New propellants from Australian Munitions

by Geoff Smith

Earlier this year I was invited by the people at Australian Munitions to test and evaluate their two new 'Australian Pistol Shotgun' single-based flake propellants, designated APS350 and APS450, which are made at their recently-commissioned Mulwala facility and are now available for sale to the general public. As their names suggest, each is designed for use in both shotguns and handguns, although my tests were limited to the latter.

APS350 has been introduced to replace the older AS30N, while APS450 supplants AS50N/AP50N, so both are at the relatively fast end of the burning-rate spectrum. Both products are claimed to be 15 per cent smaller in grain diameter than their predecessors, with a slightly longer grain length and are made using ingredients that are more environmentally friendly than those used previously. While the older propellants were double based, meaning some nitroglycerin goes into the nitrocellulose mix, the new ones no longer include this rather hazardous additive.

According to the supplied information, the new propellant facility uses modern technology that ensures improved processing safety while

Geoff Smith firing the long-barrelled Taurus

lowering environmental risks and impacts. These two new propellants are likely to be just the first of many to be offered in the coming years, with the website hinting at a propellant to replace AP100 as well as some new rifle powders. Sharp-eyed visitors to the Australian Munitions website will possibly observe a container labelled APS650.

While I was supplied with a few pages of recommended loading data, I was also advised that loads deemed suitable for the older propellants could also form the basis for beginning loads with the ones under review. My initial tests were performed purely to provide independent feedback to Australian Munitions and I was asked not to share either details or samples to other people until after the launch. It was only after completing my tests I was given permission to report these findings to our readership.

I decided to use the three calibres I reload most, namely .357 Magnum, 9x19mm and .44 Magnum, and develop loads based on supplied data and previously published data for AS30N and AP50N, with a variety of different projectiles. The guns employed were a Taurus Model 66 revolver with a 300mm barrel, a Tisas 1911-style handgun with 5" barrel and a Smith & Wesson Model 629 revolver with an 8.125" barrel.

Because these are fast-burning propellants the ideal loads for the larger volume cartridges best suited cast bullet, single-action-style rounds, while the 9mm loads were pretty much standard usage. Despite this I used projectiles that were jacketed, plated, cast lube-sized and cast tumble lubed in each of the cartridges. Naturally, with the 9mm loads it was equally important the gun cycled reliably as well as providing good accuracy.

I measured performance with a LabRadar chronograph which enabled velocities from the muzzle right out to 50m to be recorded. The data was downloaded into the Recreational Software 'Shooting Lab' software package which allowed for further analysis of both the downrange behaviour of the bullets as well as the accuracies obtained.

Loads were dispensed volumetrically using a Lee Precision powder dispenser and cross-checked on an Ohaus beam balance. Cartridges were assembled using Lee Precision dies after carefully cleaning cases and priming with components as listed in the summary results table. All tests were performed from late summer through to autumn 2018 at SSAA's Para Range, north of Adelaide.

The formal tests were conducted by shooting groups of 10 shots for each loading from a rest, either over 50m or 25m. Each target was retrieved and carefully labelled and general observations about recoil, muzzle blast, smoke, residues inside cases and any other pertinent items were noted. The LabRadar unit was set up to measure velocities at five nominated positions between the muzzle and the target with projectile data for each group being entered accordingly.

Informally, loads were assembled and used in a variety of matches to compare with results achieved previously using (mainly but not exclusively) AP70N and AP100 propellants.

It seemed to me an ideal propellant, in the first instance, should be easy to use. It should meter through dispensing equipment smoothly and provide charges of consistent weight without any annoying electrostatic effects hanging granules up on to the non-conductive surfaces of the loading equipment. In this respect both APS350 and APS450 gave consistent results and did not jam

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the charge plates in my loading gear. Typically I would charge the requisite number of cases for a particular load, then hold the loading block up to the light to ensure all had a roughly equivalent volume. I would then remove and weigh one in five randomly to ensure there was no major departure. This is especially important with small volumes since tiny variations can cause significant pressure differences. I didn't find any such problems with either of the subject propellants.

The next feature of my hypothetical ideal propellant was it should burn cleanly and consistently. For this I simply noted the smoke and blast then examined the fired cases. If the charge produces very little smoke and flash and each shot sounds and feels similar, and afterwards the fired cases are relatively clean internally with no unburned granules either in the case or on the shooting bench forward of the muzzle, then the propellant is chemically doing its job at least.

Once again I found no problems to speak

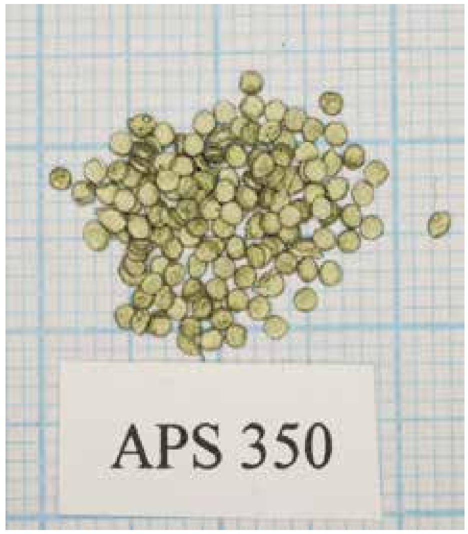
The Taurus model 66 revolver used for testing .357 magnum loads

The S&W Model 629 used for the .44 magnum tests

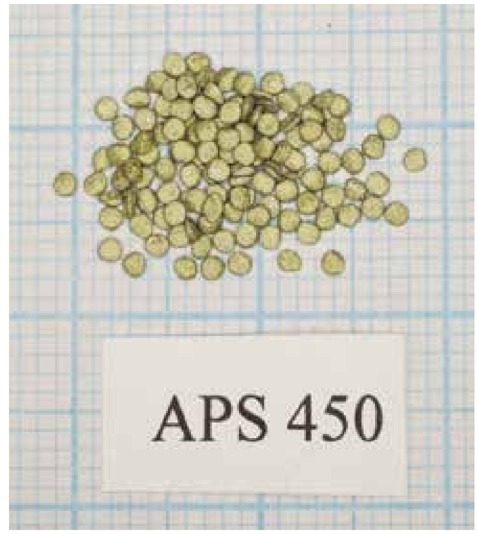
The Tisas Zig M1 9x19mm handgun used on 9mm loads

The test bench on the 25m range showing the Labradar chronograph

AP70N propellant on 1mm graph paper for comparison



APS350 propellant on 1mm graph paper



APS450 similarly compared on 1mm graph paper

of. The only means at my disposal for checking chamber pressures was examining fired cases and primers. I measured case head diameters before and after firing and checked them against Sporting Arms and Ammunitions Manufacturers' Institute (SAAMI) specifications, finding all within the normal range. Likewise no primers showed the slightest signs of excessive flattening with any of the loads developed.

The first loads I assembled for the 9mm, based on supplied information, were seriously underpowered, in the sense that the gun didn't cycle and the cases seemed a bit dirty because I assume there wasn't enough pressure to seal them into the chamber properly. Once I had increased the charges sufficiently to make the gun cycle properly, these issues disappeared. The supplied 9mm load data from Australian Munitions was found to be quite conservative.

The most important test though considers what the bullet is doing, since this is what shooting is all about. Is the bullet travelling to the target at a reasonably uniform velocity and are the shots all grouping acceptably tightly? Different projectiles will retain velocity differently depending on their mass and shape, but as long as they're uniformly made they should group adequately. The home cast projectiles were carefully weighed to ensure they were satisfactory while the commercially-made ones were assumed to have been subject to quality control in manufacture. I elected to shoot groups of 10 shots, since smaller groups can become compromised by the odd flyer and larger ones would have taken too long and been difficult to score.

At the end of the testing I found I had a huge amount of data. The Shooting Lab software gives velocities at each of five distances as nominated for each shot, as well as velocity loss over the range in question and the ballistic coefficient for each shot. It then works out the average velocity, average deviation, standard deviation, velocity loss and a variety of other parameters and arranges them on a very neat print-out.

For each set of 10 shots I also kept the target. Once again, the Shooting Lab software enables group analysis by placing the fired target on to a calibrated computer screen and nominating each shot with a mouse click. When this is done the graphical analysis software works out group size, mean group centre and a number of other interesting criteria that would be hard to establish manually.

The one I like most is the 'average group radius' which gives a statistically weighted figure in Minutes of Arc (as well as inches) for the dispersal radius of the group. Among the best of the groups obtained was the 3.33MOA dispersal radius of the group shot over 50m from the .357 Magnum, with a load of 5.1gr of APS450. This load drove the 155-grain round nose projectile at an average velocity of 1022fps with a standard deviation of 8.2fps. If we use the rough rule of thumb of one inch at 100 yards for 1MOA, this translates

Australian Munitions Propellant Tests - 10-shot groups - March-April 2018

cartridge	firearm	Propellant	Charge (gr)	bullet type	bullet wt	Range (m)	mean V	sd	AGR	spread
9x19mm	Tisas 1911	APS350	2.90	Speer JSP	125gr	50	941.70	5.00	NR	NR
9x19mm	Tisas 1911	APS350	2.90	Lee RN cast	124gr	50	1012.20	5.10	NR	350
9x19mm	Tisas 1911	APS350	2.90	Frontier plated	124gr	50	946.90	9.90	NR	250
9x19mm	Tisas 1911	APS350	3.00	Lee RN cast	124gr	25	1009.50	6.00	8.87	168.9
.357M	Taurus 66-12	APS350	4.20	cast RN (RCBS)	155gr	50	967.00	13.70	3.99	174
.357 M	Taurus 66-12	APS350	4.20	cast RN (RCBS)	155gr	25	1021.40	14.30	3.60	112.5
.44M	S&W 629	APS350	6.20	Lee SWC T/L	240gr	25	1001.30	10.00	6.49	137.2
9x19mm	Tisas 1911	APS450	3.30	Frontier plated	124gr	50	970.70	5.10	NR	270
9x19mm	Tisas 1911	APS450	3.30	Speer JSP	125gr	50	973.30	4.70	NR	427
9x19mm	Tisas 1911	APS450	3.30	Lee RN cast	124gr	50	1036.40	9.70	NR	366
9x19mm	Tisas 1911	APS450	3.60	Lee RN cast	124gr	25	1062.10	9.60	16.76	325.6
.357M	Taurus 66-12	APS450	5.10	cast RN (RCBS)	155gr	50	1022.00	8.20	3.33	201.7
.357M	Taurus 66-12	APS450	5.40	cast RN (RCBS)	155gr	25	1108.40	11.50	4.46	147.8
.44M	S&W 629	APS450	6.50	Lee SWC T/L	240gr	25	986.70	16.60	6.51	146.3
.44M	S&W 629	APS450	7.10	Lee SWC T/L	240gr	25	1039.20	8.00	7.41	184.4
.44M	S&W 629	APS450	7.10	Lee sized SWC	240gr	25	1039.70	7.80	7.44	184.9

as a possible group size of just over 6" at 100 yards, meaning that this load in my gun should be capable of shooting 40/40 in the field silhouette match. If only I could match it!

In overview then, the accuracy obtained with all of the loads tested was acceptable and quite comparable to loads routinely shot in these firearms using AP70N and AP100 propellants. The only minor peculiarity occurred with the 9mm tumble lubed projectiles which, with equal charges, gave higher muzzle velocities than those obtained with jacketed or plated projectiles of the same weight. I found the new propellants under test conform to the claims made for them within the constraints of the tests I undertook, and they would appear to fill a useful place in the higher burning rate end of propellants offered by Australian Munitions.

The new propellants are available in 500g and 2kg containers. The updated manual which will include loading data for a wide variety of cartridges will be released in 2019. In the interim, load data will be published on the website at adi-powders.com.au/pistol ∎


Some of the projectiles used for the tests