

India Successfully Tests Agni-Prime Missile from Rail-Based Launcher | Strategic Significance Explained

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Agni-Prime Missile Latest News

- The Defence Research and Development Organisation (DRDO) successfully test-fired the **Agni-Prime (Agni-P) missile** from a **rail-based mobile launcher**.
- This launch has placed India among a **select group of nations** — Russia, the US, China, and possibly North Korea — with the capability to launch long-range ballistic missiles from railway platforms using **canisterised launch systems**.

Agni Series of Missiles

- The Agni series is India's family of nuclear-capable ballistic missiles, developed under the Integrated Guided Missile Development Programme (IGMDP) by the Defence Research and Development Organisation (DRDO).
- They are a key element of India's strategic deterrence capability.

- **Agni-I (1989):** A medium-range ballistic missile (MRBM) with a range of 700–1,000 km. It was India's first in the series and is road- and rail-mobile.
- **Agni-II (1999):** A two-stage solid-fuel missile with a range of 2,000–3,000 km, capable of carrying nuclear warheads.
- **Agni-III (2006):** An intermediate-range ballistic missile (IRBM) with a range of 3,500–5,000 km, providing wider regional coverage.
- **Agni-IV (2011):** Improved navigation and accuracy, range of 3,500–4,000 km, lighter and more advanced than Agni-III.
- **Agni-V (2012):** An intercontinental ballistic missile (ICBM) with a range of 5,000–8,000 km, extending India's deterrence to cover much of Asia and parts of Europe and Africa.
- **Agni-P (Agni-Prime, 2021):** A next-generation variant with a range of 1,000–2,000 km, combining advanced technologies from Agni-IV and V, lighter, more accurate, and canisterised.
- **Agni-VI (under development):** Expected range of 8,000–10,000 km, with potential multiple independently targetable re-entry vehicle (MIRV) capability.

Agni-P: The Next-Generation Upgrade to Agni-I

- India's Agni missile series, developed since the late 1980s, began with the **Agni-I medium range ballistic missile** (700–1,000 km range) tested in 1989.
- While Agni-I remains in service, defence planners sought upgrades, leading to the development of **Agni-P (Agni-Prime)**.
- Agni-P combines Agni-I's range with advanced **propulsion and navigation technologies** from Agni-IV and Agni-V.
 - It is the sixth missile in the Agni series.
- Weighing 11,000 kg, it is a **two-stage, solid-fuel missile** with an operational range of **1,000–2,000 km**, capable of carrying **high explosive, thermobaric, or nuclear warheads**.
- A nuclear-capable version tested in 2021 drew praise from the then Defence Minister, who said it would further bolster **India's Credible Deterrence capabilities**.

Mobile Launch Platforms and India's Second-Strike Capability

- Mobile launch systems are vital to a nation's **second-strike capability**, enabling it to retaliate after a nuclear attack.
- For India, which follows a **"no first use" nuclear doctrine**, such survivability is critical.
- Advances in **satellite imagery, missile accuracy, and sensing technologies** have made stationary silos increasingly vulnerable.
- As noted by defence experts, silos face heightened risks from both conventional and nuclear strikes.
- To counter this, militaries rely on **mobile launch platforms** — submarines, aircraft, and road or rail-based launchers — which are harder to detect and more resilient in an all-out conflict.

Advantages of Rail-Based Missile Launchers

- Rail-based missile platforms offer distinct advantages over road or sea systems.

- While road-based launchers are constrained by road width and quality, India's **70,000-km railway network** enables nationwide mobility without major preparation.
- The **numerous railway tunnels** provide natural hiding spots, allowing launchers to evade enemy satellite surveillance and remain concealed until deployment.
- Compared to **submarine-launched ballistic missiles (SLBMs)**, rail-based platforms are also **cheaper to build and maintain**, making them a more efficient and scalable option for strengthening strategic deterrence.

Countries with Rail-Based Missile Technology

- India's recent test places it among a **select group of nations** with rail-based missile launch capability.
- The idea dates back to the **Cold War**, when both the US and USSR explored rail-mobile ICBMs.
- The **US studied rail launchers** for its Minuteman ICBMs in the 1950s and again planned Peacekeeper deployment in the 1980s, but abandoned both due to cost and the Soviet collapse.
- The **Soviet Union successfully deployed** the RT-23 Molodets rail-based ICBM system, later dismantled under the **START Treaty**.
 - Russia later considered reviving the concept with the Barguzin system but shelved it in favour of hypersonic missile development.
- In **2016, China reportedly tested** a rail-mobile version of its DF-41 ICBM.
- **North Korea** has also tested rail-based short-range ballistic missiles (SRBMs), demonstrating their mobility and survivability.
- Experts note that rail-based missiles are a **cheap, reliable option** for enhancing nuclear force survivability, with Russia pioneering it, the US considering it, and North Korea actively pursuing it.

Source: IE | FP | PIB

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