Indian nuclear weapons capability

【Overview】

India is a non-signatory of the NPT that maintains a nuclear arsenal. As of April 2020, the country is believed to possess 150 warheads, up 20 on the year (Kristensen, Hans M. & Korda, Matt 2020). This estimate is based on the amount of weapons-grade fissile matter likely in India's possession as well as the number of potentially available nuclear-capable delivery systems.

India's nuclear weapon is believed to be plutonium-based (Kile, Shannon N. & Kristensen, Hans M. 2019). As of January 2017, India possessed approximately 580 kg of weapons-grade plutonium (International Panel on Fissile Materials 2018). There are reports of new processing facilities under construction and increased plutonium production (Kristensen, Hans M. & Korda, Matt 2018). Given that 4-6 kg of plutonium is needed to manufacture a nuclear bomb (although this is influenced by the level of technology), this amount is the equivalent of 97-145 nuclear warheads. With higher levels of technical sophistication, however, it is possible to obtain a bomb from 2-4kg plutonium, in which case the same Indian stockpile would suggest an arsenal of 145-290 warheads (Union of Concerned Scientists 2004). The warheads are not deployed, and they are viewed as being held in a central depository. India possesses about six tons of reactor-grade plutonium with a view to future usage, in addition to weapons-grade plutonium cited above (International Panel on Fissile Materials 2018). India is also increasing production of highly enriched uranium (HEU), presumably for use aboard nuclear submarines (International Panel on Fissile Materials 2018).

India, like the U.S. and Russia, is aiming to build a three pillar system of nuclear weapons. India is strengthening and modernizing its nuclear capability. The background is its strained relationship with Pakistan but it has been pointed out that, in recent years, China deterrence is gaining focus(e.g. O'Donnell, Frank & Bollfrass, Alexander K. 2020). India's nuclear capability consists of five types of ground-launched ballistic missile, one sea-launched ballistic missile type, and two types of aircraft. There are also at least five more types of ballistic missiles in development (two ground-launched, two sea-launched and one air-launched). One of them, Agni-5, has a range approximating the ICBM trajectory and Agni-6 is expected to have a longer reach. It is also believed that India is planning to build a fleet of four to six Indian-manufactured SSBN (Kile, Shannon N. & Kristensen, Hans M. 2019). The first vessel Arihant, which launched in 2009 and was officially commissioned in 2016, suffered a severe flooding accident in 2017. Though Indian government announced the completion of the repair work on November 2018 and Arihant finished its first deterrent patrol in the same year, it is not clear whether the vessel was carrying a nuclear warhead (Kile, Shannn N. & Kristensen, Hans M. 2019). Arighat, the second Arihant-class submarine also launched in 2017, and third and fourth vessels will launch in 2020 and 2022, respectively (Kile, Shannon N. & Kristensen, Hans M. 2018).

- Nuclear warheads 150

- Nuclear weapons delivery vehicles [1)]

Type / designation	Missile/ bomb	No. of warheads per weapon	No. of warheads	Range (km)	Payloads (kg)	Year first deployed	Remarks
Ground-launched ballistic missile			70				
Prithvi- 2	24	1	24	350	500	2003	2)
Prahaar	?	1	?	150	200	In development	3)
Agni – 1	26	1	26	700 +	1,000	2007	4)
Agni – 2	10	1	10	2000 +	1,000	2011	5)
Agni – 3	10	1	10	3,200 +	1,500	2014?	6)
Agni – 4	?	?	?	3,500 +	1,000	2018?	7)
Agni – 5	?	?	?	5,200 +	1,000	2020?	8), 9)
SLBM							
Dhanush		1	4	400	500	2013	10)
Sagarika (K-15/B-05)	(22)	1	(22)	700	500 - 600	2018?	11)
K-4	(4)	?	(4)	3,000	?	In development	12)
Airborne weapons			36				13)
Loading machine : Mirage 2000H (Vajra)	32	1	32	1,850	6,300	1985	14)
Loading machine : Jaguar 1S/1B (Shamsher)	16	1	16	1,400	4,760	1981	15)
Air-launched cruise missile							
Nirbhay	?	?	?	(>700)	?	In development	16)

【Notes】

1) The source for information on missile / bomb, No. of warheads per weapon, range, and year first deployed is **Kile, Shannon N. & Kristensen, Hans M. 2019**. The source for information on payloads is **Kile, Shannon N. & Kristensen, Hans M.2015**.

2) Single-stage. Liquid propellant. Road-mobile. The yield of the nuclear warheads is 12kt. The latest test launch was conducted on December 3, 2019 (**The Economic Times 2019**).

3) Single-stage. Liquid-propellant. Road-mobile. A successor to Prithvi 1 (150km range). The latest test launch was conducted on September 20, 2018 (**Molenda, Jenevieve 2018**). It is also reported that India is developing a new ground-launched ballistic missile, Pranash, an advanced version of Prahaar with extended range of 200km (**Hindustan Times 2020**).

4) Two-stage. Solid-propellant. Road-mobile. The yield of the nuclear warhead is 40kt. Operational in 2007 and deployed with 334th Missile Group (**Kile, Shannon N. & Kristensen, Hans M. 2014**). The latest test launch was conducted on October 30, 2018 (**NDTV2019**).

5) A modified variant of the Agni-I. Two-stage. Solid-propellant. Road-mobile. The yield of the nuclear warhead is 40kt. The latest test launch was conducted on November 17, 2019, which is believed to be its first night launch (**INDIA TV 2019**).

6) Two-stage. Solid-propellant. Rail-mobile. (Single-stage, Road-mobile, according to some documentation.) The yield of nuclear warhead is 40kt. The latest test launch was conducted on November 30, 2019, which is believed to be its first night launch (Sputnik 2019).

7) Two-stage. Solid-propellant. Road・Rail-mobile. (Road-mobile, according to some documentation (Kile, Shannon N. & Kristensen, Hans M. 2018).) The yield of nuclear warhead is 40kt. The latest test launch was conducted on December 23, 2018 (NDTV 2018).

8) Three-stage. Solid-propellant. Road-mobile. The first test launch was conducted on April 19, 2012. The latest test launch was conducted on December 12, 2018 (The Economic Times 2018). Unlike other types in the Agni series, the Agni-5 is cased, for quicker response, in a newly developed mobile canister (launch tube), from which it is fired. While many reports allude to Indian plans to MIR the Agni-5, Kristensen and Norris discount the scenario (Kristensen, Hans M. & Korda, Matt 2018).

9) The Agni-6, an ICBM with an extended range, is believed to be in development (Kristensen, Hans M. & Korda, Matt, 2018). The U.S. Air Force's National Air and Space Intelligence Center sees the Agni-6 to be in design phase and estimates its strike range at 6,000km (National Air and Space Intelligence Center 2017).

10) Single-stage. Liquid-propellant. The yield of nuclear warhead is 12kt. The naval version of the Prithvi-2. It is launched from Sukanya-class offshore patrol vessels. Each ship carries two Dhanush missiles (Kristensen, Hans M. & Korda, Matt 2018). The latest test launch was conducted on February 23, 2018 (The Times of India 2018-2).

11) Two-stage. Solid-propellant. The yield of nuclear warhead is 12kt. INS Arihant is capable of carrying 12 K-15 missiles (Kristensen, Hans M. & Korda, Matt 2018) Some reports allege INS Arighat is capable of carrying 24 K-15 missiles but this is unconfirmed (Kile, Shannon N. & Kristensen, Hans M. 2018). The latest test launch was conducted on January 27, 2013 (Mallikarjun, Y. & Subramanian, T. S. 2013). It will be deployed on Arihant-class submarines. Arihant nuclear submarine can carry 12 K-15 missiles (Kristensen, Hans M. & Korda, Matt 2018). The ground-launched model of the K-15 is called the Shourya, and it may attain nuclear capability (Missile Threat 2018-2). Shourya was successfully test launched for the third time on September 23, 2011 (Subramanian, T. S. & Mallikarjun, Y. 2011).

12) Two-stage. Solid-propellant. The latest test launch was conducted on January 19, 2020 (NDTV 2020). INS Arihant can carry four K-4 missiles (Kristensen, Hans M. & Korda, Matt 2018). INS Arighat and newer vessels are believed to be capable of carrying eight missiles (Kile, Shannon N. & Kristensen Hans M. 2019). There are reports on the ongoing development of a K-5 variant with a 5,000km range. India's Defence Research and Development Organisation (DRDO) has announced plans to develop the range-extended K-6 missile. (Kile, Shannon N. & Kristensen, Hans M. 2019).

13) Other fighter-bombers (including the Su-30MKI) are believed to have a secondary role in delivering nuclear missions.

14) No. 1 Squadron and No. 7 Squadron (possibly 9) of 40 Wing are deployed at Maharajpur Air Force Station, and 1 or 2 Squadron is thought to have a nuclear mission (Kristensen, Hans M. & Korda, Matt 2018). Upgrades continue, with the latest model known as the Mirage 2000 I.

15) Out of four squadrons (a total of 76 aircraft), two are considered to have nuclear missions (Kristensen, Hans M. & Korda, Matt 2018).

16) Nirbhay, an air-launched cruise missile in development (700-1,000km range, 450kg payload), is suspected of nuclear capability. Tests since 2013 continued to fail, with the fifth finally succeeding on November 8, 2017 (**Pandit, Rajat, 2017**). The latest Nirbhay test is dated April 15, 2019. (**Gady, Franz-Stefan 2019**). On February 6, 2020, Defence Research and Development Organisation (DRDO) announced the completion of the Nirbhay development program and also revealed a new development plan of several cruise missiles, including a successor to Nirbhay (**Dahlgren, Masao 2020**).

【Source】

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