



Shotgun Distance Determination Test No. 19-5306 Summary Report

Each sample set contained a questioned shotgun pattern image and known shotgun pattern distances. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the target at the time of discharge. Data were returned from 39 participants and are compiled into the following tables:

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This report contains the data received from the participants in this test. Since these participants are located in many countries around the world, and it is their option how the samples are to be used (e.g., training exercise, known or blind proficiency testing, research and development of new techniques, etc.), the results compiled in the Summary Report are not intended to be an overview of the quality of work performed in the profession and cannot be interpreted as such. The Summary Comments are included for the benefit of participants to assist with maintaining or enhancing the quality of their results. These comments are not intended to reflect the general state of the art within the profession.

Participant results are reported using a randomly assigned "WebCode". This code maintains participant's anonymity, provides linking of the various report sections, and will change with every report.

Manufacturer's Information

Each sample set contained a questioned shotgun pattern image (Unknown) and known shotgun pattern distances. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the questioned shotgun pattern (Unknown) at the time of discharge.

SAMPLE PREPARATION: The shotgun used to produce the distance standards and evidence item was a Siaga 12 gauge shotgun with a cylinder choke and the ammunition was Winchester Super Target TRGT12M8.

DISTANCE STANDARDS: Item designated as "Known" consisted of a collection of shotgun patterns on 24" wide white printer paper. The shotgun was locked into a fixture and the paper was placed at a predetermined distance from the shotgun. This was done for each of the predetermined distances. After firing, the shot patterns were scanned.

QUESTIONED ITEM: Item designated as "Unknown" consisted of a shot pattern on 24" wide white printer paper. The shotgun was locked into a fixture and the paper was placed 20 feet away from the muzzle of the shotgun. After firing, the shot pattern was scanned.

SAMPLE SET ASSEMBLY: The unknown and known patterns were rolled up and placed into a pre-labeled sample pack plastic sleeve.

VERIFICATION: All three predistribution laboratories reported a greater than/less than range that was in close proximity to the expected distance.

Summary Comments

This test was designed to allow participants to assess their proficiency in muzzle to target distance determination using shotgun patterns. Each sample set contained a questioned shotgun pattern image and known shotgun pattern distances. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the target at the time of discharge. The questioned shotgun pattern was prepared with the firearm locked into a fixture and the white paper target was placed 20 feet away from the muzzle of the shotgun. (Refer to the Manufacturer's Information for preparation details.)

In Table 1, all 39 responding participants (100%) reported a greater than distance between 15 and 18 feet and a less than distance between 21 and 27 feet. In the Summary of this table, CTS has grouped the responses provided by the participants based on their greater than/less than distance results and provided a tally of the ranges between responses as calculated by CTS.

For greater than/less than distances, a +/-3' allowance from the known shot distance (20') was used as the baseline. Any reported "greater than" values which were larger than 23' and reported "less than" values which were smaller than 17' were highlighted as inconsistent.

The ranges of the reported values were analyzed and CTS did not recognize any extreme range values.

CTS is aware that laboratory reporting policies differ and there are varying acceptable ranges. It will therefore be at the discretion of the laboratory to further evaluate participants' results based on their own policies and procedures.

Distance Determination Results

What is the distance range that the muzzle of the shotgun could have been from the target (Q1) at the time of discharge? Please report a numeral response (e.g. "6") from the supplied Distance Standards.

TABLE 1 (Distance in Feet)

WebCode	Greater Than	Less Than	Calc. Range	WebCode	Greater Than	Less Than	Calc. Range	WebCode	Greater Than	Less Than	Calc. Range
34J2QT	18	22.5	5	MECAT7	15	27	12				
38XW7Q	15	24	9	MUPF9B	18	21	3				
3V4FHP	15	27	12	MVZM6C	15	24	9				
4FR2ZR	15	24	9	MZRUQ7	15	27	12				
4XMULQ	18	24	6	NL6449	15	27	12				
82TM4E	15	27	12	RJRAG8	15	24	9				
9EY3NN	18	24	6	U3WVQ6	18	21	3				
9TJGQN	18	21	3	U6MWWT	18	21	3				
A29M4L	18	21	3	UU3LM2	18	21	3				
AA3TWM	18	21	3	VP22U2	15	27	12				
BRXLHK	18	21	3	W9WUEY	15	24	9				
BYYYYF	18	21	3	WD4F83	18	21	3				
E4G8DQ	18	21	3	WG3Q33	18	24	6				
EV6CUH	15	27	12	Y3XEHN	18	21	3				
FHYEQG	18	21	3	YRXNY2	18	24	6				
FZET47	15	27	12	YVXVKY	18	24	6				
GPCUTB	18	24	6	YYX3MN	15	24	9				
HAD6D6	18	21	3	ZB4H7X	15	21	6				
J3C98D	18	21	3	ZBAT36	18	21	3				
KG6LF7	18	24	6								

Response Summary				Participants: 39	
Greater Than Distance	Participants Reporting	Less Than Distance	Participants Reporting	CTS Calculated Range	Participants Reporting
1	0 (0.00%)	1	0 (0.00%)	3	16 (41.03%)
3	0 (0.00%)	3	0 (0.00%)	6	8 (20.51%)
6	0 (0.00%)	6	0 (0.00%)	9	6 (15.38%)
9	0 (0.00%)	9	0 (0.00%)	12	8 (20.51%)
12	0 (0.00%)	12	0 (0.00%)	15	0 (0.00%)
15	15 (38.46%)	15	0 (0.00%)	18	0 (0.00%)
18	24 (61.54%)	18	0 (0.00%)	21	0 (0.00%)
21	0 (0.00%)	21	17 (43.59%)	24	0 (0.00%)
24	0 (0.00%)	24	13 (33.33%)	27	0 (0.00%)
27	0 (0.00%)	27	8 (20.51%)	30	0 (0.00%)
30	0 (0.00%)	30	0 (0.00%)	Other	1 (2.56%)
33	0 (0.00%)	33	0 (0.00%)		
Other	0 (0.00%)	Other	1 (2.56%)		
No Response	0 (0.00%)	No Response	0 (0.00%)		

Conclusions

TABLE 2

WebCode	Conclusions
34J2QT	The shooting distance was between 5.4 m (18 ft) and 6.9 m (22.5 ft).
38XW7Q	The unknown shot pellet pattern was visually examined. The unknown shot pellet pattern is consistent in pattern size and density with having been produced at an approximate distance between 15 feet and 24 feet from the muzzle of the shotgun.
3V4FHP	The shot pattern defect A is consistent with a muzzle to target distance between 15' and 27'.
4FR2ZR	Examination of Item #2 revealed a pattern of holes. Test patterns were submitted at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, and 33 feet. The shot pattern from Item #2 was consistent in size, appearance and density with the patterns obtained between 15 and 24 feet, muzzle-to-target. The evidence will be retained at the laboratory.
4XMULQ	The shot pattern from the banner was compared with the known shot patterns fired at distances from 1 foot to 33 feet from the muzzle of the Siaga shotgun with the following results: The muzzle of the Siaga shotgun was approximately 18 to 24 feet away from the banner when fired.
82TM4E	Using the provided distance standards (Item 1.2) and visually comparing them to the unknown shotgun pattern (Item 1.1), the unknown pellet pattern was reproduced at a distance greater than fifteen inches and less than twenty-seven inches.
9EY3NN	From comparison of the shot pattern test posters and "unknown" poster, overall visual appearance and measurements, it is our opinion that the estimated muzzle to target distance of damage to the "unknown"/banner at the time of discharge would be between 18 and 24ft (5.4 to 7.3m).
9TJGQN	We estimate that under the circumstances of investigation, the distance from the muzzle of the shotgun to the banner was between 18 and 21 feet.
A29M4L	Once the pattern found on the poster has been compared with then distance patterns provided, it is determined that range of firearms distance from shotgun suspect's to the poster is greater than 18 feet and less than 21 feet.
AA3TWM	Once the sample unknown has been studied and observed, the diameter is measured by equivalent circle method, compared with the known standards samples sent, established a range of fire between 18 feet to 21 feet shot.
BRXLHK	Once the sample unknown has been studied and observed, the diameter is measured by equivalent circle method, compared with the known standards samples sent, established a range of fire between 18 feet to 21 feet shot.
BYYYYF	Muzzle to Target Determination: The Item 2 (unknown) shot pattern is indicative of a pattern of shot pellets that is consistent with #8 shot. Visual examination and comparison of the Item 2 (unknown) shotgun pattern spread and pellet concentration to those of the Items 1.1 through 1.12 (test targets) revealed that the Item 2 shotgun pattern was created at a distance greater than 18 feet and less than 21 feet.
E4G8DQ	Compared the unknown shotgun pattern with known distances standards from 1' to 33' with the firearm Siaga, calibre 12 gauge and ammunition Winchester Super Target TRGT12M8, using the equivalent circle method, it was possible to establish a distance determination of shot greater than 18 feet and less than 21 feet
EV6CUH	Comparison has been made between the incident (banner) pattern and the patterns produced by test-firing the recovered gun and ammunition at different distances. Assuming that the incident shot was fired using this gun and ammunition, the findings indicate that this shot was fired from a distance of between 15 and 27 feet away.

TABLE 2

WebCode	Conclusions
FHYEQG	The range of shot distance from the shotgun to the banner was made in a range greater than eighteen feet and less than twenty one feet.
FZET47	The shotgun pattern labeled as "unknown" is consistent with tests fired at a muzzle-to-target distance greater than 15 feet and less than 27 feet using the supplied known distance standards.
GPCUTB	The shooting distance has been greater than 18 feet and less than 24 feet.
HAD6D6	I conducted range determination tests using the exhibit 12 gauge, Siaga brand shotgun, loaded with 12 gauge, Winchester brand, number 8 shot cartridges. These tests were conducted with a muzzle to target distance of 18 feet and 21 feet. The shot spread at a distance of 18 feet measured an approximate diameter of 250 millimetres, and at a distance of 21 feet measured an approximate diameter of 325 millimetres. The result of this examination showed that the damage caused to the exhibit banner was as a result of a single discharge of shot, where the muzzle to target distance was between 18 feet and 21 feet.
J3C98D	Compared the questioned shotgun pattern, with twelve distances standards obtained with the evidence shotgun and measurements by equivalent circle method, established a range of fire between 18 and 21 feet.
KG6LF7	The determined shooting distance is greater than 18 and smaller than 24 feet.
MECAT7	The questioned pattern (unknown distance) was produced between 15 and 27 inches from the muzzle of the shotgun.
MUPF9B	Considering the different measurements projectiles dispersion and the type of lead shot density we would have to establish a distance interval of 18 to 21 feet between the muzzle of the shotgun and target(banner).
MVZM6C	My laboratory tests indicate that the muzzle of the barrel of the 12-gauge Siaga rifle was located at a distance between 15 and 24 feet at the time of firing.
MZRUQ7	Examination of the Item 1 banner revealed the presence of a shot pattern. The shot pellet pattern found on Item 1 is consistent in pattern size and density with having been produced at an approximate distance between 15 feet and 27 feet from the muzzle of the submitted firearm.
NL6449	Item 1 unknown pellet pattern on scaled copy paper bears a visible pellet pattern that is consistent with the muzzle of the shotgun having been at a distance greater than 15 feet and less than 27 feet from the target at the time of firing.
RJRAG8	CONCLUDED SHOOTING RANGE IS BETWEEN 15FT LOWER-BOUNDARY AND 24FT UPPER-BOUNDARY.
U3WVQ6	[No Conclusions Reported.]
U6MWWT	I conducted a comparison examination between the provided range charts and a spread of shot located to a banner recovered from the convenience store. The range charts provided were taken from the exhibit 12 gauge Siaga brand shotgun, using Winchester brand, Super Target No.8 shot cartridges. (TRGT12M8) As a result of this examination I formed the opinion that the muzzle of this shotgun at the time of discharged was more than 18feet and less then 21feet from this banner.
UU3LM2	Initiality, a direct observation was made to 12 standards patterns and the questioned shotgun pattern by performing analysis to determine the range of firing distance. Taking into account tests performed on comparison patterns using the equivalent circle method, the shotgun was able to established a range of firing distance between 18 an 21 feet.
VP22U2	The shotshell pellet patterns on the test fires were compared to the shotshell pellet pattern

TABLE 2

WebCode	Conclusions
	around Q1. It is the opinion of the undersigned that the pattern from Q1 indicates a muzzle-to-target distance between 15 feet and 27 feet.
W9WUEY	In my opinion, the questioned shot was fired when the muzzle of the gun was greater than 15 feet and less than 24 feet from the convenience store banner. The most likely distance within this overall range from which the shot was fired is between 18 and 21 feet.
WD4F83	The shot was made from a distance no less than 18 feet and no more than 21 feet.
WG3Q33	Comparison of distance standards created using the suspected shotgun and ammunition to the evidence banner was performed. Based on shot pellet distribution sizes and densities, it was determined the the shotgun muzzle was at a distance of greater than 18 feet and less than 24 feet from the banner when it discharged.
Y3XEHN	I measured the distance of the pellet spread from the pattern at the scene. I then compared the pellet spread displayed on the test fired distance standards that were supplied. These distance standards were obtained by test firing the exhibit Saiga 12 gauge shotgun with a cylinder choke using Winchester Super Target TRGT12M8 ammunition. As a result of this comparison I formed the opinion that if this was the shotgun and ammunition used to create the Unknown pattern then the muzzle of the shotgun was between 18 and 21 feet from the banner (target) that it was fired into.
YRXNY2	The distance of firing between the muzzle of the shotgun and the target was estimated to be between 18 feet and 24 feet.
YVXVKY	In my opinion the unknown shot was fired at a minimum distance of 18ft, maximum distance of 24 feet. It was most likely between 18-21 feet but only have one sample at each distance so cannot rule out 24 feet.
YYX3MN	The photograph of the unknown shot pattern (Item 0001-AA) was compared to the twelve photographs of shot patterns (Item 0001-AB) reported to have been made at known muzzle to target distances of 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30 and 33 feet. The pattern observed on the photograph of the unknown shot pattern is consistent with having been made at a muzzle to target distance of greater than fifteen (15) feet and less than twenty-four (24) feet.
ZB4H7X	Considering the unknown shotgun pattern and the known distances patterns observed, we strongly support that the shooting range, between the muzzle of the shotgun and the target, is between 15 feet and 21 feet.
ZBAT36	Compared the questioned shotgun pattern with the difference distances standards obtained with the evidence shotgun (12 gauge with a cylinder choke) and measurements by equivalent circle method, established a range of fire between 18 feet and 21 feet.

Additional Comments

TABLE 3

WebCode	Additional Comments
34J2QT	We are astonished that an internationally promoted test does not use SI units.
BYYYYF	<p>Items 1.1 through 1.12 are 1 to 1 scale copies of test targets labeled as Shotgun Pattern at 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, and 33 Feet. The Item 1.1 through 1.12 test pattern targets were visibly examined and compared to the Item 2 Unknown Shotgun Pattern with the following result: Items 1.1 through 1.5 and Items 1.11 and 1.12 were eliminated as having been created by the same firearm and ammunition as Item 2 based on the test target having either a too small or too large of a maximum spread pattern and significant visible differences in pellet impact distribution. Items 1.6 through 1.10 were used to determine what test target or targets were most similar in pellet distribution and pellet concentration. A clear plastic overlay that is marked with concentric circles from the center in 1" radiuses out to 11" in 1" increments was placed over the Item 2 Unknown Shotgun Pattern center so that the majority outer pellet impacts were contained within the same 1" circle. A dry erase marker was use to place a dot over each pellet impact. The overlay was then placed over the top of the Item 1.6 through 1.10 targets and photographed to show the differences in pellet concentrations. The marks for the Item 2 Unknown Shotgun Pattern were removed and the overlay was placed on the 1.6 through 1.10 test target and the pellet impacts were marked, counted and recorded for each radius in a table (19-136E Distance Determination Pellet Concentration Sheet). If the pellet count on a target was below the 461 average pellet count for #8 shot as found on the Average Pellet Count for Shotshells table (http://shotshell.drundel.com/pelletcount.htm) the missing number of pellets were added to the radius in which the shotcup hole was located. The pellet concentrations from the Item 1.6 - 1.10 test targets were compared to the Unknown Shotgun Pattern concentrations. Lastly, a maximum spread measurement was taken with the 24" caliper on the most distant pellets on each of the Item 2 Unknown Shotgun Pattern and 1.6 - 1.10 test targets. The Distance Determination Pellet Concentration Sheet and photographs of the Item 1.6 through 1.10 overlays have been loaded into the LOR. The data collected from the test targets indicates that the Item 2 Unknown Shotgun Pattern is most consistent with having been created by a shot fired from a distance greater than 18' and less than 21'. Remarks: The determined distance is based upon the provided test targets, which consisted of targets shot only once and at 3 foot increments. Due to shotgun pellet spread being somewhat inconsistent, even from the same distance, multiple test targets from 1 foot increments may have provided more precise results.</p>
HAD6D6	<p>The measurement of the shot spread at a distance of 18 feet excluded the bottom most shot pellet, or "flyer". Also, the elongated shape of the shot damage to the exhibit banner suggests that the shotgun was not perpendicular to the banner at the time of discharge. The damage to the exhibit banner was caused by a complete (uninterrupted), single discharge of shot, that measured approximately 255 millimetres high and 290 millimetres wide. Furthermore, PPE and a remote firing devise was used to conduct this range determination exercise (Method 43).</p>
MUPF9B	Possibly closer to 21 than 18.
MVZM6C	<p>I noticed that the rule on the paper of the unknown shotgun pattern was not to scale compared to the other papers, there was a difference of 2 mm by 150 mm with the other papers. This did not affect my results.</p>

TABLE 3

WebCode	Additional Comments
MZRUQ7	Did not examine patterns at the following foot increments: 1, 3, 6, 9, 30, 33.
U6MWWT	The shot pattern to the banner indicates that the firearm was not perpendicular to the banner at the time of discharge.
VP22U2	This analysis deviated from our SOP which states that test fires for shotgun cases are to be done in triplicate.
WD4F83	Shot consisted of pellets with a diameter of 1,69 mm.
Y3XEHN	I would always do at least three shots at each bordering distance to take into account shot to shot variation in the shot patterns produced. The scale of the unknown pattern was approximately 2% larger than the scale of the distance standards. This however made no difference in determining the range of distances.

-End of Report-
(Appendix may follow)

Test No. 19-5306: Shotgun Distance Determination

DATA MUST BE SUBMITTED BY **Dec. 2, 2019, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: K398HX

The Accreditation Release section can be accessed by using the "Continue to Final Submission" button above. This information can be entered at any time prior to submitting to CTS.

Scenario:

Police are investigating an armed robbery at a convenience store. The victim stated that the suspect shot at him, missed and hit a banner. The suspect was apprehended later that night and police recovered a Siaga 12 gauge shotgun with a cylinder choke and Winchester Super Target TRGT12M8 ammunition from his vehicle. Investigators are asking you to compare the recovered banner with the distance standards provided to determine the distance from the muzzle of the shotgun to the banner.

Items Submitted (Sample Pack SDD):

Known: Known distance standards from 1' to 33'.

Unknown: Unknown shotgun pattern.

1.) What is the distance range that the muzzle of the shotgun could have been from the target at the time of discharge? Please report a numeral response (e.g. "6") from the supplied Distance Standards.

Greater than (feet) and Less than (feet)

Please note: Any additional formatting applied in the free form spaces below will not transfer to the Summary Report and may cause your information to be illegible. This includes additional spacing and returns that present your responses in lists and tabular formats.

2.) What would be the wording of the Conclusions in your report?

3.) Additional Comments

RELEASE OF DATA TO ACCREDITATION BODIES

The Accreditation Release is accessed by pressing the "Continue to Final Submission" button online and can be completed at any time prior to submission to CTS.

CTS submits external proficiency test data directly to ASCLD/LAB, ANAB, and/or A2LA. Please select one of the following statements to ensure your data is handled appropriately.

- This participant's data is intended for submission to ASCLD/LAB, ANAB, and/or A2LA. (Accreditation Release section below must be completed.)
- This participant's data is **not** intended for submission to ASCLD/LAB, ANAB, and/or A2LA.

Have the laboratory's designated individual complete the following steps **only if your laboratory is accredited in this testing/calibration discipline** by one or more of the following Accreditation Bodies.

Step 1: Provide the applicable Accreditation Certificate Number(s) for your laboratory.

ANAB Certificate No.
(Include ASCLD/LAB Certificate here)

A2LA Certificate No.

Step 2: Complete the Laboratory Identifying Information in its entirety.

Authorized Contact Person and Title

Laboratory Name

Location (City/State)