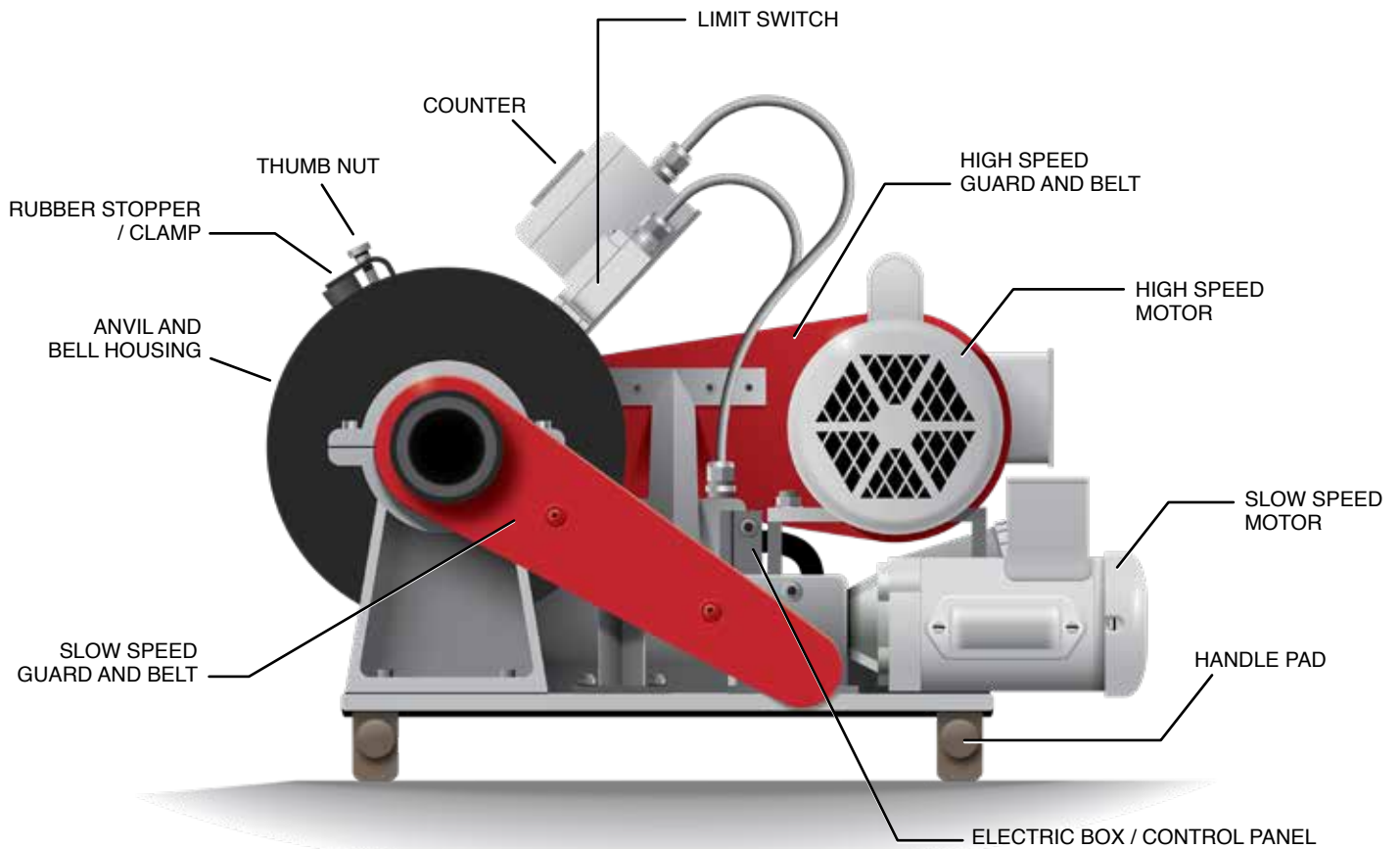
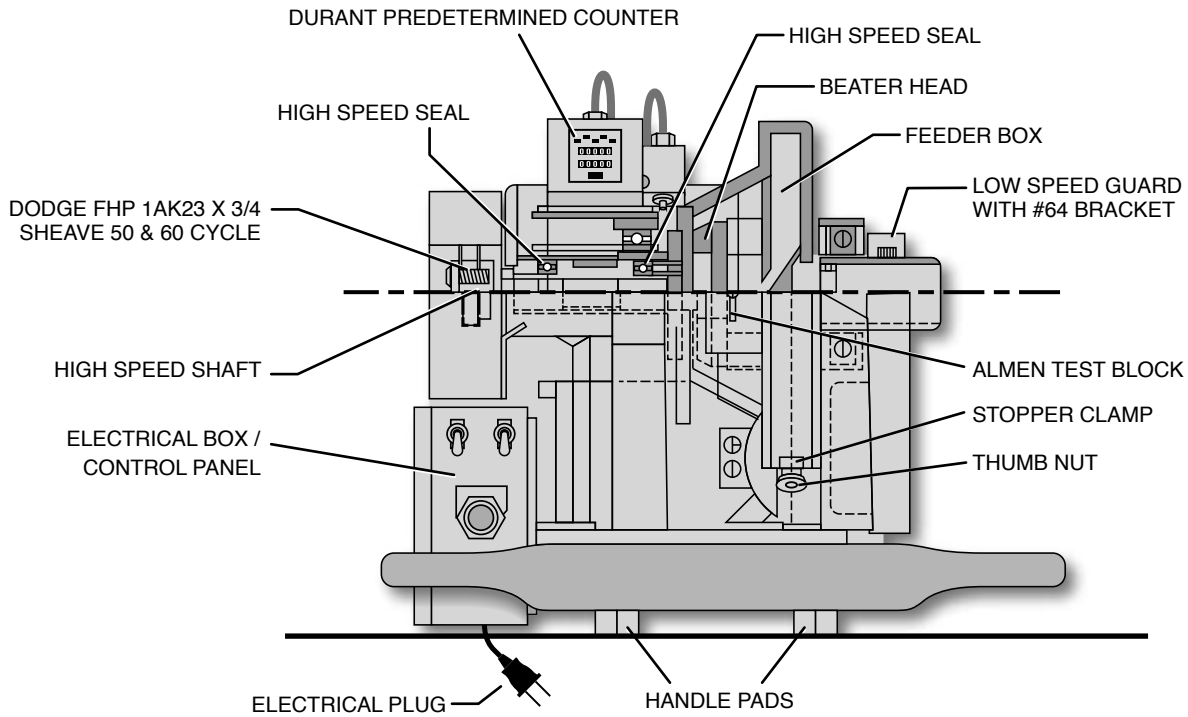
## TRANSMITTED ENERGY TEST PROCEDURE

1. Using a sample splitter, carefully split the operating mix of used abrasive shot from the last durability test run (step 18) to obtain a sample of  $50.0 \pm 0.1$  grams.
2. Place the sample from #1 into the test machine.
3. Place an Almen A Strip in the test machine fastened to the peening attachment. The peening attachment is designed to match the peening test strip holder discussed in SAE J-442 with an additional attachment on the back to mount it in the Ervin Test Machine.
4. Set the machine counter and peen the Almen Strip for 40 cycles.
5. Remove the peening attachment and the almen strip from the peening attachment.
6. Measure the arc height of the strip using an Almen Gage.
7. The resulting number is Transmitted Energy.

## TEST MACHINE MAINTENANCE

- The large bearings in the pedestals and the precision high speed shaft bearings are permanently lubricated at the factory and do not need lubrication.
- The gear box on the low speed motor should be kept full of good quality mineral oil.
- Put a drop of light machine oil on the end bearings of the automatic counter shaft once per month.
- Follow normal maintenance procedures on the electric motors, V-belts and sheaves.
- The Ervin Test Machine should be recalibrated after every 20 durability tests or after any mechanical changes (such as new V-belts) to maintain reliable test results.
- The machine should be returned to the manufacturer for replacement of high speed bearings, castings or other special parts.

# Ervin Test Machine Parts Identification



## Technical Data

### High Speed Drive Motor: Baldor L3509-50

	60 Hertz Option	50 Hertz Option
Horse Power	1	1
Volts	115/230	115/230
Amperes	9.8/4.9	9.2/4.8
R.P.M.	3,450	2,850
Phase	Single	Single

### Low Speed Drive Motor and Gear Reducer:

	60 Hertz Option	50 Hertz Option
Horse Power	1/6	1/6
Phase	Single	Single
R.P.M.	1,725	1,425
Gear Ratio	40	40

### Fixed Sheave: High Speed Shaft

	60 Hertz	50 Hertz
	1AX30 – 60 Hertz	1AX25 – 50 Hertz
	Belt Size 3L or 4L	Belt Size 3L or 4L

#### Variable Sheave: High Speed Motor

Variable Pitch FPH  
Browning  
Sheave number 1VP62 x 5/8"

#### Variable Sheave: Low Speed Motor

1VP25 x 1/2" Browning Variable Pitch Sheave

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## Accessories List

Quantity	Description
1	5/32" Allen Wrench
1	3/16" Allen Wrench
1	Collection Tray
1	Plastic Faced Hammer
3	No. 6 Rubber Stopper
6	Dust Bag
1	Plastic Funnel
1	Graduated Cylinder
1	Hose Clamp
1	Peening Attachment - Strip Holder
5 lbs	Calibration Shot for Standardization
3	Laboratory Test Report Forms

## Shipping Dimensions & Weight

**Crate and Pallet Size:** 35" x 35" x 21"

**Weight:** 308 lbs.

# ERVIN



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**The World Leader**

Engineered Steel Shot and Grit for Blast Cleaning,  
Shot Peening and Advanced Metal Powders

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