De Zeven Provincien Class

Outlook

- Greek frigate competition lost to FREMM
- No export sales likely despite excellent qualities of these ships
- Domestic procurement may include two ships to replace remaining pair of Karel Doorman class

Orientation

Description. Guided missile air defense and command frigate or destroyer (FFG/DDG). Officially classified as frigates, but due to size and role, these ships can be considered destroyers. The first two ships are equipped with full task-group-command capabilities; the second two are restricted to anti-air defense.

Sponsor. The Royal Netherlands Navy.

Status. In service.

Total Produced. All four ships of this class are active.

Mission. The primary mission of the first pair of these ships is to function as flagships for task groups of the fleet, with full command capabilities; the second pair is for air defense purposes. The requirement for theater missile defense has been taken into consideration and is an integral part of the frigates' anti-air warfare definition.

Price Range. An average unit price of $475 million is estimated for the whole class, based on publicized contract data and the differences in the capability levels between the first and second pairs of ships (LCF vs. NLF). In September 1996, the Dutch Ministry of Defense stated that the second pair of ships would cost EUR549 million ($750 million) thanks to the deletion of full command capabilities, some EUR65.7 million less than the first pair ordered in 1995.

Pennant List

Number & Name	Builder	Launch Date	Commission Date
F-802 *De Zeven Provincien*	Schelde	4/8/2000	4/26/2002
F-803 *Tromp*	Schelde	4/7/2001	3/14/2003
F-804 *De Ruyter*	Schelde	4/13/2002	3/2004
F-805 *Evertsen*	Schelde	4/5/2003	3/2005

Contractors

Prime

De Zeven Provincien Class

Royal Schelde Group, Royal Schelde	http://www.schelde.com, Glacisstraat 165, PO Box 16, Vlissingen, 4380 AA Netherlands, Tel: + 31 118 485 000, Fax: + 31 118 485 050, Prime

Subcontractor

Oto Melara SpA	http://www.otomelara.it, Via Valdilocchi 15, La Spezia, 19136 Italy, Tel: + 39 0187 5811 11, Fax: + 39 0187 58266, Email: press-office@otomelara.it (127mm L54)
Raytheon Missile Systems	http://www.raytheon.com, 1151 E Hermans Rd, Tucson, AZ 85706 United States, Tel: + 1 (520) 794-3000, Fax: + 1 (520) 794-1315 (SM-2 Missiles)
Rolls-Royce Naval Marine Inc, Bird Johnson Co	http://www.rolls-royce.com, 110 Norfolk St, Walpole, MA 02081 United States, Tel: + 1 (508) 668-9610, Fax: + 1 (508) 660-6152 (Spey Marine Gas Turbine)
Thales Nederland BV	http://www.thalesgroup.com/netherlands, Haaksbergerstraat 49, Hengelo, 7554 PA Netherlands, Tel: + 31 74 2488111, Fax: + 31 74 2425936, Email: info@nl.thalesgroup.com (Goalkeeper; SEWACO TACTICOS; Smart-L Radar; APAR; Scout)

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

	Metric	U.S.
Dimensions		
Length – Overall	144.2 m	473.1 ft
Length – Waterline	130.7 m	428.8 ft
Beam	18.8 m	61.7 ft
Draft	5.2 m	17.1 ft
Flight Deck	27x18.8 m	88.6x61.7 ft
Displacement		
Full Load	6,044 tonnes	
Performance		
Speed	52-55 kmph	28-30 kt
Range	9,250 km at 33 kmph	5,000 nm at 18 kt
Crew	202 (32 officers)	

	Type	Quantity
Armament		
Missiles – SSM	Harpoon	8
Missiles – SAM	Standard SM2-MR Blk IIIA	32
	Evolved SeaSparrow	32 (quad pack)
Missiles – SAM Launchers	Mk 41 VLS	40 cells
Guns	Oto Melara 127mm L54	1
	Oerlikon 20mm	2
CIWS	Thales Goalkeeper 30mm	1 (provision for second)
Torpedo Tubes	Mk 32 Mod 9 fixed	2x 2
Torpedoes	Mk 46 Mod 5	12
Helicopter	NH90/Lynx	1

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	Type	Quantity
Electronics		
Radars – Air Search	Thales SMART-L (3D, D)	
Radars – Air/Surface Search/Fire Control	Thales APAR	
Radars – Surface Search	Thales Scout (I-band, LPI)	
Radars – IFF	Mk XII	
Radars – Navigation	Decca 1226	
ESM/ECM	Thales Sabre intercept/jam	
EO Surveillance System	Mirador	
EW (Countermeasures)	SRBOC Mk 38 launchers	4
Combat Data System	Thales SEWACO X	
Weapons Control	Sirius IRST optronic	
Sonar	STN Atlas DSQS-24C (MF)	
Machinery		
Configuration	CODOG	
Gas Turbines	Rolls-Royce Spey	2x 26,150 shp
Diesels – Propulsion	Stork-Wärtsilä 16V26ST	2x 6,800 shp
Diesels – Power Generation	Alstom Paxman 12VP185	4x 1,650 kW
Gearboxes		2
Propellers	Controllable pitch, 2 shafts	2

Design Features. The De Zeven Provincien class is an enlarged air warfare derivative of the ASW-oriented Karel Doorman class. The inclusion of the sensors required for the ship's new role meant reconfiguring the sensor suite of the platform and redesigning the superstructure to minimize the radar cross-section. The design process exploited the latest technologies in virtual reality simulation to eliminate the need to build detailed physical mock-ups of the ship's bridge, combat information center, or machinery spaces. Consequently, substantial savings were achieved in both time and money as a result of this computerized design process. The construction is based on the use of modular structures, allowing the construction of a number of major parts of the ship simultaneously at different sites.

The design includes a new blast- and fragment-resistant bulkhead technology, called PriMa. The double-plated steel bulkheads are connected by way of an unstiffened single-plate attachment to the upper and lower decks and to the side walls. As a result of this design, the bulkheads have a membrane-like blast absorption quality. This allows the ship to maintain structural integrity even if the hull is severely distorted by the blast from an explosion. The bulkheads' double-plated construction also provides protection against penetration by missile fragments. They divide the ship into seven autonomous internal zones for more effective damage control. Special attention has been given to the integration of explosion-resistant hatches on the ship; the objective was to avoid weakening the integrity of the bulkheads, which would degrade their membrane-like behavior and ballistic-stopping-action performance.

The new bulkhead design is part of an overall integrated approach to boost the ship's survivability in combat situations. In addition to physical strength, this also includes a reduction in the vessel's susceptibility to enemy hard/soft-kill measures and to enemy sensors (i.e., through infrared and radar signature management).

Originally, the main engines for this class were to be new Rolls-Royce WR-21s, which will also be deployed on the Royal Navy's Type 45 destroyers. Unfortunately, delays in the timescale of the WR-21 made this option impossible, so the decision was made to retain the Rolls-Royce SM-1C Spey gas turbines. However, when the ships were designed, the engine room was designed with the WR-21 in mind, and there is room for these turbines. It is likely that the ships will receive the WR-21 later on in their operational lives, a move that would substantially increase fuel efficiency and engine power. The cruise engines are two Wartsila diesel engines. The power train drives two adjustable counter-rotating propellers. Also unique to this ship class is the use of commercial off-the-shelf (COTS), standard ABB aluminum motors to drive a number of essential onboard functions, such as pumps for fuel delivery and chilled water for refrigerating equipment.

Operational Characteristics. The ships are fitted with the STN Atlas DSQS-24C hull-mounted systems. These systems have substantially increased processing power over their predecessor models, improving their detection and classification performance in difficult environmental conditions such as increased ambient noise, salinity layers, and false contacts caused by rocks and shipwrecks.

The De Zeven Provincien class ships are armed with a mix of Standard SM-2 Block IIA missiles and Evolved SeaSparrows integrated with the selected SMART-L and APAR radars and the SEWACO FD command system. The ships can be upgraded to a sea-based

theater missile-defense capability by using SM-2 Block IVA missiles.

For traditional surface warfare functions, the ships are fitted with Harpoon missiles and a 127mm Oto Melara gun that can also be utilized for naval fire-support. Thales' USFA business unit and the Dutch TNO Physics & Electronics Laboratory are in the process of developing a new-generation proximity fuze for this gun under the acronym MEDEA (Multirole Extended-range Digital Electronic Artillery). Its functions include impact; delayed impact; proximity to land, sea, and air targets; and programmed time detonation.

The ships carry a single NH90 helicopter. These are principally intended as an anti-submarine warfare (ASW) weapon, but they also have ASuW capability using air-launched Harpoon.

Launch of De Zeven Provincien

Source: Royal Netherlands Navy

Variants/Upgrades

LCF. Commonly used designator for the Dutch version of the ship, especially in non-Dutch literature. The acronym refers to the Dutch description *Luchtverdedigings en Commando Fregat* (Aerial Defense and Command Frigate). This is applied to the first pair of ships, which is equipped with full task-group-command capabilities.

NLF. The second pair of the De Zeven Provincien class ships is designated as NLF (*Nieuw Luchtverdedigingsfregat*, or New Air Defense Frigate). These ships are restricted to air defense duties and do not have group command capabilities.

RNLN Future Surface Combatant. The De Zeven Provincien class LCF will be followed by a yet-to-be-defined surface combatant, which is expected to enter service around 2012, although this schedule now appears impossible to meet. It is possible that this program could be closely coordinated with the Belgian Navy. The two countries have very similar naval defense requirements because of their geographical location and position in NATO. Cost savings from sharing the same platform with another country would be considerable for either operator navy.

However, Belgium replaced its aged Weilingen class frigates with two Karel Doorman class ships purchased from the Netherlands, and this would seem to preclude them from joining a future construction project. In its place, the Netherlands may join with Germany in the F-125 program.

Program Review

Background. The De Zeven Provincien class had its origins in a 1989 proposal to develop a multirole version of the Karel Doorman class. Previously, the ships had been part of the NATO joint venture to develop a common frigate, the NFR-90, for Germany, the Netherlands, Spain, France, Italy, the U.K., and Canada. The collapse of the NFR program was deemed the result of excessive bureaucracy and too many national requirements contained within the program. Accordingly, the Dutch approached the German Navy with a suggestion that a bilateral agreement to build an AAW frigate be made. This could be either an enlarged version of the M class frigate or an AAW derivative of Germany's F-123.

A memorandum to this effect was signed in 1989, but the plans ran at very low priority until 1991, when it became evident that replacements for the task-group flagships *Tromp* and *De Ruyter* were required. These two ships were equipped with a number of unique systems that required excessive maintenance and support. In 1995, they began to suffer from hull cracking that promised to end their lives within a few years.

The Dutch Navy was aware that it lacked the resources to develop both a task-group-command system and a new air warfare system on its own. The practicality of adapting the M class hull design had already been demonstrated by the successful modification of the Kortenaer ASW frigate design into the Heemskerck class of AAW ships. The new AAW ship would have to be lengthened to provide the extra internal volume; one of the recognized drawbacks of the Karel Doorman class was the limited internal volume.

The Trilateral Frigate Program

In November 1992, Spain joined the Dutch-German agreement on design of future frigate programs. A Memorandum of Understanding (MoU) was signed a year later by Blohm + Voss, Royal Schelde, and EN Bazán shipyards. The intention was to develop common combat systems for the new-generation frigates being built for the three navies. The total program was envisioned as comprising up to 10 ships only, with Spain and Germany each building four and the Netherlands, two. An MoU was signed on September 9, 1993, by EN Bazán and Schelde, the German ARGE F-124 consortium, to cooperate in the areas where commonality was deemed possible and feasible.

By 1994, the agreement among Spain, Germany, and the Netherlands had evolved into the Trilateral Frigate Cooperation (TFC) memorandum, which aimed to build common systems for three anti-air warfare (AAW) ship types. The main common item for all participant navies was to be the AAW system from Hughes and Signaal (now part of Thales), using the APAR multifunction radar. Also, all three versions were to share the SMART-L long-range volume search radar, as well as the SM-2 Block IIIA Standard Missile and ESSM (Evolved SeaSparrow Missile) systems. Spain later decided to pull out of the TFC AAW team on the grounds that the technology was unlikely to be developed in time to meet Spanish production schedules. The Spanish Navy adopted the U.S. AEGIS system in its place.

By this time, the detail design for the Dutch ship was already in hand by Schelde, in cooperation with the naval architect bureau NEVESBU and the Navy. Project definition for the Dutch ship's SEWACO (sensor, weapons, and command) suite was already in motion in early 1993. Royal Schelde was awarded a project definition contract for the Dutch new air defense frigates on December 15, 1993. The contract for detailed design was awarded on June 30, 1995, followed by an order for the first two ships on February 5, 1997. The first two ships would have full command capabilities as well, making them able to function as flagships to replace the RNLN's Tromp class.

Dutch Double Program

In February 1996, the Dutch Navy was able to fund the construction of two additional ships of the class by selling two Kortenaer class frigates to Greece, canceling a midlife modernization of the two Heemskerck frigates, and delaying the procurement of 20 NH90 helicopters by three years. The order for the second pair was placed in May 1997. At the time that order was firmed up, it was stated that the unit price of the ships was "several hundred million Guilders less" than the estimated $500 million each for the first two ships. This may have turned out to be a fortunate investment; the *Heemskerck* ran hard aground off the coast of Scotland in September 1999 and, though salvaged, suffered severe hull and shaft damage that raised the possibility that she could be scrapped. For some time, the ship's status remained ambiguous, but she was eventually repaired and took part in international exercises during 2002.

By this time, the design of the new ships was evolving. Early diagrams had shown the LCF as being a stretched M class, very similar in profile except for the changes in mast structure required by the new radars. This was changing with the incorporation of significant extra

superstructure volume and reprofiling of the superstructure units to reduce radar cross-section.

LCF, by now, was bearing little obvious resemblance to the original Karel Doorman class. A further change to the ship was related to the armament. Original plans had been for the LCF to mount reconditioned twin 4.7-inch guns taken from the Tromp class. However, only two such mounts were available, but four ships were being built. After a search for additional mounts of the required type, it was decided that procuring refurbished U.S. 5-inch L54 Mk 45 mounts offered the most cost-effective solution. As a side virtue, these guns offered the chance of firing the new family of U.S. long-range precision-guided munitions.

Exports to the UAE?

In 1996, the United Arab Emirates indicated that it might be interested in buying up to six air defense and command frigates from the Netherlands at a later date. Originally, this was presented as a deal in which the six ships were sold to the UAE in three batches of two, and two Kortenaer class frigates with modernized onboard systems were transferred to act as training ships. However, by August 1997, it was reported that the UAE Supreme Defense Council had abandoned the plans to buy up to six De Zeven Provinciens from Schelde.

TABM Modifications

The lead ship of the class, the *De Zeven Provincien*, was launched in April 2000 and commissioned in April 2002, following an extensive trial period. Reportedly, these trials have proved successful. One preliminary investigation looked into including the capability for theater ballistic missile defense. A study was initiated in early 2002 with the aim of identifying the cost and timescales involved. Provision in the basic De Zeven Provincien class design had been made for a sixth eight-round VLS launch nest, and one possibility is that this would be used for the TABM (tactical antiballistic missile) capability. A decision on this was originally expected in 2003; if positive, the first ship would be modified by 2009. In 2006, TABM trials were carried out by the *Tromp*. These were successful, but plans to modify the ships remain under consideration.

The second ship of the class, the *Tromp*, was launched on April 7, 2001, and commissioned on March 14, 2003. The third, *De Ruyter*, was laid down in September 2000, launched on April 6, 2002, and commissioned in March 2004. The final ship of the group, *Evertsen*, was laid down in September 2001 and commissioned in March 2005.

Successful Sea Trials

In 2004, the *De Zeven Provincien* took part in firing trials in the Atlantic. These were an unqualified success, and her combat systems performed well above expectations. In one test, the ship engaged six targets simultaneously, and in another, it scored a killing hit on a target drone at a range in excess of 100 kilometers. One missile shot (which had its proximity fuze deliberately turned off) passed within 8 feet of its target.

Since the commissioning of the last ship of this class, there has been no further movement to build additional ships. The design was offered to Greece as part of that country's new frigate program but, despite the existing close relationship between the Hellenic and Dutch navies, this contract went to the Franco-Italian FREMM design. There are still rumors that the Netherlands may buy a final pair of De Zeven Provincien class ships to replace the last pair of Karel Doorman frigates. In this case, construction would be funded by the sale of those two ships. Nothing has been confirmed, however.

Funding

This program was funded by the Dutch Ministry of Defense.

In June 1996, when the addition of two ships (without the command facilities) was presented for approval in the Netherlands Parliament, the extra funds were planned to be obtained by delaying the procurement of 20 NH90 helicopters by three years, the sale of two Kortenaer class frigates, and cancellation of the Jacob Van Heemskerck class Capability Upkeep Program (CUP). The price (at the time of the second pair) was quoted as several hundred million guilders less than the NLGl1.68 billion ($1 billion) for the first two.

A year later, the Dutch Ministry of Defense stated that the total cost of procuring the four ships would be NLGl3.171 billion, or $1.61 billion. From that amount, the actual construction of the ships was budgeted to use NLGl3.08 billion, and the balance was to be set aside for spare parts. At that time, only about half of that amount had been committed because not all contract negotiations had been completed.

De Zeven Provincien Class

Contracts/Orders & Options

Contractor	Award ($ millions)	Date/Description
Raytheon Systems	N/A	Jul 1999 – Four shipboard WSC-6 SHF satcom terminals.

Timetable

Month	Year	Major Development
Dec	1989	Germany and the Netherlands agree to cooperate on frigate design
Nov	1992	Spain joins Germany and the Netherlands on frigate development program
Dec	1993	Project definition awarded to Schelde
Dec	1994	TFC final baseline review conference in Germany approves common design
Jun	1995	Detailed design contract awarded; Spain withdraws from APAR
Feb	1996	Order for first two ships
May	1997	Second pair of ships ordered
Sep	1998	First-of-class laid down
	1999	Second ship laid down
Apr	2000	*De Zeven Provincien* launched
Apr	2001	*Tromp* launched
Mar	2002	*De Zeven Provincien* commissioned
Apr	2002	*De Ruyter* launched
Mar	2003	Fourth ship launched; second commissioned
Mar	2004	Commissioning of the third ship
Mar	2005	Last ship commissioned

Worldwide Distribution/Inventories

Netherlands. Four ships in service.

Forecast Rationale

The only remaining outlet for the De Zeven Provincien program is a very speculative suggestion that two new frigates may be procured to replace the remaining pair of Karel Doorman class ships. This is an unlikely prospect on several counts. The remaining Karel Doorman class ships are barely reaching middle age (they are 15 and 17 years old, respectively) by modern warship standards. The only military reason for replacing them would be to establish commonality with the rest of the fleet. This would hardly justify the purchase of two warships. The other reason to build two more De Zeven Provincien class destroyers would be as part of an economic stimulus plan and the time for those measures has passed.

There is no doubt that the Royal Netherlands Navy's four De Zeven Provincien class destroyers provide the Dutch fleet with air warfare ships that can bear favorable comparison with any in their size and cost bracket. Plans to install a Mk 41 launcher for Tomahawk missiles have been abandoned, but an air warfare combat system upgrade to provide an effective ballistic missile defense capability is still under discussion. Having said that, construction of additional ships of this class appears to be most unlikely. This report will be maintained in the short term in case the Netherlands Navy does decide to order two additional ships, but the odds of this happening are not high.

Ten-Year Outlook

Since no additional construction is pending, the forecast chart for the De Zeven Provincien class has been omitted.

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