

## Four nuclear capable missiles lined up for test this month

*India has lined up four indigenously developed nuclear capable missiles for tests this month*

*By Hemant Kumar Rout*

Bhubaneswar: India has lined up four indigenously developed nuclear-capable missiles for tests this month. The missions assume significance as the missiles to be flight tested from different platforms are capable of reaching all major cities of Pakistan.

The weapon systems slated for tests are submarine-launched long-range ballistic missile K-4, supersonic cruise missile BrahMos, intermediate-range ballistic missile Agni-II and short range ballistic missile Prithvi.

Defence sources on Sunday told The Express that K-4 has been scheduled for November 8, followed by two versions of BrahMos - surface-to-air and air-to-air - on November 11, Agni-II on November 16 and Prithvi on November 20.

While the Defence Research and Development Organisation (DRDO) will conduct a developmental trial of K-4 missile with advanced navigation systems from an underwater platform off Visakhapatnam coast, Strategic Forces Command (SFC) will carry out user trials of Agni-II and air-force version of Prithvi missile off Odisha coast.

BrahMos Aerospace will test fire two rounds of the cruise system to further demonstrate the weapon's ability for precision hit. With the two tests - one from land-based platform and another from fighter aircraft Sukhoi-30 MKI - BrahMos will be put on trial for the seventh time this year.

The missile, a joint venture of India and Russia, has undergone five successful tests including two each in May and October and one in September. The air-variant of the cruise weapon is expected to go into production after the test against sea-based target.

Though four nuclear-capable missiles being lined up for tests in one month amidst heightened tension along border sends a clear signal of the country's strategic preparedness, a defence official tried to cover it up stating that India sticks to its 'no first use' doctrine.

"Preparations are on in full swing for the tests. If weather permits, the missiles will be test fired as per the schedule. The focus will be on the performance of K-4 and Agni-II as both the missiles will be put to tests with new advanced systems," he said and added that the atmosphere in November allows better visibility to track the flight path.

Kept under wraps by the DRDO so far, K-4 is about 12 metre long with a diameter of 1.3 metre. Capable of three dimensional manoeuvres, it weighs around 17 tonne and is capable of delivering two tonne warhead up to a distance of over 3,500 km.

The underwater missile is considered a potential weapon for India as it can deceive enemy radars and target important installations deep in Pakistan from a standoff distance in the Bay of Bengal.

<http://www.newindianexpress.com/states/odisha/2019/nov/04/four-nuclear-capable-missiles-lined-up-for-test-this-month-2056717.html>



MISSILE, LAUNCH DATE	STRIKE RANGE
K4, Nov 8	3500 km
BrahMos, Nov 11	300 km
Agni-II, Nov 16	2000 km
Prithvi, Nov 20	350 km

## A breakthrough, but miles to go

THE DRDO recently demonstrated a land-based prototype of its fuel-cell based Air Independent Propulsion (AIP) system for Indian submarines to Navy Chief Admiral Karambir Singh.

The operation of the land-based prototype, was witnessed by Admiral Singh and G Satheesh Reddy, secretary, department of defence R&D and chairman DRDO, at the Naval Materials Research Laboratory in Ambernath, Maharashtra. Conventional submarines are powered by diesel-electric propulsion. The submarine has to periodically surface for diesel recharge, a time when it is most vulnerable.

AIP significantly extends the underwater stay of conventional submarines by providing an alternate source of electric power.

The fuel-cell is one of three such currently used technologies that the DRDO

has zeroed in on.

The Phosphoric Acid Powered Fuel Cell in AIP is "engineered to the form-and-fit of a submarine," DRDO says. Perfecting this could make India one of a handful of countries to develop an AIP.

India cited the DRDO project as reason to reject an offer to install French-built AIP kits on the fifth and sixth Scorpene class submarines currently being built at the MDL, Mumbai. However,

Navy officials say that the DRDO AIP has years to go before it is marinised and gyro-stabilised to fit inside a submarine. The DRDO has a shot at integrating the AIP into the lead boat of the INS Kalvari, when it comes in for its first long refit in 2024.

The Phosphoric Acid Powered Fuel Cell in AIP is "engineered to the form-and-fit of a submarine," DRDO says. But Navy officials say it will take time for AIP to be ready

## K-9 Vajra makes its desert debut



THE INDIAN ARMY'S K-9 Vajra self-propelled howitzer made its fiery debut in the deserts of Rajasthan in October as part of the Bhopal-based 21 Strike Corps' ongoing war exercises 'Sindhu Sudarshan'.

Self-propelled guns — howitzers mounted on a tank chassis — allow artillery provide mobile firepower as fast-moving strike corps move into enemy territory. The Army bought 100 of the K-9 towed artillery from the consortium of L&T and South Korea's Hanwha Techwin for ₹4,500 crore in 2018, a requirement that had been 20 years in the pipeline.

## Indian Army to have first Dhanush regiment by March 2020

The Indian Army, which began inducting the indigenously upgraded Dhanush artillery guns, will have the first regiment in place by March 2020 and will get all 114 guns by 2022, Army sources said. Dhanush is the indigenously upgraded variant of the Swedish Bofors gun imported in the 1980s.

“The first regiment of 18 guns will be in place by March 2020. We will get another 36 guns by March 2021 and another 40 by March 2022. The entire order for 114 guns will be completed by 2022,” an Army source said.

In April, the Ordnance Factory Board had handed over the first batch of six Dhanush guns. The Gun Carriage Factory, Jabalpur, received the Bulk Production Clearance to manufacture 114 guns from the Army on February 18, 2019.

The Defence Ministry had stated earlier that indigenisation to the extent of about 81%, has “already been achieved” and by the end of 2019, the level of indigenisation in the manufacture of the gun “will go up to 91%.”

### Options discussed

Sources said the induction process was reviewed at the recently concluded Army Commanders’ Conference and “various options for the employment were discussed”.

Dhanush is a 155 mm, 45-calibre towed artillery gun with a range of 36km and has demonstrated a range of 38 km with specialised ammunition. It is an upgrade of the existing 155m, 39 calibre Bofors FH 77 gun.

The Army recently procured 155mm Excalibur precision guided ammunition from the U.S. having the ability for targeted artillery strikes at extended ranges. Sources said the ammunition can be used with all 155-mm artillery guns in the inventory.

The Excalibur projectile is developed by Raytheon and BAE Systems Bofors, and according to information on Raytheon’s website, it provides accurate “first-round effects” at all ranges in all weather conditions and “extends the reach of .39-calibre artillery to 40 km and .52-calibre artillery to more than 50 km”.

### Phased trials

The first phase of trials of Dhanush were conducted between July to September 2016 at Pokhran and Babina ranges and the second phase was conducted between October to December 2016 at Siachen base camp with three guns. The last round of user exploitation trials were completed with six guns in June last year.

The gun is fitted with an inertial navigation system having global positioning system (GPS)-based gun recording and auto-laying, an enhanced tactical computer for on-board ballistic computations, an on-board muzzle velocity recording, an automated gun sighting system equipped with camera, thermal imaging, and laser range finder.

After close to three decades, the Army inducted its first modern artillery guns system in November last year. These include M-777 Ultra Light Howitzers (ULH) from the U.S. and K9 Vajra-T self-propelled artillery guns from South Korea.

<http://www.defencenews.in/article/Indian-Army-to-have-first-Dhanush-regiment-by-March-2020-757778>