

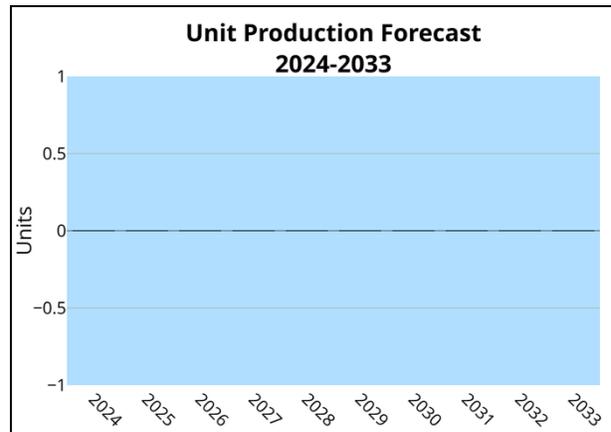
ARCHIVED REPORT

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C-90 Series

Outlook

- Serial production on an as-needed basis only
- C-90 performed well during Spanish Army combat deployments, but lack of name recognition continues to hinder export sales
- Forecast reflects C-90 family of weapons for Spanish Army procurement and possible export, though no orders have been made public, and aside from delivery of legacy systems to Ukraine in 2022 by Spain there has been little activity to suggest ongoing production



Orientation

Description. Man-portable anti-armor and bunker-busting weapons.

Sponsor. Instalaza initially pursued the C-90 program as a private venture. The Spanish Army sponsored the further development and procurement of the C-90 (also known as the M3).

Status. Development through as-needed serial production.

Total Produced. Through 2024, we estimate that Instalaza produced at least 270,299 C-90 series weapons.

Application. A lightweight, man-portable, shoulder-fired, disposable anti-armor and multipurpose weapon system.

The C-90-CR-BK is optimized for bunker-busting applications.

Price Range. In 2022 U.S. dollars, the C-90-C reportedly maintains a unit price of \$2,169.

Contractors

Instalaza SA	https://www.instalaza.es , Monreal 27, Zaragoza, Spain, Tel: + 34 976 2934 23, Fax: + 34 976 2993 31, Email: instalaza@instalaza.es , Prime
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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 75 Glen Road, Suite 302, Sandy Hook, CT 06482, USA; rich.pettibone@forecast1.com

C-90 Series**Technical Data**

Dimensions. The following data reflect the production-standard C-90-CR, with data for the C-90-CR-RB in parentheses.

	<u>SI Units</u>	<u>U.S. Units</u>
Projectile length	82.5 (92.5) cm	32.48 (36.42) in
Total length	98.4 (98.4) cm	38.74 (38.74) in
Projectile diameter	90 (90) mm	3.54 (3.54) in
Total diameter	11.5 (11.5) cm	4.53 (4.53) in
Projectile weight	3.65 (3.98) kg	8.03 (8.76) lb
Total weight	5.0 (5.0) kg	11.0 (11.0) lb
Finspan	19.5 (21.0) cm	7.68 (8.27) in
Cone standoff	3.6 (3.6) cal	3.6 (3.6) cal

Performance. The range data reflect the effective anti-armor range. The C-90-CR-AM features an anti-personnel range of 800 meters (874.88 yd). The armor perforation data reflect the contractor's published literature. The warheads of all the variants (except the original C-90-C, the C-90-CR, and C-90-CR-RB) are

	<u>SI Units</u>	<u>U.S. Units</u>
Speed	140 (180) mps	459.31 (590.54) fps
Altitude	Line of sight	Line of sight
Range	300 (300) m	328.08 (328.08) yd
Armor perforation	40 (48) cm	15.75 (18.9) in

Propulsion. A solid-fuel rocket motor of unidentified designation. In the C-90-C, the motor burns for 8 milliseconds. While the burn time differs in other models, the motor burns out before the projectile exits the launch tube. The munition features a pyrotechnic ignition system.

Launcher Mode. The C-90 launcher consists of a lightweight, reinforced aramid-resin launch tube with a permanently fixed firing mechanism and sights. The operator disposes of the entire launcher after firing.

Control & Guidance. After the munition exits the launch tube, six spring-loaded fins deploy to provide aerodynamic stabilization to the warhead in flight.

optimized for multipurpose uses, including anti-personnel and perforation of bunkers. The contractor states that the C-90-CR-BK (formerly C-100) features a bunker perforation performance with follow-through of 25 centimeters (9.84 in).

Warhead. All C-90 production models (except the C-90-CR-FIM) feature high-explosive shaped-charge warheads with differing geometries and composition. For a complete list of available warhead options, see the **Program Review** below.

The more recent MAT-120 warhead is a submunition-dispensing type; the (possibly anti-personnel) submunitions self-destruct if they do not detonate in the normal manner.

Instalaza may have based another new warhead, the Alhambra, on its advanced-design hand grenade of the same name. The warhead is reportedly a fragmentation type with a non-pyrotechnic tracer element.

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90mm C-90 Shoulder-Launched Weapon System

Source: Instalaza SA

Variants/Upgrades

Variants. None. The contractor develops different versions of the basic C-90 as distinct production models.

Modernization and Retrofit Overview. Not applicable. The contractor integrates any product improvements as production cut-ins.

Program Review

Background. In 1979, Instalaza SA, a firm with more than four decades of experience in the armaments industry, began the development of a new anti-armor/multipurpose weapon to meet a Spanish Ministry of Defense requirement. The contractor also looked to the new weapon as a potential replacement for its popular 89mm Model 65 rocket launcher. This lightweight multipurpose weapon remains in service with Spain and at least 13 other nations.

Rapid Development and Fielding

Development of the initial version of the C-90, designated C-90-A, ran into the early 1980s. Manned firings commenced in 1983. Operational evaluations began the following year. Spanish Army procurement of the slightly revised version (designated C-90-B) began in 1985. Also in 1985, Instalaza secured the initial export sale to an unidentified customer.

Description. The basic C-90 is a lightweight, simple, and easy-to-use system that is especially rugged.

Simple and Adaptable

The disposable container/launcher is a factory-loaded unit with sealed ends to protect the munition. The launch tube features a permanently fixed firing mechanism and sight. The C-90 requires no power source for the sights or firing mechanism, making the weapon insensitive to stray electrical effects. The weapon includes a shoulder support and sling. For use at night, Instalaza developed the VN38 passive night-vision device, which the operator can quickly mount on the weapon.

Each C-90 munition comprises three basic components:

- The specialized warhead
- The pyrotechnically activated fuze system
- The solid rocket motor at the rear

The C-90 series of weapons are available with a range of warhead options tailored to specific mission areas. Each model of the C-90 features a different rocket and warhead combination for a specific application, as follows:

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C-90-A	Original developmental model; never reached serial production
C-90-B	Basic production model, with iron sights for anti-armor use
C-90-C	Redesigned basic model, with optical sights for anti-armor use
C-90-C-AM (M3)	Combined anti-armor/anti-personnel warhead. Features a fragmentation component (1,000+ fragments), with a lethal radius of 21 meters (59.05 ft)
C-90-CR-AM (M3)	A slightly larger and longer-range model of the C-90-C-AM
C-90-CR (M3)	Enhanced-performance model of the C-90-C
C-90-CR-RB (M3)	The anti-armor model, featuring the best armor-perforation performance
C-90-CR-FIM (M3)	Features a combined smoke/incendiary warhead

Sequence of Operation

After removing the protective end caps, the operator acquires the target through the day/night optical sight. This sight features two dots of tritium to illuminate the graticule at night. The sight provides a 13° field of view, which equates to a 45-meter (147.6-ft) span at 200 meters (218.72 yd). Optical acquisition and sighting are possible out to a range of 350 meters (383.92 yd).

To ready the weapon for firing, the operator places the selector switch in the fire position, pulls the cocking lever, and releases the safety catch. After the operator pulls the trigger, the solid-fuel rocket ignites pyrotechnically in 5 milliseconds. The propellant charge burns out before the projectile exits the launch tube, preventing injury to the operator.

TR-90 Training System

In order to provide realistic yet simple and cost-effective training for the C-90 series of weapons, Instalaza developed the TR-90 training system. The TR-90 launcher, including the optical sight and firing

mechanism, is essentially identical to the all-up system. The major difference is that the TR-90 fires an aluminum dart-shaped projectile powered by two small propellant charges. The propellant gas acts in two directions; the rear-moving gas compensates for the recoil and closely simulates firing a live projectile.

Since the only items needing replacement in the TR-90 are the plastic stabilization assembly and the small propellant cartridge, the training costs are among the lowest for all systems of this type.

Combat-Proven C-90 Series

With the C-90 series of weapons, Instalaza has developed an anti-tank/assault weapon that is technologically comparable to any similar competing system. As with most other weapons in this class, the HEAT warheads of the C-90 are ineffective against explosive reactive armor (ERA). Nevertheless, the combat-proven C-90 series is more than able to hold its own against lightly armored vehicles and structures in urban or wooded areas, where the system's relatively short range is less of a handicap.

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90mm C-90, Ready to Fire

Source: www.congedatifolgore.com

Funding

Instalaza SA initially pursued the development of the C-90 as a private venture. The Spanish Ministry of Defense sponsored further development and Spanish Army procurement of the C-90 series.

Worldwide Distribution/Inventories

Export Potential. Despite the fact that at least 16 nations have reportedly procured C-90s, this versatile and cost-effective family of light multipurpose weapons has yet to make a significant impact on the international market. Instalaza's relative lack of name recognition continues to hinder export sales.

Countries. In addition to **Spanish Army** procurement, **Saudi Arabia** purchased at least one member of the C-90 family. Instalaza has reportedly also secured export sales to at least 11 other nations in **Asia, Europe, Central America, and South America.**

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Forecast Rationale

The Spanish Army has reportedly used the C-90 with good results during combat operations. However, despite the surge in international demand for weapons of this class, the Forecast International Weapons Group does not expect that a proven combat record will significantly enhance C-90 export sales. In a glutted market, the C-90's better-known competitors are more likely to reap the near-term benefits of this increased demand.

Spain's Defense Budget Dilemma

Though the Spanish defense budget has grown since the outbreak of Russia's invasion of Ukraine, the fiscal noose remains tight around the Spanish Ministry of Defense's capitalization earmark. Unless the MoD can

find ways to tease out additional spending flexibility for replenishing or upgrading existing stocks, there will remain little room for the purchase of further C-90 equipment for the Spanish Army.

Spain Remains Primary Customer

The C-90 contractor, Instalaza SA, anticipates a moderate level of demand for the weapon and continues to promote it on its website. As Instalaza does not release customer information, we are unable to evaluate the actual export market for the C-90. We do know, however, that the C-90 is in service with at least 12 nations in addition to Spain. Nevertheless, the Spanish Army will continue to be the primary market for the C-90, if further orders are made.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Instalaza SA												
C-90 Tube												
	270,299	0	0	0	0	0	0	0	0	0	0	0
Total	270,299	0	0	0	0	0	0	0	0	0	0	0