



Technical Data Package

38 Special +P 135 gr Gold Dot[®] Hollow Point



Prepared by:
Ernest M. Durham
Development Engineer
ATK AAI, Lewiston, Id
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Abstract

The purpose of this product is to provide ammunition specifically designed for "Snub Nosed" revolvers carried for Law Enforcement back-up use. Previous 38 Special ammunition was designed for four or six inch barreled revolvers that generate higher velocities corresponding to barrel length. These higher velocities facilitated easier opening of hollow point bullets. If the same ammunition is fired in short barreled revolvers typical of those LE Officers carry, the corresponding lower velocity bullets do not penetrate windshield glass, plywood, or car door barrier tests. When penetration occurs in the other tests, non-expansion of the bullets leads to diminished terminal performance and gross over-penetration of the target.

This SPEER Gold Dot Hollow Point ammunition was specifically designed to operate in the most prevalent back-up revolver: The Smith & Wesson J Frame with 1 7/8" barrel. Ballistic gelatin testing demonstrates excellent terminal performance when shot through the FBI Ammunition Test Protocol. Attached results document the superior performance of this ammunition in this operating platform.

Durham, Ernest M., 09 October 2003
Technical Report 38 Special +P 135gr. GDHP
ATK Ammunition Accessories, Inc.
CCI / Speer Lewiston Idaho

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1 Objective

- 1.1 The goal of this project was to create a cartridge designed to perform specifically in Smith & Wesson J – Frame and similar short barreled revolvers commonly carried for back up in a Law Enforcement role. The cartridges designed as a result of this project are chambered in 38 Special +P, and comply with SAAMI pressure limits for +P 38 Special ammunition. Bullet weight was selected to maximize penetration in three principal test barriers when shot through and into 10% ordinance gelatin. Those test barriers are FBI bare gelatin, heavy clothing, and IWBA 4 Layer Denim.

Where applicable, data from 9mm Luger +P 124 grain SPEER Gold Dot Hollow Point was included for comparison (By customer request).

2 Cartridge Offering

- 2.1 38 Special 135 gr. +P Gold Dot Hollow Point Product # 53921

3 Cartridge Components

- 3.1 Cartridge Shellcase

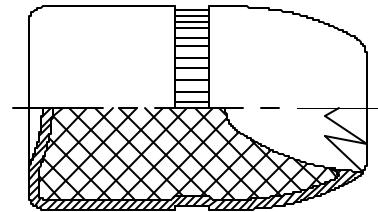
Cases are made of Alloy 260 Cartridge Brass, ASTM 134-98 (70% Cu, 30% Zn). The shellcases incorporate Boxer Priming. Cases are nickel plating for corrosion resistance and ease of feeding. The exterior of the case is coated with an anti-oxidizing and lubricity agent.

Each loaded cartridge is headstamped with the manufacturer's name and caliber designation.

- 3.2 Bullet, Gold Dot Hollow Point

Bullets are fabricated with a lead core encapsulated with copper. Bullets are specifically designed to expand at the velocities found in 1 – 7/8” revolvers. Bullet weight is controlled to within ± 2.5 gr.

The copper bullet jacket is electrochemically bonded to the lead core to prevent core-jacket separation during expansion. Because the jacket is plated onto the core, concentricity is exact from one side to the other, guaranteeing precise rotation about the center of mass, and resulting superior accuracy.



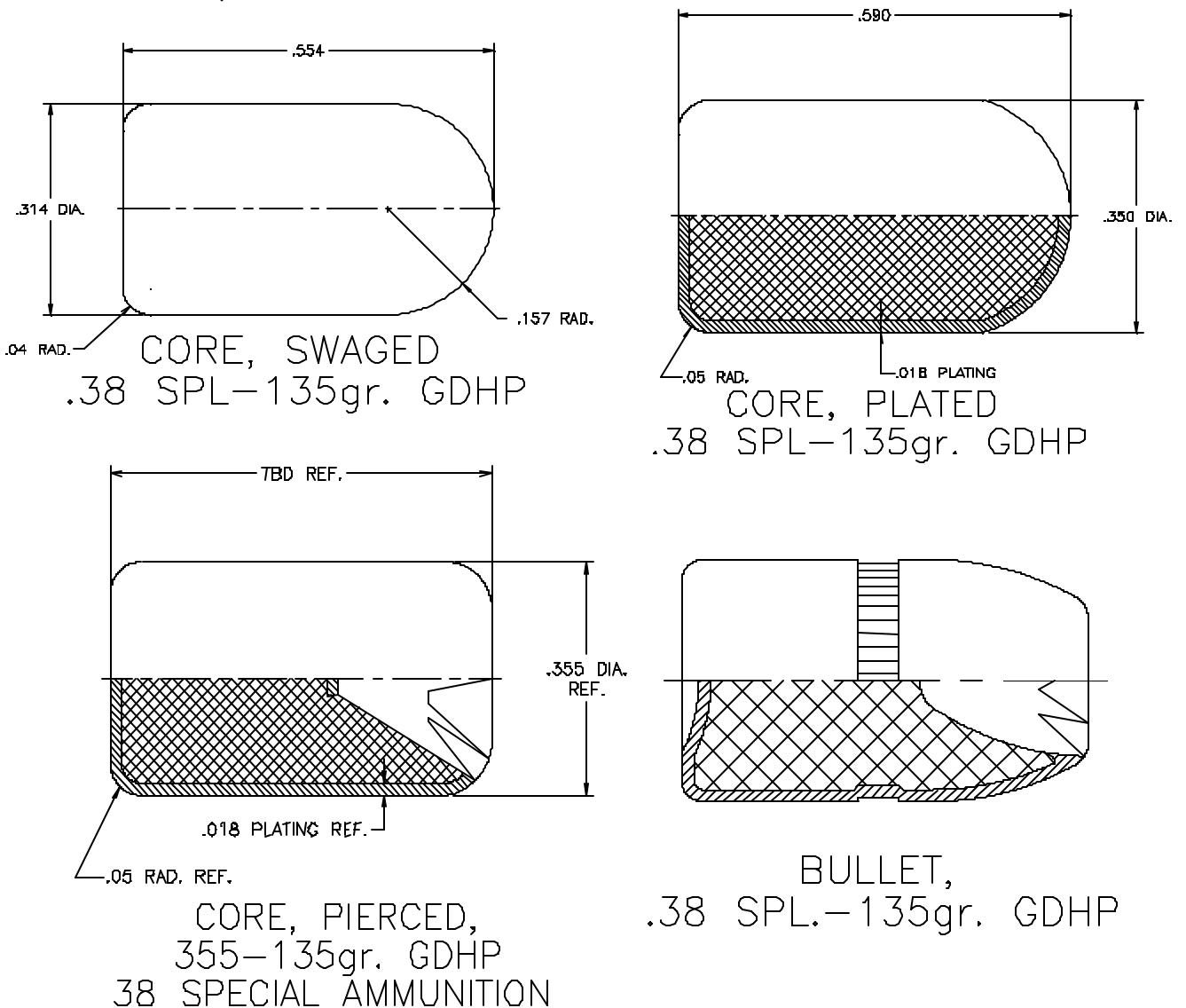
3.2 Bullet, Gold Dot Hollow Point (Cont.)

Tooling for this product was specifically designed to meet and exceed the design criteria. Special care was taken to lay out internal bullet flutes to create pre-designated weak points that allow the bullet to easily expand.

Bullets were not selected from existing inventory, but newly developed for this application. The special star-stab operation assures expansion even through the toughest barriers. Exact control on core stab depth means repeatable performance shot after shot.

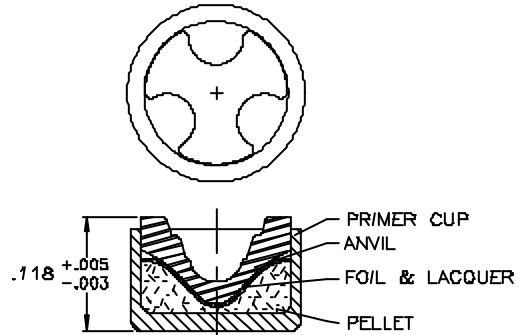
The bullet ogive (Nose curvature) was selected to give clearance in the revolvers cylinder, and offer a profile tough enough to retain its shape but flexible enough to begin expanding at the lower velocities found in 1-7/8" barrels.

3.2.1 Bullet Component Parts



3.3 Primer

Primer cup is made of Brass (70% Cu, 30% Zn) and is nickel plated. Priming mixture is standard for Law Enforcement service ammunition and incorporates Lead Styphnate as a primary explosive. Primer design incorporates a foil paper between the primer mix and the anvil.



3.4 Propellant Powder

The propellant utilized in this 38 Special GDHP cartridge is double based (Nitrocellulose + Nitroglycerine) flake type. All powder lots used have chemical and physical properties supplied and are on file if requested. The propellant used in this product is very insensitive to temperature extremes and offers a low muzzle flash. The high energy propellant is specifically formulated with optimum levels of nitrocellulose and nitroglycerine for energy, burn rate modifiers and deterrents to deliver a progressive burning powder, acid scavenging chemical stabilizers to ensure long stable shelf life and flash suppressants to control excessive secondary muzzle blast. The propellant is produced in the United States of America by an ISO 9001:2000 certified supplier.

3.5 Cartridge Sealants

Case mouth interior is coated with Case Waterproofing Compound, Black Lucas, MIL-C-13783C for reference only.

Colored nitrocellulose lacquer is utilized to seal the primer in the shellcase primer pocket.

4 Quality Assurance Provisions

4.1 ISO 9001 Certification

CCI/Speer was the first ammunition plant in the United States to be certified to the rigorous international quality management standard ANSI/ASQC ISO 9001 and has maintained that certification since 1996.

4.2 Lot Size

Lots are typically loaded in $100,000 \pm 20,000$ round increments, depending on component amounts available at the time of loading. Coordinated deliveries of Shipment Lots can be arranged for special circumstances. Consistency of manufacturing guarantees lot to lot uniformity.

Each ammunition lot is assigned a unique identification number to include the day, month and year of manufacture or assembly line on which manufactured. This number appears on both the cartons and shippers.

4.3 Sampling Plans for Testing

Quality Assurance sample plan SITP-CF-001 (Standard of Inspection and Test Plan, Centerfire) utilized for Function and Casualty testing. Classifications of defect types are outlined in the plans for consistent and uniform processing of production lots.

4.4 Standard Defect List and Visual Controls

Quality Assurance sample plan SDL-CF-302 (Standard Defect List, Centerfire) utilized for visual defect classification and sampling plan sizes.

4.5 Dimensional Controls

Quality Assurance Dimension Inspection Plan DIP-62 (Dimensional Inspection Plan) is utilized to monitor all shellcase and cartridge dimensional attributes.

4.6 Destructive Tests

Quality Assurance sample plan SITP-CF-001 calls out inspection types and sample sizes for all destructive tests performed on the ammunition. These tests include the following:

- Accuracy Testing
- Primer Sensitivity Drop Test
- Function and Casualty Firing
- Bullet Pull
- Bullet Push
- Bullet Jump

4.7 Function Testing

Function testing shall be in accordance with STM-CF-301 (Standard Test Method, Centerfire) and SDL-CF-301 per specifications outlined in SITP-CF-001. Function firing will be performed in weapons that Law Enforcement service weapons in actual use, and are exclusively dedicated to this product.

Function weapons include the following:

- Smith & Wesson Model 10
- Smith & Wesson Model 640
- Ruger SP-101

4.8 Propellant Weight

Positive propellant powder detection for each cartridge is mechanically monitored throughout production. The weight of components is monitored during fabrication, and after assembly during the QA process.

4.9 Visual Inspection

All loaded service ammunition is passed through a 100% inspection process to verify product quality before packaging and shipment to the customer.

5 Technical Cartridge Specifications

5.1 Dimensional Control, Cartridge

The overall length of the loaded cartridge is held to $\pm .015$ inches. Primers are to be seated $-.005 \pm .005$ inches below flush. Maximum case bulge shall not exceed receiver gages based on SAAMI maximum cartridge recommendations.

5.2 Dimensional Control, Cases

Case exterior measurement to be according to ATK shellcase drawings. This drawing conforms to SAAMI 38 Special shellcase exterior dimensions.

5.3 Primer Sensitivity

Sensitivity is determined by a standard SAAMI (Small Arms Ammunition Manufacturing Institute) firing pin of .100 in. diameter with full radius.

Ball weight: $1.94 \pm .02$ oz.

No fire height minus two (2) standard deviations hereby called H₂S: 1.0 inches minimum.

All fire height plus four (4) standard deviations, hereby called H₄S: 11.0 inches minimum.

6 Ballistic Specifications

6.1 Velocity

Velocity of cartridges shall be measured with an industry standard 7.71 in. SAAMI test barrel.

Product	Instrumental Velocity
38 Special +P 135 gr. GDHP	1125 ± 50 fps

6.1.1 Revolver Velocity

The velocity of shots fired from short barreled revolvers will vary from the instrumental velocity. Expect a velocity loss of approximately 265 fps when fired from a 1-7/8" revolver and 190 fps when fired from a 4" revolver. Individual firearms will vary.

Product	1-7/8 Revolver Velocity
38 Special +P 135 gr. GDHP	860 fps

6.2 Chamber Pressure

Chamber pressure is measured by SAAMI conformal piezoelectric transducer. Test barrels are monitored on a periodic schedule and compared to established lots of SAAMI reference ammunition for pressure and velocity.

Pressures of cartridges adhere to the following SAAMI guidelines:

Product	Maximum Average Pressure
38 Special +P	21,500 psi

6.3 Accuracy

Five (5) individual groups of five (5) shots each shot at 50 yards shall not have an extreme spread greater than 3.0 inches. Cartridges are fired from a standard SAAMI accuracy barrel.

6.4 Bullet Push

Bullets shall have a push resistance of 50lb average, 30lb minimum individual when compressed .030 inches below nominal length.

6.5 Bullet Pull

Bullets shall have a pull resistance of 50lb average, 30lb minimum individual when pulled vertically from the shellcase mouth and maximum value recorded.

This quality attribute is particularly important in small lightweight revolvers. The recoil generated during firing exerts a forward inertial force on the bullets in the cylinder. If cartridges do not possess bullet pull high enough to retain the bullets in the cases, elongation may occur. Excessive elongation beyond the cylinder face can cause the inability of the cylinder to rotate. Special manufacturing steps are rendered to this cartridge to prevent this defect from occurring.

6.6 Bullet Jump

Bullets shall not elongate further than .020" during bullet jump testing. Jump test as per STM-CF-306 Cartridge Elongation Test.

6.7 Environment

Ambient temperature for pressure measurement is $70 \pm 10^{\circ}\text{F}$. Average pressure at temperature extremes of $+ 125^{\circ}\text{F}$ and $- 20^{\circ}\text{F}$ is to maintain specification within 20 % of ambient pressure.

6.8 Calculated Theoretical Maximum Range



Firearm Type	135gr. (1 7/8" BBL)	135 gr. (4" BBL)
Maximum Range	4,912 ft	5,163 ft
Muzzle Velocity	860 fps	935 fps
Ballistic Coefficient	.141	.141
Departure Angle	34 °	34 °
Time of Flight	18.2 sec	18.8 sec
Impact Angle	64 °	65 °
Impact Velocity	255 fps	259 fps

6.9 Calculated Theoretical Recoil

6.9.1 Smith & Wesson Model 640
Weight of firearm: 23 oz.



Ammunition Type	135gr. +P GDHP
Free Recoil Velocity	12.34 fps
Free Recoil Energy	3.40 ft-lb

6.9.2 Smith & Wesson Model 10 HB
Weight of firearm: 33.5 oz.



Ammunition Type	135gr. +P GDHP
Free Recoil Velocity	8.51 fps
Free Recoil Energy	2.35 ft-lb

6.9.3 Glock Model 19 (Included for comparison)
Weight of firearm: 30 oz.



Ammunition Type	9mm Luger +P 124gr. GDHP
Free Recoil Velocity	12.43 fps
Free Recoil Energy	4.50 ft-lb

7 Measured Attributes









Characteristic	38 Special +P 135gr. Speer GDHP	9mm Luger +P 124gr. Speer GDHP
Velocity	860 fps	1210 fps
Accuracy (5x5 @ 25 yds)	.681"	.705"
Muzzle Energy	221 ft-lb	402 ft-lb
Bullet Drop @ 50 yds	1.4"	0.8"
Bullet Type	Gold Dot Hollow Point	Gold Dot Hollow Point
Residue	6.2%	4.5%

8 FBI Test Protocol Performance



38 Special +P 135gr SPEER Gold Dot Hollow Point Part # 53921

Ballistic Performance
FBI Gelatin Test Events

Test Gun: S&W M640 1-7/8" BBL	Bare Gelatin	Heavy Clothing	IWBA 4 Layer Denim	Plywood	Steel	Wallboard	Auto Glass
							
Velocity	864 fps	870 fps	871 fps	844 fps	866 fps	885 fps	838 fps
Penetration	11"	11"	13"	12"	12"	10"	11"
Retained Weight	100 %	100 %	100%	99%	98%	100%	97%
Expanded Diameter	.576"	.577"	.554"	.357"	.455"	.549"	.556"

9mm Luger +P 124gr. SPEER Gold Dot® Hollow Point Part # 53617

Ballistic Performance
FBI Gelatin Test Events

Test Gun: Glock M19	Bare Gelatin	Heavy Clothing	IWBA 4 Layer Denim	Plywood	Steel	Wallboard	Auto Glass
							
Velocity	1224 fps	1211 fps	1207 fps	1183 fps	1199 fps	1228 fps	1197 fps
Penetration	12"	12.5"	16.25"	16"	17"	12.25"	14.5"
Retained Weight	100%	100%	100%	100%	100%	100%	99%
Expanded Diameter	.728"	.637"	.550"	.514"	.463"	.684"	.672"

9 Terminal Performance Tabulated Data

135gr. +P GDHP	Velocity	Penetration	Retained Wt.	Expanded Dia.
Bare Gelatin	864 fps	11"	100%	.576"
Heavy Clothing	870 fps	11"	100%	.577"
IWBA 4 Layer Denim	871 fps	13"	100%	.554"
Plywood	844 fps	12"	99%	.357"
Steel	866 fps	12"	98%	.455"
Wallboard	885 fps	10"	100%	.549"
Automobile Glass	838 fps	11"	97%	.556"

9mm 124 +P GDHP	Velocity	Penetration	Retained Wt.	Expanded Dia.
Bare Gelatin	1224 fps	12 ½"	100%	.728"
Heavy Clothing	1211 fps	12"	100%	.637"
IWBA 4 Layer Denim	1207 fps	12"	100%	.550"
Plywood	1183 fps	15"	100%	.514"
Steel	1199 fps	17"	100%	.463"
Wallboard	1228 fps	12 ¼"	100%	.684"
Automobile Glass	1197 fps	14 ½"	99%	.672"

10 Terminal Performance Summary

The data below represents averages of all events.

Grand Averages, All Shots, All Tests	Velocity	Penetration	Retained Wt.	Expanded Dia.
38 Special +P 135gr. GDHP	863 fps	11.4"	99%	.518"
9mm Luger +P 124 GDHP	1207 fps	13.6"	100%	.606"

This Speer Gold Dot ammunition was developed within the stringent requirements of the FBI Ammunition Test Protocol and performance requests of the Law Enforcement customer and project sponsor. These events were carefully developed by ballistics experts not only to sufficiently test performance, but provide for accurate test repeatability. All testing was performed in the short barreled revolvers.

11 Contact Information

Ken Kees
Director of Engineering
CCI / Speer Centerfire Ammunition
2299 Snake River Ave
Lewiston, ID 83501
(208)-799-3968
(208)-799-3921 FAX

Ernest M. Durham
Development Engineer
CCI / Speer Centerfire Ammunition
2299 Snake River Ave
Lewiston, ID 83501
(208)-799-4490
(208)-799-3921 FAX

Allan Jones
Manager of Technical Publications
CCI / Speer Centerfire Ammunition
2299 Snake River Ave
Lewiston, ID 83501
(208)-799-3971
(208)-798-3661FAX