



NAVAL PRODUCTS



SUMMARY

SEACLAD Ammunition5

- SEALEM Product family
 - SEALEM 15-01/15-02 Rockets
 - SEALEM 08-01/08-02 Mortars
- SEALIR Product family
 - SEALIR 15-01 Rockets
 - SEALIR 08-01/08-02 Mortars
- SEALAT Product family
 - SEALAT CANTO®
 - SEALAT ANTI-WAKE
- SEAMOSC Product family
 - SEAMOSC Mortars

Decoy Launching Systems - SYLENA Range 19

- SYLENA - Operational Capability
- SYLENA Range
 - SYLENA LW
 - SYLENA MK1
 - SYLENA MK2
- SYLENA Architecture
 - Physical architecture
 - Functional architecture

Decoy Launching Systems - DAGAIE® Range27

- DAGAIE® NG
- NGDS®

Submarine Launched Devices 31

- Red, Green or Yellow Stars signals
- Smoke and Flares (Day/Night) signals
- Colored Smoke signals
- Anti-Sonar device

Marine Location Markers37

- MLM 10 - type 6153
- MLM 30 - type 6152
- MLM 90 - type 6060
- MLM FD - type 6313

*Worldwide unrivalled Self-Protection solution
against all existing and emerging threats.*

SEACLAD AMMUNITION

"SEA Borne Countermeasures Lacroix Advanced Decoy"

**Effective ship's protection through
innovative countermeasures:**

- **Radio Frequency Corner Reflectors** against chaff discriminator seekers
- **Spectral Morphologic Imaging Infrared Decoys** against multi-frequency seekers
- **Innovative anti-torpedo solutions ***
- **Masking and screening capability** against EO and Laser guided threats

* in close cooperation with DCNS

- Multi-threat capability
- Adaptable to a wide range of launchers
- In-service on-board worldwide navies

DEFEATING ALL EXISTING AND EMERGING THREATS

SEALEM



SEALIB



SEAMOSC



SEALAT



SEALAT



This commercial document is not contractual.

LACROIX capability in naval countermeasures is based on proactive innovation to meet customer requirements. Proven solutions use predictive tactical and technical models, updated and validated by evaluation programs and sea trials.



Taylored for the assets you want to protect



DACAIE® and NGDS® launching systems are the property of Safran



This commercial document is not contractual.

SEALEM PRODUCT FAMILY



CORNER REFLECTOR RF DECOY

In the field of RF today, existing technology is being replaced by structural elements whose signature and profile are very close to that of ships. This technology provides the response to old, existing and emerging threats.

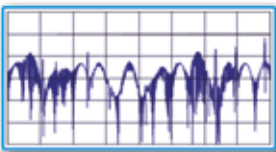
OPERATIONAL FEATURE

Matching ship's RF signature to challenge advanced missile's CCM:

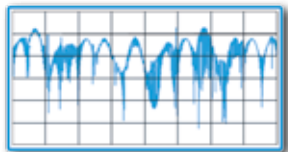
- High level RCS
- Broadband response (including I, J and K band)
- Ship-like RCS fluctuation
- Cross-Polar coherence
- Credible spatial distribution (RF imagery)

Defeating:

- Generic and emerging threats
- Multi-missiles salvos.



SHIP RCS FLUCTUATION
(PITCH AND ROLL)



CORNER REFLECTOR
DECOY RCS

SEALEM ROCKETS



SEALEM 15-01/15-02

CHARACTERISTICS

- Diameter: 150 mm
- Length: 1650/1800 mm
- Weight: 36 kg

EFFECTS

- Duration: in accordance with all tactical engagements
- RCS: tailored to ship RCS

	Centroid Seduction	Distraction / Seduction
Range	< 250 m	500 m - 1800 m
Initial height	< 100 m	< 150 m
Reaction time	< 3 s	< 7 s (at 1000 m)



This commercial document is not contractual.

SEALEM MORTARS



SEALEM 08-01/08-02

CHARACTERISTICS

- Diameter:62/80 mm
- Length: 1300/1600 mm
- Weight: 4/7 kg

EFFECTS

- EW Tactic: Centroid Seduction
- Duration: in accordance with all tactical engagements
- RCS: tailored to ship RCS
- Range: < 200 m
- Reaction time: < 2 s



This commercial document is not contractual.

SEALIR PRODUCT FAMILY



MORPHOLOGIC IIR DECOY

To meet the most recent infrared seeker threats, LACROIX has developed a new generation of payloads, based on spectral and low temperature composition, with:

- High stability in shape and time (no fluctuation thanks to a single payload per engagement),
- Same characteristics as the ship to protect.

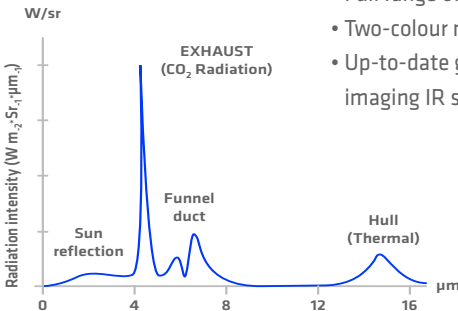
OPERATIONAL FEATURE

Matching ship's IR signature

- Ship-like spectrum distribution
- No temporal fluctuations (long duration burning)
- Morphologic replication

Defeating:

- Full range of traditional IR seekers
- Two-colour missiles
- Up-to-date generation of imaging IR seekers.



This commercial document is not contractual.



SEALIR 15-01

CHARACTERISTICS

- Diameter: 150 mm
- Length: 1650 mm
- Weight: 36 kg

EFFECTS

- EW Tactics: Distraction, Seduction
- Duration: in accordance with all tactical engagements
- Energy: adaptable to a platform intensity of 500 to 4000 W/Sr
- Area: adaptable in accordance with specifications and platform characteristics

	Centroid Seduction	Distraction / Seduction
Range	< 250 m	500 m - 1800 m
Initial height	< 100 m	< 150 m
Reaction time	< 2 s	< 7 s (at 1000 m)



SEALIR MORTARS



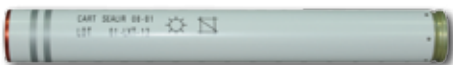
SEALIR 08-01/08-02

CHARACTERISTICS

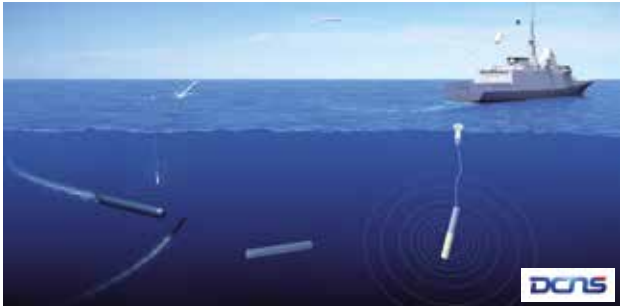
- Diameter: 80 mm
- Length: 670/1600 mm
- Weight: 3,5/7 kg

EFFECTS

- EW Tactics: Distraction and Centroid Seduction
- Duration: in accordance with all tactical engagements
- Energy: adaptable to a platform intensity
- Range: < 200 m
- Reation time: < 2 s



SEALAT - CANTO[®] AMMUNITION



ANTI-TORPEDO COUNTERMEASURES

OPERATIONAL FEATURE

LACROIX SYLENA system operates, through a SEALAT pyrotechnic mortar, DCNS CANTO[®] broadband Acoustic Torpedo Countermeasure. CANTO[®] is an all-in-one broadband active acoustic emitter acting both as a jammer for dilution effect and as a false target generator for confusion effect. CANTO[®] is acting against both active and passive sonar.

CHARACTERISTICS

- Caliber: 145 mm
- Length: < 1200 mm
- Weight: < 25 kg



SEALAT Mortar (CANTO[®] inside)



DCNS CANTO[®] countermeasure

This commercial document is not contractual.

SEALAT ANTI - WAKE AMMUNITION



WAKE HOMING TORPEDO COUNTERMEASURES

OPERATIONAL FEATURE

Deployment of a Wide Area False Wake:

- Modifying Ship Wake geometry
- Disturbing Wake Homing Torpedo guidance mode

Defeating:

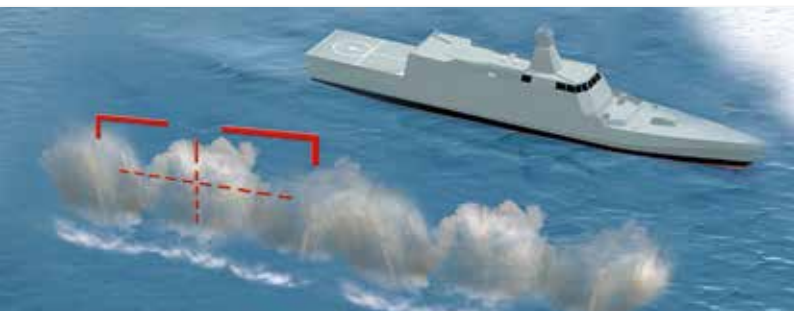
- Torpedoes with Wake Homing or Nibbling closing-in procedures.

EFFECTS

- Reaction time: ~ 5 s
- Duration: > 10 min
- Range/Depth: Designed for optimal performance

in cooperation with **DCNS**

SEAMOSC PRODUCT FAMILY



ELECTRO-OPTIC MASKING / LASER SCREENING

Seamosc deploys a large cloud once the threat is detected in order to generate:

- Wide-band masking effects: Electro-Optic profile suppression
- Screening effects: Laser beam reflection.

OPERATIONAL FEATURE

Deployment of a large cloud, generating:

- Wide-band target suppression
- Laser beam back scattering

Defeating:

- EO asymmetric threats: Anti-Tank Missile, SACLOS, a.s.o.
- Laser guided threats: Anti-Ship Missile or Bomb.



SEAMOSC 08-01 TO 08-03

CHARACTERISTICS

	1 payload	3 sub payloads
Diameter	80 mm	80 mm
Length	< 700 m	1600 m
Weight	< 5 kg	12 kg

EFFECTS

- Cloud dimensions at $t_0 + 5$ s:
 - Length: 65 m up to 180 m
 - Height: 12 m up to 20 m
- Screen located 40 m away from the ship
- Renewal capability
- Masking duration depends on relative wind and velocity and renewal rate.



Systems and decoys for an unrivalled protection

Anti-Missile
Anti-Torpedo

DECOY LAUNCHING SYSTEMS SYLENA Range by LACROIX

A wide range of solutions tailored to your requirements

- **Intuitive** Man/Machine Interface
- **Safe** and optimised handling procedures
- **Very quick reloading**
- **Easy** integration on any ship
- **Light weight** and **small footprint**
- **Very low Life Cycle Cost**

SYLENA

OPERATIONAL CAPABILITY

FULL EFFECTIVENESS AGAINST EXISTING AND EMERGING THREATS:

ANTI-MISSILE COUNTERMEASURES:

- Radio-Frequency: Corner Reflector decoys
- Imaging Infra-Red: ship-like decoys
- Electro-Optic: Screening/Masking effects
- LASER beam backscattering effects.

DECOYS QUALIFIED
BY FRENCH NAVY

SEEKER
TESTED

ANTI-TORPEDO COUNTERMEASURES:

- Electro-Acoustic decoys/jammers
- Anti-Wake-Homing decoys (under development).

SEALEM
RF Corner Reflectors

SEALIR
Morphologic IR

SEAMOSC
Screening/Masking

SEALAT
Anti Wake Homing
Torpedo

SEALAT - CANTO®
Anti Torpedo

**Defeating up to five missiles or torpedoes
per launcher without reloading.**

SYLENA LAUNCHERS



SYLENA LW (LIGHT-WEIGHT) ANTI-MISSILE DESIGNED FOR PATROL SHIP OR OPV

OPERATIONAL CAPABILITY

- Centroid seduction tactic
 - RF : 2 decoys per launcher (SEALEM 08-01)
 - IIR : 2 decoys per launcher (SEALIR 08-01)

CHARACTERISTICS

	Width (mm)	Height (mm)	Depth (mm)	Weight (Kg)
Launcher without ammunition	300	1000	1300	110
Launcher with ammunition	300	1400	1300	150

SYLENA LAUNCHERS



SYLENA MK1 ANTI-MISSILE DESIGNED FOR CORVETTE OR FRIGATE

OPERATIONAL CAPABILITY

- Centroid seduction (RF/IIR) and distraction (IIR)
 - RF : 2 decoys per launcher (SEALEM 08-01 or SEALEM 08-02)
 - IIR : 4 decoys per launcher (SEALIR 08-01)

CHARACTERISTICS

	Width (mm)	Height (mm)	Depth (mm)	Weight (Kg)
Launcher without ammunition	750	1050	1500	255
Launcher with ammunition	750	1655	1750	300

SYLENA LAUNCHERS



SYLENA MK2 DUAL ANTI-MISSILE AND ANTI-TORPEDO DESIGNED FOR CORVETTE, FRIGATE AND LARGER SHIP

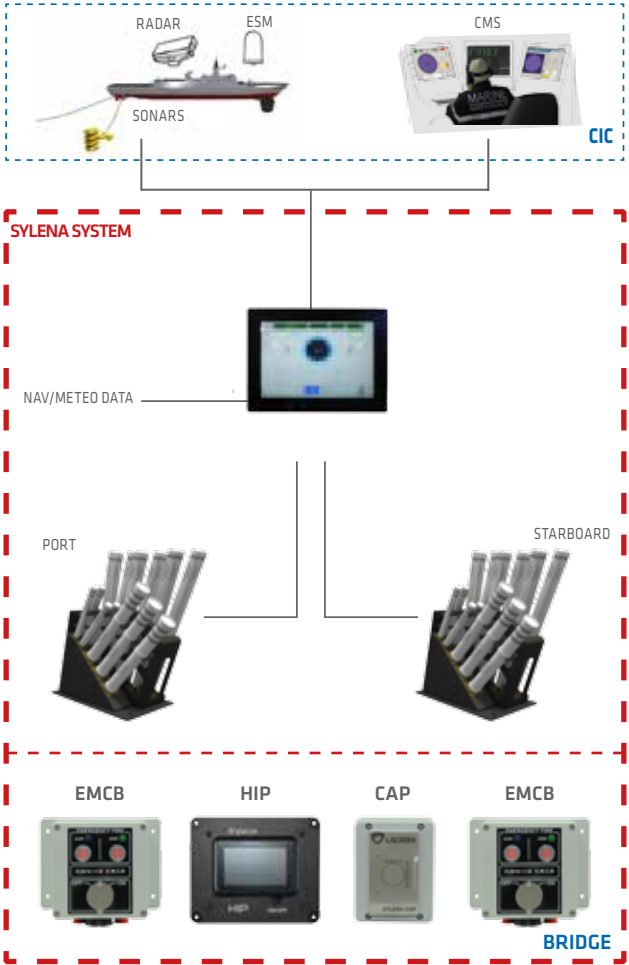
OPERATIONAL CAPABILITY

- Centroid seduction (RF/IIR) and distraction (IIR)
 - RF : 2 decoys per launcher (SEALEM 08-01 or SEALEM 08-02)
 - IIR : 4 decoys per launcher (SEALIR 08-01)
- Dilution / Confusion (torpedoes)
 - AT : 3 decoys per launcher (SEALAT - CANTO®)

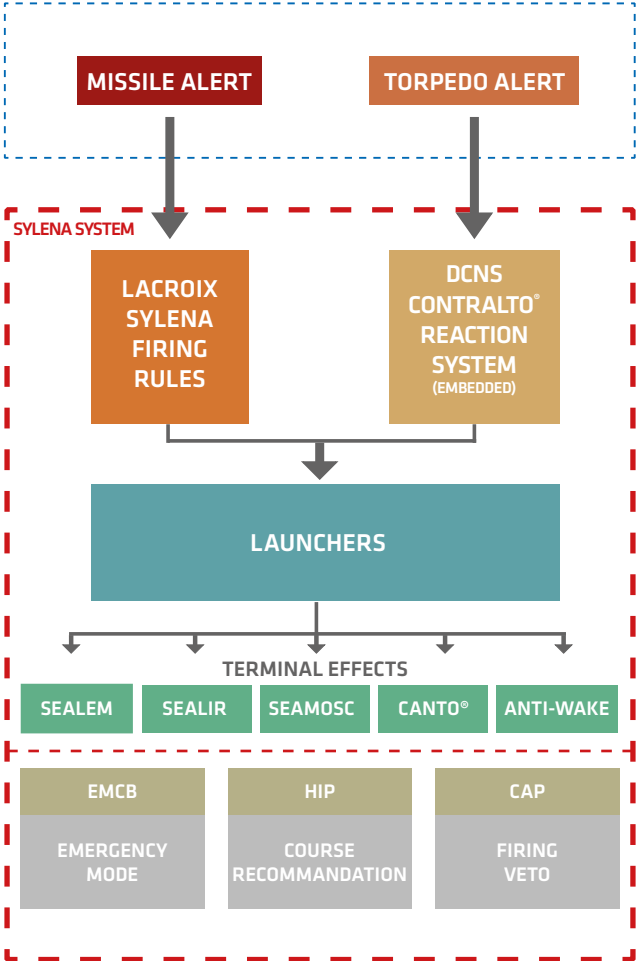
CHARACTERISTICS

	Width (mm)	Height (mm)	Depth (mm)	Weight (Kg)
Launcher without ammunition	750	1050	1500	255
Launcher with ammunition	750	1655	1800	420

SYLENA ARCHITECTURE PHYSICAL



SYLENA ARCHITECTURE FUNCTIONAL



*Systems and decoys for an unrivalled
protection*

DECOYS LAUNCHING SYSTEMS

DAGAIE® range by  SAFRAN

DAGAIE® NG and **NGDS®** Systems are designed
to deploy Lacroix SEACLAD decoys

DAGAIE® and NGDS® Systems are the property of  SAFRAN





DESIGNED FOR CORVETTES AND FRIGATES

GENERAL FEATURES

As a modernization of DAGAIE® systems, DAGAIE® NG has been designed to defeat all current and emerging missile seekers. This system operates high credibility RF and IR decoys, including Corner Reflectors and Morphologic IR Technologies.

OPERATIONAL CAPABILITY

A panel of tactical engagements consistent with **Lacroix SEACLAD Ammunition** :

- REM Rockets for distraction
- SEALEM Mortars for seduction
- SEALIR Mortars for seduction



NEW GENERATION DAGAIE[®] SYSTEM (NGDS[®]) DESIGNED FOR FRIGATE AND ALL TYPES OF SURFACE VESSELS

GENERAL FEATURES

The NGDS[®] is a countermeasures system that can protect all types of surface vessels against all threats.

OPERATIONAL CAPABILITY

A large panel of tactical engagements consistent with **Lacroix SEACLAD** ammunition:

- SEALEM rockets : RF effect for distraction
- SEALIR rockets : IR effect for distraction and seduction
- SEALEM mortars for RF seduction
- SEALIR mortars for IR seduction
- SEAMOSC mortars for Laser and Optronic screening and masking

LACROIX SUBMARINE LAUNCHED DEVICES

- Star signals
- Flares
- Smoke
- Anti-Sonar

SUBMARINE LAUNCHED SIGNALS



RED, GREEN OR YELLOW STARS

USE

High visibility coloured star signal launched by submarine to transmit a brief agreed upon code (e.g.: red = emergency surfacing, green = torpedo launching simulation,...).

EFFECTS

Star deployment: red, green or yellow
Day and Night.

CHARACTERISTICS

- Visibility : > 5 Nm
- Altitude zenith of star : 50 m
- Effect duration : 10~15 s
- Max operating depth : 500 m



SUBMARINE LAUNCHED SIGNALS



SMOKE AND FLARES (DAY/NIGHT)

USE

Smoke and flame signal launched by submarine to indicate its current position or to transmit a brief agreed upon code to aeronaval forces.

EFFECTS

Flame and smoke (white colour)

Day and Night.

CHARACTERISTICS

- Visibility : > 5 Nm
- Effect duration : 420 s
- Max operating depth : 500 m



SUBMARINE LAUNCHED SIGNALS



COLORED SMOKE

USE

Coloured smoke signal launched by submarine to indicate its current position or to transmit a mutual agreed brief code to aeronaval forces (e.g.: torpedo launching simulation, ...).

EFFECTS

Coloured smoke (Day).

CHARACTERISTICS

- Visibility : > 5 Nm
- Effect duration : 120 s
- Max operating depth : 500 m



SUBMARINE LAUNCHED SIGNALS



ANTI-SONAR

USE

Underwater countermeasure to decoy active sonars (surface ship, helicopter, submarine or torpedo).

EFFECTS

Anti-sonar seduction false echoes.

CHARACTERISTICS

- Effect duration : - 15 min
- Max operating depth : 500 m



LACROIX MARINE LOCATION MARKERS

- MLM 10 - type 6153
- MLM 30 - type 6152
- MLM 90 - type 6060
- MLM FD - type 6313

MARINE LOCATION MARKERS

DAY AND NIGHT



MLM 10 - TYPE 6153

APPLICATION: SAR platforms

- Marine location marker triggered by a percussion device (no battery)
- Can be used from any airborne platform or from a ship
- Day and night use: smoke and flare
- Empty body sinks after use
- HERO safe

PERFORMANCE CHARACTERISTICS

Shelf life ≥ 5 years
Flying hours ≥ 500 hours/year
Duration 10 min

TRANSPORTATION / HANDLING

Hazard class 1.3 G

MARINE LOCATION MARKERS

DAY AND NIGHT



MLM 30 - TYPE 6152

APPLICATION: SAR platforms

- Marine location marker triggered by a percussion device (no battery)
- Can be used from any airborne platform or from a ship
- Day and night use: smoke and flare
- Empty body sinks after use
- HERO safe

PERFORMANCE CHARACTERISTICS

Shelf life ≥ 5 years
Flying hours ≥ 500 hours/year
Duration 30 min

TRANSPORTATION / HANDLING

Hazard class 1.3 G

MARINE LOCATION MARKERS

DAY AND NIGHT



MLM 90 - TYPE 6060

APPLICATION: SAR platforms

- Marine location marker triggered by a sea water battery
- Can be used from any airborne platform or from a ship
- Day and night use : smoke and flare
- Empty body sinks after use
- HERO safe

PERFORMANCE CHARACTERISTICS

Operational shelf life	≥ 20 years
Training shelf life	≥ 25 years
Flying hours	≥ 500 hours/year
Duration.....	90 min
Visibility.....	5 km at 150 ft

TRANSPORTATION / HANDLING

Hazard class 1.3 G

MARINE LOCATION MARKERS

FLUORESCENT DYE



MLM FD - TYPE 6313

APPLICATION: SAR platforms

- Marine location marker triggered by a sea water battery
- Can be used from any airborne platform or from a ship
- Fluorescent dye
- Pollution free
- Empty body sinks after use
- HERO safe

PERFORMANCE CHARACTERISTICS

Operational shelf life	≥ 20 years
Training shelf life	≥ 25 years
Flying hours	≥ 500 hours/year
Duration.....	2h30
Visibility.....	9 km at 1000 ft

TRANSPORTATION / HANDLING

Hazard class N.A.



**PROTECTING YOUR CREW
IS IN OUR DNA**



LACROIX

LACROIX
Route de Gaudiès
09270 Mazères
FRANCE

Phone: + 33 (0) 561 677 900
Fax: + 33 (0) 561 677 986
www.lacroix-defense.com



New ! Follow
[@LACROIX_Defense](https://twitter.com/LACROIX_Defense)
on Twitter

 Etienne Lacroix group

This document is not contractual. Lacroix reserves the right to make any changes.
Photographer credits: ©ECPAD/France/Collection SIRPA MARINE/2013/Jonathan BELLENAND,
A. Paringaux / Lacroix / SAGEM - Created by: Communication Etienne Lacroix - 09/2016