THREE-STATE RFID e-SEALS

They are able to say:

1) It hasn't been used yet.

2) It is in use

3) It has been opened or tampered with.

RFID electronic seals or *e-seals* are the key to enter in a new dimension of freight transport and meet the requirements of industry players for future international trade flows based on a **higher level of security and information**.

LeghornGroup manufactures **RFID e-seals able to increase the cargo physical security** - such as ensuring no possible replica of the seal - **and inform in real time on how the goods are stored, tracked, routed, maintained and delivered to customers.**

Automatic identification of the seal and information about the **seal locking status**: any tampering event to the seal is permanently stored in its chip's memory.

Quick and accurate RF retrieval of information by static gateway reading systems or by handheld devices assigned to check point personnel.

Three-state RFID *e-seals*: the seal *e-volution*

RFID e-seal that **operates in passive RFID technology** and **enables automatic remote reading**, for complete automation of cargo logistics operations at the entry / exit gates. It detects any event that occurs with and returns it by RF interrogation:

- **unlocked** seal
- **correctly locked** seal
- **tampered** seal

Tamper evidence functionality is built-in within the RFID IC: seal security is grounded at HW and isn't transferred to any external SW systems and algorithms, as for competing products.

Additional information can be stored in the chip user memory by using any RFID reader/writer available in the global market and compliant with the standard ISO18000-6. Information can be password protected.

Three-State RFID e-seals - Key features

- **Univocal identification** (EPC-TID)

- **Not replicable**

- Contactless, not line-of-sight reading

- **Three types of information of the seal status: UNLOCKED/ LOCKED/ TAMPERED**

- **Long range** reading distance - full **automated operations** and checks **free from human error**

- System **interoperability** due to compliance with ISO18000-6 (including EPC Global)

- Combines **high mechanical security level offered by ISO17712:2013 compliance with** electronic RFID security

- **Any event - UNLOCKED, LOCKED and TAMPERED - is permanently stored in the RFID IC memory**

*Every player in the **logistic chain of international freight of containerized goods** - Port Authority, Terminal, Shipping Line, Forwarder or Customs - can benefit from **timely, secure and standardized sharing of the transportation info along the supply chain by means of RFID e-seals**.*

*They are the solution **to strengthen the interoperability of the existing platforms and informative systems in use at seaports and terminals**.*

Processes will be more effective, definitively leading to cost savings.

SOTER SEAL – bolt lock HSS

UHF RFID Three-State bolt-lock seal

it can provide its status information, **UNLOCKED**, **LOCKED** or **TAMPERED**, which is stored in the RFID chip. Compliant with ISO 17712:2013, High Security Seal for international container freight.

LeghornGroup **SOTER SEAL** is a sturdy **UHF RFID bolt-lock seal** that combines high mechanical security with the electronic security offered by RFID, automatic radio frequency identification technology.
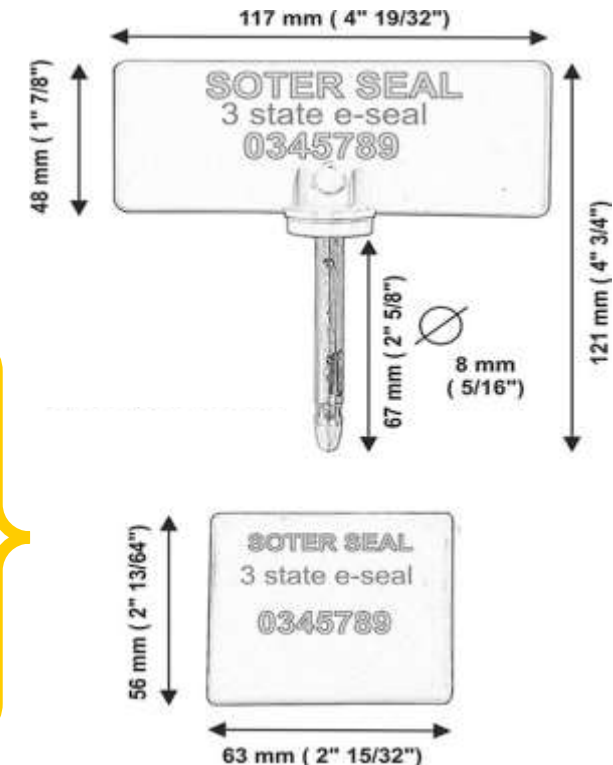
It is the first RFID bolt seal – compliant with ISO 17712 technical standards – available on the market that is able to provide its status information; **UNLOCKED, LOCKED and TAMPERED,** which is stored in the RFID chip.

The outer **polypropylene plastic housing** of the seal – customizable with laser mark and numbering on request – **embeds a unique and last generation electronic chip**, that has its own univocal coding, which cannot be replicated.
This allows for secure and reliable automatic identification of the seal applied to the container or vehicle.

- It has univocal ID code and read/write user memory capabilities.

- It offers immediate and accurate seal identification together with the status of the seal i.e. unlocked/locked and evidence of any tamper event.

- It is an ideal solution for guaranteeing cargo security and tamper evidence along the shipping and supply chain.

117 mm (4" 19/32")

48 mm (1" 7/8")

SOTER SEAL
3 state e-seal
0345789

67 mm (2" 5/8")

8 mm (5/16")

121 mm (4" 3/4")

56 mm (2" 13/64")

SOTER SEAL
3 state e-seal
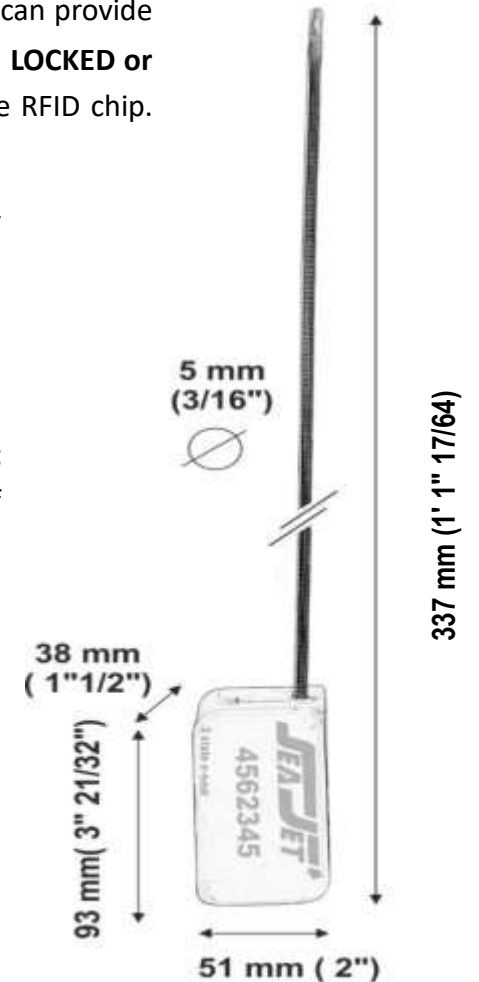0345789

63 mm (2" 15/32")

MYRMIDON SEAL – cable lock HSS

UHF RFID cable-lock seal can provide its status information, **UNLOCKED, LOCKED or TAMPERED**, which is stored in the RFID chip. Compliant with ISO 17712:2013.

LeghornGroup **MYRMIDON SEAL** is a sturdy **UHF RFID cable-lock seal** that combines high mechanical security with the electronic security offered by RFID, automatic radio frequency identification technology.

It is the first RFID cable seal – compliant with ISO17712 technical standards – available on the market that is able to provide its status information, **UNLOCKED, LOCKED and TAMPERED,** which is stored in the RFID chip.

The outer **polypropylene plastic housing** of the seal – customizable with laser mark and numbering on request - **embeds an unique and last generation electronic chip**, that has its own univocal coding, which cannot be replicated. This allows for secure and reliable automatic identification of the seal applied to the container or vehicle.

- It has univocal ID code and read/write user memory capabilities.

- It offers immediate and accurate seal identification together with the status of the seal i.e. unlocked/locked and evidence of any tamper event.

- It is an ideal solution for guaranteeing cargo security and tamper evidence along the shipping and supply chain.

5 mm (3/16")

337 mm (1' 1" 17/64)

38 mm (1"1/2")

93 mm(3" 21/32")

51 mm (2")

SEAJET 4562345

Technical specifications

Radio Frequency specification

- Frequency   860 – 960 MHz – UHF EPC Global
- Reference RF Standard   ISO/IEC 18000-63
- RF Protocol   EPC Class 1 Gen2 / ISO/IEC 18000-63
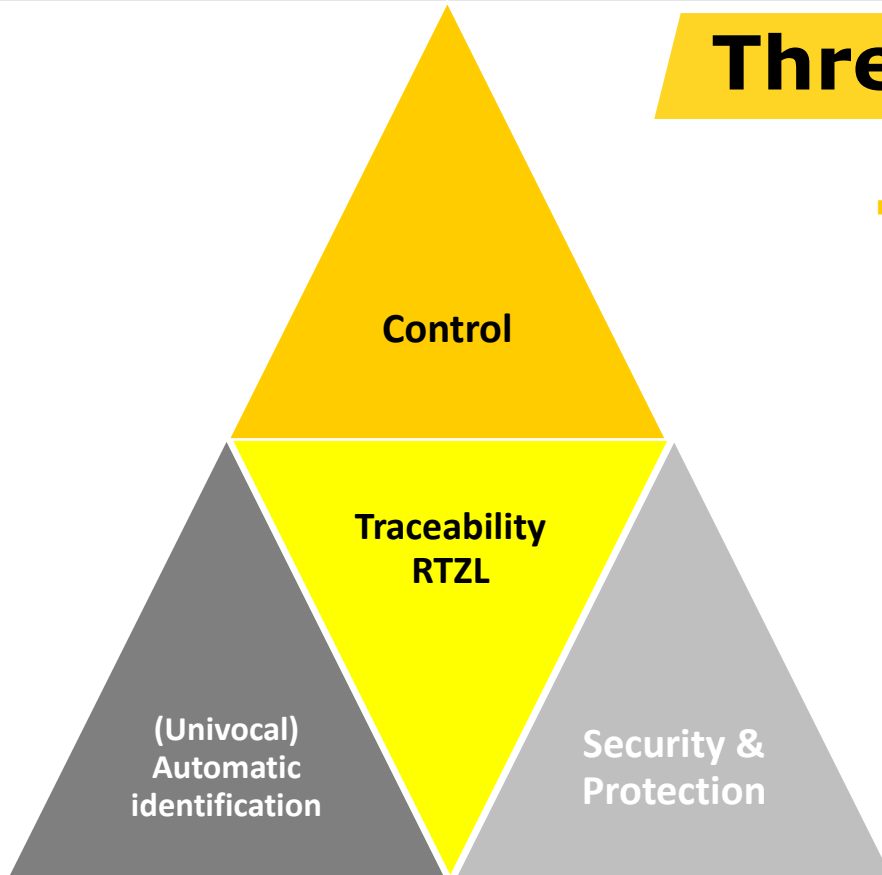- Technology   Passive
- Integrated circuit   NXP G2iM+

Mechanical specification

- IP Protection   IP66
- Operative Temperature   – 30° C / + 80 ° C
- Storage Temperature   – 30° C / + 80 ° C
- ISO 17712:2013   Yes

Electronic specification

- Reading distance by handheld reader   3 m (118” 7⁄64”) (depending on reader)
- Reading distance by gate reader   8 m (314” 61⁄64”) (depending on reader)
- Quality   100% performance tested
- User read / write memory   Yes
- Memory size   from 128 bit up to 448 bit of EPC Memory; up to 640 bit of User Memory
- Password protection   Yes
- Status Detection   Yes – Locked, Unlocked or Tampered
- TID (tag unique identification)   Yes
- S/N in memory (same of seal)   Yes
- Read / write cycle   10000
- Data retention   20 year
- Integration with handheld reader   OS ANDROID and WINDOWS CE commercial readers
- Integration with gate reader   ISO/IEC 18000-6 commercial industrial readers

Three-State RFID e-seals - Benefits

Control

Traceability RTZL

(Univocal) Automatic identification

Security & Protection

- Ensuring **interoperability** between new (and legacy) systems and platforms **for categories of transport nodes**

- Making possible the **real-time interaction with the goods for control and security purposes**

- **Streamlining transport processes** guaranteeing a **paperless traceability** of goods & **resources' optimization**

- **Following the goods** and not only the transport means

e-seals Integration

LeghornGroup **e-seals work in accordance with RFID ISO standards** - e.g. ISO18000-6 for UHF: their EPC code **can be read by any reader following the same technical standard** in the market.

Read/Write operations are generally performed by using the **free software that for demo purposes** is provided by the reader manufacturer.

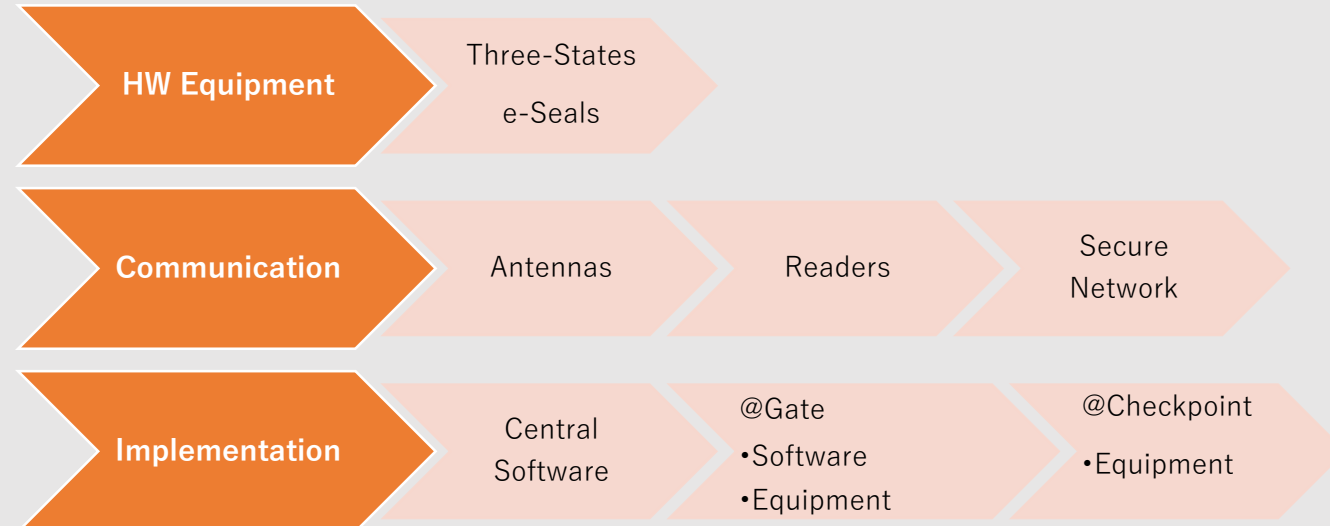**Specific SW application is required to read the tamper evidence information** stored in the EPC memory of LeghornGroup e-seals.

LeghornGroup

- can offer **middleware**, which basically interfaces to upper SW level e.g. presenting data in format suitable with the customer system (database structure).
- developed some **SW applications** – free of charge for our customers - to read the tamper evidence bit, e.g.:
    - Embedded SW for Impinj Speedway Revolution R420/R220
    - Application for ATID 880N, CHAINWAY C7x and C6x series handheld reader, Windows CE/Mobile
    - Application for Android smartphone BT connected to CAEN RFID handheld readers (QID, QIDmini, SkID)

Customers have successfully used LeghornGroup e-seals globally, by using fixed and handheld readers from Impinj, CAEN RFID, Kathrein, ChainWay, Zebra Technologies, and Alien Technology RFID manufacturers.

e-seals Integration

LeghornGroup can:

1. **provide RFID reader + SW app** free of charge for the tested readers.

2. **suggest different reader models** and guide the customer's technical team in the integration phase. Usually, the reader manufacturer makes available API or even complete SDK to develop specific app.

3. **offer SW development turn-key service** (costs depending on the customer requirements and the chosen reader).

HW Equipment	Three-States e-Seals		
Communication	Antennas	Readers	Secure Network
Implementation	Central Software	@Gate • Software • Equipment	@Checkpoint • Equipment

Field of action of LeghornGroup

PROTECTION: We can protect your goods and assets with security seals and various products for tamper protection. The company can create bespoke, technical solutions to meet client's requirements.

CONTROL: We ensure goods and people can be monitored using security products and integrated complete hardware and software solutions that allow the operator to monitor and intervene in real time, even remotely.

IDENTIFICATION: LeghornGroup's understanding of authentication along with their innovative technical products and solutions allow users to uniquely and securely identify, goods, vehicles, containers, animals and people.

TRACKING: LeghornGroup's real time GPS tracking devices allow users to monitor location, status and movements of vehicles and people.

RFID SOLUTIONS: LeghornGroup also manufactures solutions for product authenticity; automatic identification systems using RFID to aid traceability of objects, animals and people, offering new and efficient operations to speed up the supply chain.

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