

## **Kalam-4 Missile, Range, Length, Capacity, Development**

May 12, 2025 • vajiramandravi.com



Kalam-4 or K-4 Missile is a nuclear capable intermediate-range submarine launched ballistic missile developed by DRDO to support its Arihant class submarines. The missile has a range of maximum 3,500 km, providing an operational flexibility. Kalam-4 is the first missile to operationalize India's sea-based nuclear triad and accommodate the demand of credible second-strike capability of its nuclear doctrine.

### **Kalam-4 Missile Development**

The strategic value of submarine-launched nuclear weapons has long been recognised due to their inherent advantages in flexibility, survivability, and operational secrecy—qualities that align closely with India's doctrine of 'No First Use' and its policy of credible minimum deterrence.

India's first indigenous nuclear-powered ballistic missile submarine (SSBN), INS Arihant, was launched in 2009 and commissioned in 2016. While its initial armament—the K-15 submarine-launched ballistic missile (SLBM)—had limited range, this shortfall has been progressively addressed with the development of longer-range variants.

In January 2010, the K-4 missile underwent a classified test off the coast of Visakhapatnam. The 10-metre-long, 1.3-metre-wide missile was launched from a submerged pontoon located 50 metres underwater. Upon launch, it successfully breached the surface, validating critical technological capabilities. A follow-up test further

demonstrated the missile's ability to withstand 50 kg/cm<sup>2</sup> of water pressure and launch effectively from a submerged platform before its booster ignition phase.

**Also Read:** [Dhanush Missile](#)

## Kalam-4 Missile Features

The **K-4** is a two-stage, submarine-launched ballistic missile (SLBM) developed by India's DRDO. Designed for strategic deterrence, it is capable of high-precision strikes and features advanced countermeasures to evade ballistic missile defence systems.

### Key Specifications include:

- **Length:** Approximately 12 metres
- **Diameter:** 1.3 metres
- **Launch Weight:** Nearly 17 tonnes
- **Warhead Capacity:** Up to 2 tonnes (conventional or nuclear)
- **Propulsion:** Solid rocket motor
- **Range :**
  - 3,000 km with full payload
  - 4,000 km with reduced payload (exact figures classified)
- **Guidance:** Inertial navigation system with satellite augmentation (GPS/NavIC)
- **Accuracy:** Circular Error Probable (CEP) of less than 10 metres (reported)

**Also Read:** [Prahaar Missile](#)

## K-4 Missile Design and Operational Features

K-4 Missile has the following design and operational features:

- The K-4 is engineered to perform three-dimensional maneuvers, enhancing its survivability against interception by missile defence systems.
- It features a nose-mounted underwater propulsion system with dual nozzles. This motor facilitates the missile's launch from a submerged platform by creating a gas bubble envelope that reduces drag during

underwater travel.

- As the missile ascends through water and breaks the surface, aerodynamic control is maintained by four control surfaces at the missile's base.
- After the burnout of the nose-mounted motor, a base shroud containing the control actuation system is ejected. The missile's first stage ignites immediately after to ensure continuous thrust.
- The flex-nozzle system enables precise steering during the boost phase.
- The missile's aerodynamic nose cone design, similar to a blunt cone or aerospike configuration, reduces drag and thermal stress during atmospheric flight.

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