

**FORT WAYNE
TACTICAL LLC**



TEST RESULTS AND EVALUATION REPORT

Small Pistol Primers - Hardness Evaluation

Fort Wayne Tactical LLC

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Revision Sheet

Release No.	Date	Revision Description
Rev. 1	19 JUL 2015	Test Results Published

Disclaimer:

Fort Wayne Tactical LLC testing data is provided for reference only. This data should not be used as conclusive evidence of any material trait or property. Tested articles were not furnished by any manufacturer and were purchased off the shelf from local suppliers. Consequently many variables in any test remain uncontrolled. Numerical data should be only used as reference.

The opinions in this report are those of Fort Wayne Tactical LLC alone and not those of any third party or manufacturer.

None of the information provided should be interpreted to imply a warranty or guarantee.

*Altering any product comes with risks, Fort Wayne Tactical LLC and it's agents assume no liability for injury to the buyer or anyone residing with or operating with the buyer. The buyer is solely responsible party for the use of their firearm.

* Modifying a firearm may nullify manufacturer's warranty. You are solely responsible for the safe use and keeping of a firearm.

* Pistols, with or without modifications should be carried only in a holster designed to protect the trigger. Failure to do so may result in injury or death to the user or other individuals due to accidental discharge.



Test Results and Evaluation Report

1.1 Purpose

The purpose of this testing is to determine relative hardness (to each other) of common market Small Pistol Primers available in the United States. This document and test results will be used in conjunction with other engineering data to determine appropriateness and verification test results.

1.2 Scope

The scope of this document includes evaluating relative hardness for the following primers:

- CCI Small Pistol Primer
- Winchester Small Pistol Primer
- Remington Small Pistol Primer
- Federal Small Pistol Primer
- Tula Small Pistol Primer
- PPU Prvi Partizan Small Pistol Primer

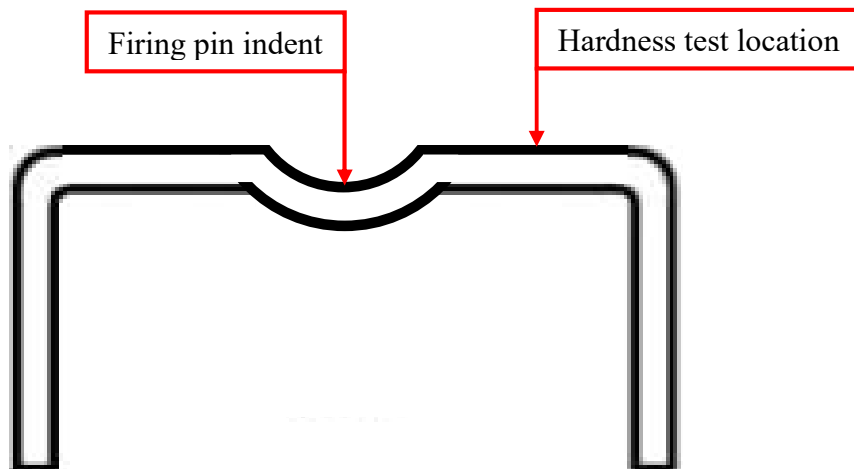
The first phase of testing will compare relative hardness of primers using the anvil indent method.

The second phase of this testing will verify that actual ammunition firing reliability matches data from hardness testing. 100 rounds of ammunition will be fired from each manufacturer. A firearm will be custom prepared as worst case to simulate low primer strike force. The results of this data will be used in validation of the hardness testing results.

2.0 TESTING AND RESULTS

2.1.1 Test Methodology

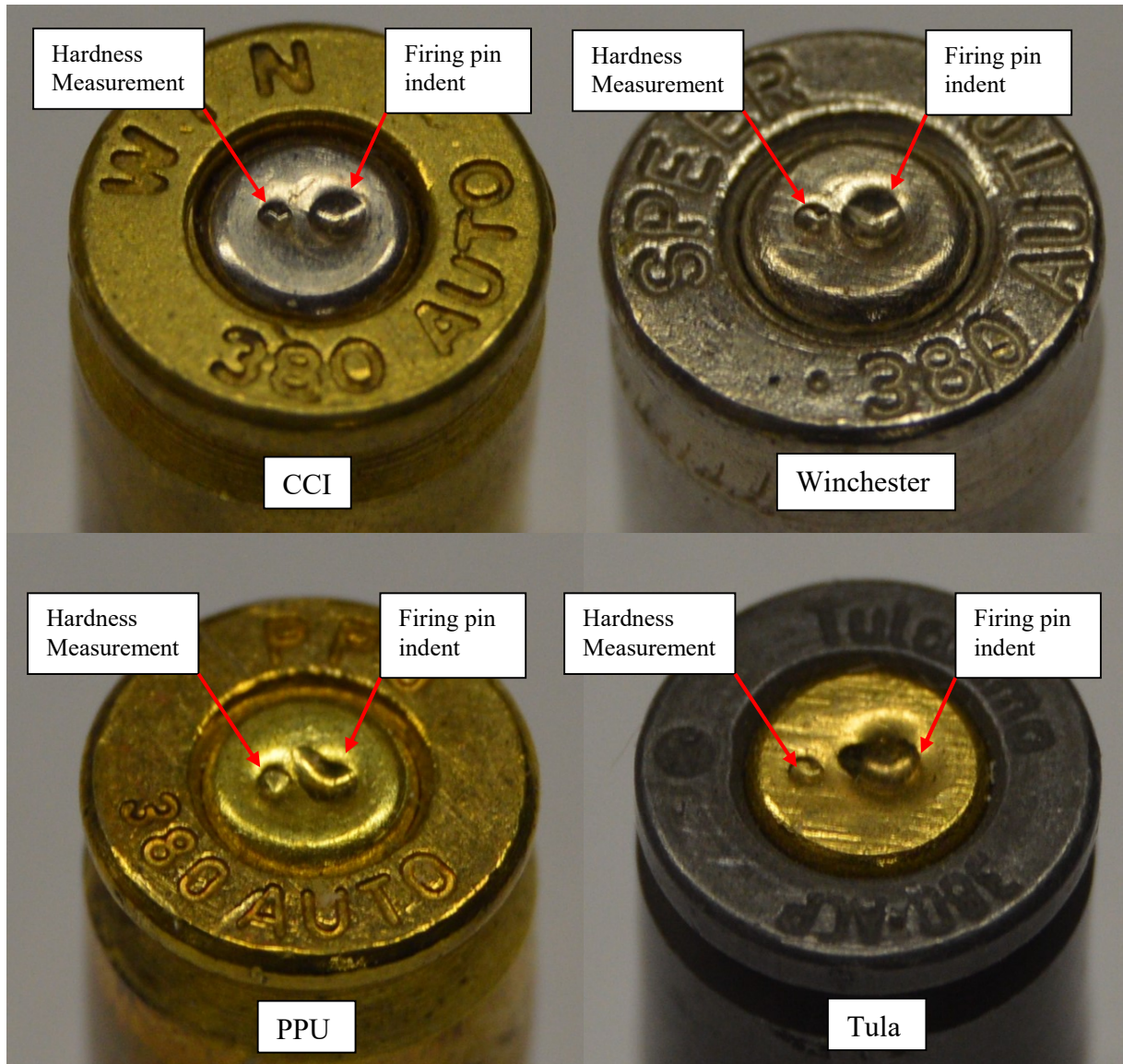
Testing will be conducted on primers. The primers will be fired to render inert and spent casings will be segregated based on the primer type. Ten (10) samples will be taken for each primer type and a comparative analysis will indicate relative hardness. Hardness will be compared between each test specimen by creating an indent midway between the firing pin indent and the rim of the primer cup. A hardness test rig shall apply 50lbf to a conical anvil for a duration of 30 seconds. The anvil shall be manufactured from 17-4 PH stainless steel and have a minimum hardness of 40Rc. This anvil hardness is sufficient given the relative (soft) hardness of brass primers.



2.1.2 Test Results

Primer	Average Indent Size (mm)
CCI Small Pistol Primer	0.50
Winchester Small Pistol Primer	0.60
Remington Small Pistol Primer	0.80
Federal Small Pistol Primer	0.75
Tula Small Pistol Primer	0.55
PPU Prvi Partizan Small Pistol Primer	0.65

Note: A smaller indent size indicates higher primer hardness. The following are representative images of hardness measurements. In some instances, primers were seated using a reloading press, therefore the brass head stamp shown in the images may not indicate primer brand.



Due to limitation of the testing approach a comparison to a standardized test method (Vickers, Brinell, or Rockwell) was not attempted, however the method utilized is similar in principal and the indent size remains a comparative scale.

2.1.3 Test Analysis

Testing results indicated a relative scale of hardness for different primers materials. However, actual (Nominal Results) were likely skewed due to:

- Small recoverable sample size relative to strike surface.
- Thickness of material (reliable data is strike area x10 thickness). We are testing at approximately 1.5x to 2x.
- Inability to test firing pin strike surface.
- Convex shape of test sample.

- Prior work hardening of the original primer cup forming operations which affect the location tested.

Reliable nominal data will prove exceedingly difficult to collect post manufacturing thus relative data will suffice for development purposes.

2.2.1 Test Methodology

Testing will be conducted with reloaded and purchased rounds of ammunition. The planned caliber is the .380 ACP. Bullets were cast and sized at approximately 102 grains; as weight was inconsequential to testing. 100 rounds of each type of selected ammunition was prepared for testing.

A Gen1 Ruger LCP pistol was modified to trigger pull 3.5lbs as a worst case for analysis. The hammer spring was significantly modified to provide lighter strikes. Reliability (as defined by ability to fire) was recorded for the five selected rounds.

Primer	Rounds Prepared	Reload or Factory
CCI Small Pistol Primer	100	Reload
Winchester Small Pistol Primer	100	Reload
Remington Small Pistol Primer	50	Factory
Federal Small Pistol Primer	100	Factory
Tula Small Pistol Primer	100	Factory
PPU Prvi Partizan Small Pistol Primer	100	Factory

2.2.2 Test Results

Primer	# Fired	# Failed	% Reliability
CCI Small Pistol Primer	100	23	77%
Winchester Small Pistol Primer	100	5	95%*
Remington Small Pistol Primer	50	2	96%*
Federal Small Pistol Primer	100	0	100%
Tula Small Pistol Primer	100	35	65%
PPU Prvi Partizan Small Pistol Primer	100	17	83%

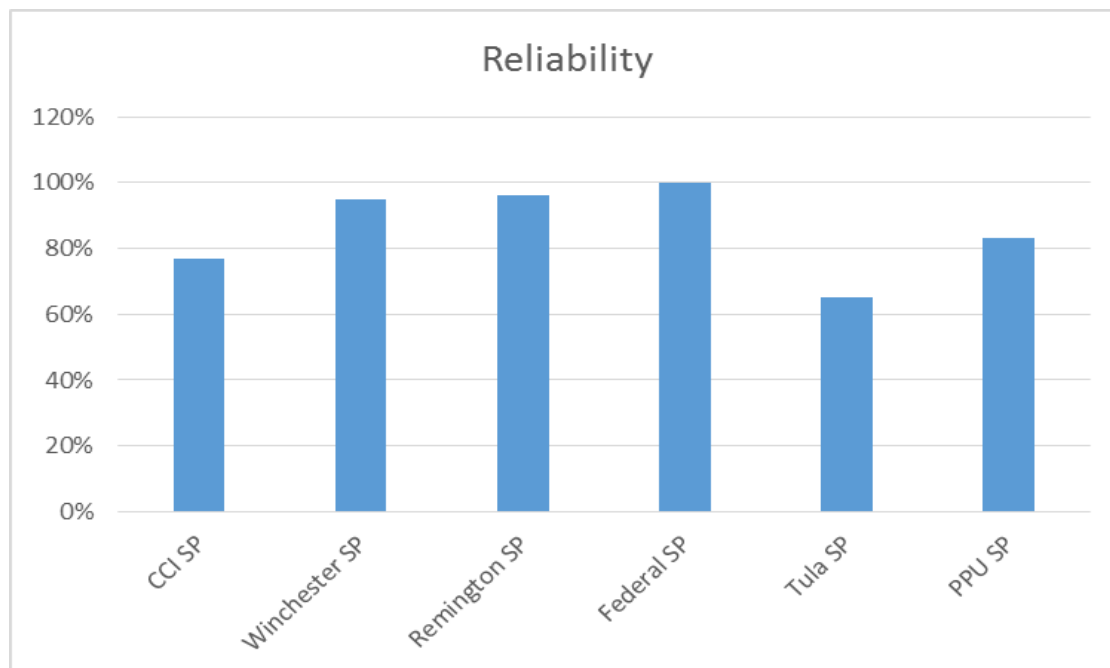
*Due to low number of test failures and sample size, Remington and Winchester are not statistically significant.

2.2.3 Test Analysis

Testing results of live ammunition support testing done on primer hardness; however, due to small sample size and low % of test failures, statistical significant was not found between Remington and Winchester branded primers. After firing testing it was discovered some PPU pistol primers may have been seated sub-flush. This variable may have adversely affected testing

of PPU pistol primers during live ammunition testing do to the primer being farther away from the firing pin and therefore introducing an artifact into the assessment of primer hardness. Weakness in this control indicates that PPU data point may be unreliable when directly compared with other ammunition.

THIS RELIABILITY IS ONLY APPLICABLE TO A TEST RIG WITH A PURPOSELY REDUCED WEIGHT HAMMER SPRING; NOT A STATEMENT ON RELIABILITY WITH NORMAL PISTOLS. ACTUAL HAMMER SPRINGS INCLUDED IN TRIGGER KITS SOLD BY FORT WAYNE TACTICAL LLC ARE WELL ABOVE THE THRESHOLD OF 100% RELIABILITY.



3.0 SUMMARY AND CONCLUSIONS

3.1 Summary

Test results indicate an acceptable level of confidence that Small Pistol primers on the US market today ordered softest to hardest:

- 1) Federal
- 2) Remington (tie)
- 2) Winchester (tie)
- 3) PPU Prvi Partizan (*reliability may have been affected due to below flush variation on primers)
- 4) CCI
- 5) Tula

While this data may be challenged (see deficiencies section), it does provide a comparative means of evaluating ammunition primer hardness. It should be noted that this data does not represent an assessment of ammunition quality; however it does provide a method of determining worst case (hardest) primers to use during performance evaluations of aftermarket firearms accessories and their ability to maintain the reliability of the firearm system. It is highly encouraged that end users conduct reliability testing with the specific ammunition they intend to use with their firearm system.

3.2 Deficiencies

Data collected is not reliable in terms of Nominal Hardness.

Variation in actual test rig indent location may affect ability of anvil to indent primer surface.

Issues encountered possibly with PPU Ammunition may artificially inflate/deflate reliability with the test rig. Due to discovery only post-testing, veracity of data point may be challenged.

3.3 Conclusions

Test results indicate an acceptable level of confidence that Small Pistol primers on the US market today order in hardness (and difficulty to fire increasing) from 1) Federal 2) Remington (tie), 2) Winchester (tie), 3) PPU Prvi Partizan (*reliability may have been affected due to below flush variation on primers), 4) CCI, 5) Tula.

Testing of after-market products intended for use in firearms using Small Pistol Primer class ammunition (ie: .32ACP, .380ACP, 9mm, .38 Special, 40S&W) may be acceptable with Tula and CCI ammunition as this represents worst case firing conditions for Small Pistol primers.

3.4 Future Testing

Future testing may be conducted to determine if the same trend aligns with other primer types such as:

- Small Pistol Magnum primers (ie: 357 Magnum)
- Large Pistol Standard primers (ie: 45ACP)
- Large Pistol Magnum primers (ie: 44 Magnum)
- Small and Large Rifle primers

Further testing with PPU Prvi Partizan Small Pistol ammunition and a larger sample size of Remington Small Pistol ammunition may be warranted.