

TRACEABILITY OF REGULATED MATERIALS

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REGULATED MATERIAL TRACEABILITY CONCEPT

Traceability is the capacity to recover background, application or localization of an item, through a single, standard and registered identification.

It is the identification process necessary to follow all events, occurrences, handlings and movements of a product.

Generally speaking, companies and governments in the world are seeking ways for tracing the distribution of controlled products, such as food, medicines, firearms and explosives, within the supply chain as to increase safety of its consumers and the environment (ISO 14000).

Traceability is essential, specially in cases where the impact caused by incidents involving the security of products causes, besides the possible harm to the consumer's health, and the reduction of population trust on the products, companies or governmental agencies.

As an example of that we can mention the many international efforts to check on production, distribution and usage of controlled products, after September 11th in the United States.

Therefore, traceability comes to fulfill the needs for operation control (production and logistics), as well as to rescue the background of controlled products business turnover.

REGULATED MATERIAL TRACEABILITY REQUIREMENTS:

For the traceability of controlled products, the following requirements are necessary:

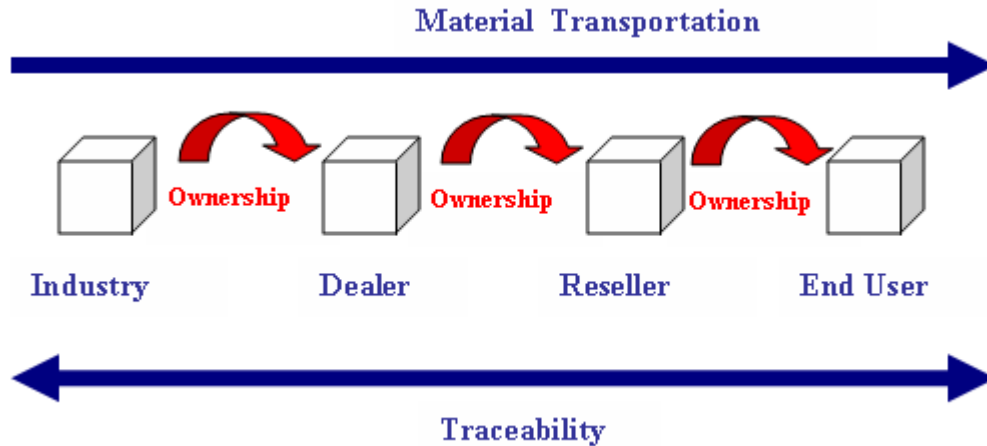
- The controlled product must have a single and standard pattern of identification;
- Information exchange among the various links of the supply chain (Industry-Dealers-Resellers-End User);
- Responsibility of each link of the supply chain to manage what it has received from its suppliers and what it is delivering to the clients;
- Standardization among the products and their transport and warehousing units;
- Precision and velocity to record and recover data in the traceability system

REGULATED MATERIAL TRACEABILITY ARCHITECTURE CONCEPTS

Traceability is based on three basic concepts: Collaborative Environment (information exchange among the links in the supply chain); Ownership Control; and Single Identification (ID) for the product.

Collaborative Environment

Collaborative Environment is the information exchange process that allows for the tracing and integration among suppliers, clients, distributors, industries, retail and transport, optimizing the Management of the Supply Chain through Computing Systems.



#1 – Collaborative Environment Architecture

Ownership

Ownership is the certification of property.

Each controlled product is identified (single identification) and traced by the concept of ownership that exists in each link of the Supply Chain.

Every transference of products is registered through a new ownership.

Thus when you physically transfer a product, its ownership is also transferred and documented, allowing for the complete traceability of the products.

During the ownership transference process, the link of the supply chain (eg: seller) checks and informs the operation to the inspection organ.

The other link (eg: buyer), will in the same manner, register with the inspection organ its ownership of the acquired product (within a pre-established time). In this way one's responsibility is appointed in each and every stage of the Supply Chain.

It is on the interest of the link possessing the ownership of the product, to immediately communicate the inspection organ about the operation, at the time of the physical transference of the product, so that in case of deviation, the responsibility is attributed to the link detaining the product ownership.

The control of ownership allows for the attribution of sole responsibility in every link of the Supply Chain.

Sole Identification (ID)

Sole Identification (ID) is the identification of the unit (smallest part of a product) of an item.

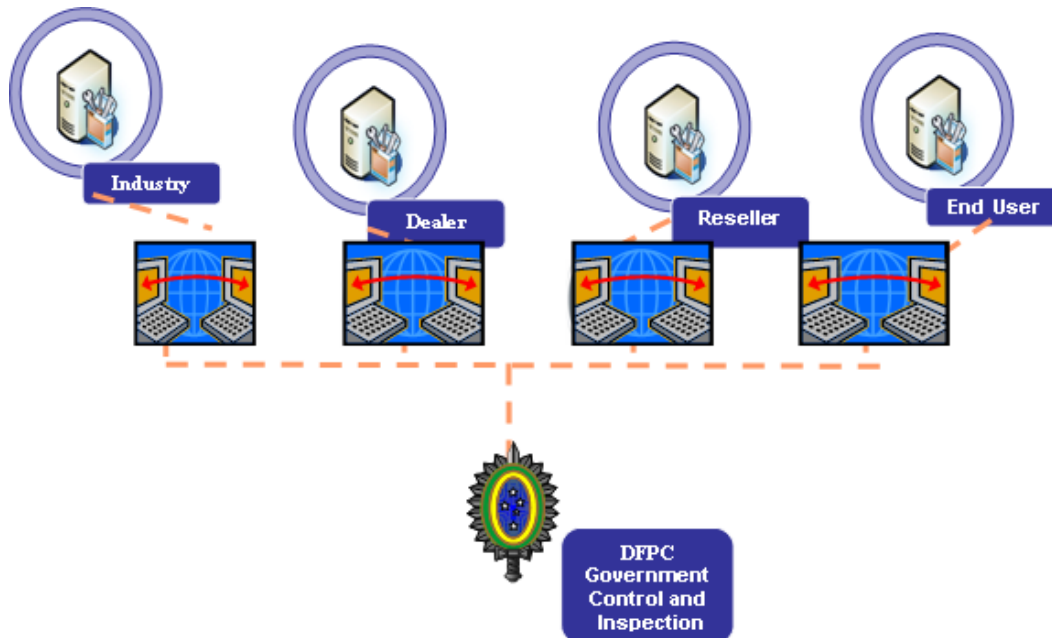
Every product in its unit has a sole and exclusive identification, which is the product ID and will follow it throughout its existence.

For an effective traceability process, it is necessary the adoption of a code pattern, applied individually to each product.

REGULATED MATERIAL TRACEABILITY LAW – GOVERNMENTAL DECREE DLOG #18 – DFPC BRAZIL

Governmental decree # 18-DFPC (Diretoria de Fiscalização de Produtos Controlados) rules the directions for traceability of controlled products.

The acquired data by the traceability process must be stored for 10 (ten) years by the respective manufacturers, allowing “ON LINE” access by the DFPC for consultation concerning product logistics and respective ownerships.



#2 – DFPC’s Inspection Architecture

Controlled products are: Detonating cords, Cartridged explosives, Blasting caps (electrical and non-electrical), Boosters and Shaped charges.

Traceability by lots are not accepted, since many links in the Supply Chain can receive products from the same lot, incapacitating identification of the link that caused a possible deviation.

Governmental decree #18 specifies Sole and Exclusive Identification (ID) for each unit of Controlled Product.

For an effective traceability of products, each unit must have the following exclusive markings:

- **Cartridge:** Manufacturer; fabrication date; emergency phone number; ID;
- **Detonating cords:** meter per meter marking; identifying manufacturer; manufacture date; emergency phone number; ID;
- **Blasting caps (Electrical and non-electrical):** manufacturer; manufacture date; emergency phone number; ID;
- **Boosters and shaped charges:** Manufacturer; manufacture date; emergency phone number; ID.

Regulated Material Exclusive Identification Code Structure (ID)

Code	DUN	COUNTRY	MANUFACTURER	PRODUCT	SEQUENTIAL	CHK SUM
Bytes	1	3	5	4	10	1

#3 – Identification Code Structure (ID)

The Sole Identification Structure (ID) is composed of:

- DUN (EAN/GS1 Standard Codification)
 1. Drum
 2. Cask
 3. Big bag
 4. Box
 5. Bag
 6. Composed Packing
- COUNTRY (EAN/GS1 Standard Codification)
 - 789 – Brazil
- MANUFACTURER (DFPC Standard Codification)
- PRODUCT (DFPC Standard Codification)

- SEQUENTIAL (Serial Number)
- CHECK SUM (Code Integrity)

The sole ID number structure is based on EPC (Electronic Product Code) coding, allowing for future integration with RFID (Radio Frequency Identification) technology.

DEVIATIONS

In case of a controlled product deviation, the DFPC, when recovering the product through reading the ID (Datamatrix, bar code or Numerical) of the controlled product, will be able to identify the origin of the deviation.

With a known origin, the DFPC will direct investigations to the deviation origin.

It is on the interest of each link in the Supply Chain to register and control the ownership of received or dispatched product in the DFPC in order to be protected in case of future deviation of controlled products.

TRACEABILITY SYSTEM IMPLEMENTATION

A full compliance solution according to DFPC Dlog #18 requirements, met the following components:

Software Main Functionalities

- ID code generation, control and administration;
 - The ID code is generated in the production time, having followed the requirements of DFPC's statements.
 - When the product receives the ID, initiates its traceability, since the manufacturer until its final consumption.
 - The control of the IDs must be kept per 10 years in the database.
- Control and administration of the ownership of the products (printed and electronics);
 - In the exit of the product of it manufactures, it is generated an ownership document (printed matter and electronic), that they will count information of the customer, Invoice, Army transportation license, and ID product list.
 - The ownership information are sent to the customer and placed disposal in the database for consultation of the DFPC.
- Interfaces:
 - DFPC government interfaces via WEB
 - DFPC uses Internet Browser to accesses the software, in order to consult controlled products transferences (ownership information).
 - Those information are also available to be downloaded from software Database.
 - Legacy System Interface (SAP, Oracle and others)

The interface provides resource to get production information (Worker Order and Setup) from the Legacy System and send them to the production cells.




Also the production cells information (worker, shift, product amount, scraps, errors, and others) are able to be uploaded to the Legacy System.

- Transference and control of electronic Ownership documentation
The ownership documentation is electronic sent to the customer, having facilitated the act of receiving products, as well as the recognition and accomplishes transference of the ownership.
- Equipments Interface
Each production cell has a dedicated set of peripheral equipments and software to control (Industrial Computer) that and guide the worker operations in the production cell.

Equipments

Necessary equipment for writing and reading of the IDs codes in the products:

- Bar code printers:
ID labeling products (pieces, boxes, pallets and containers)

PRODUTO/PRODUCT ANFOMAX		ONU 0082
RG/ID 578904520083700000295373		
<small>DATA FABRICAÇÃO</small> <small>MANUFACTURE DATE</small> 21/10/2006		<small>LOTE/LOT</small> 2389/06
<small>QUANTIDADE</small> <small>QUANTITY</small>		<small>VALIDADE</small> <small>EXPIRATION</small>
137/740		6 MESES
<small>LIQUIDO</small> <small>NET</small> 25,00 kg	<small>PESO</small> <small>WEIGHT</small> <small>BRUTO</small> <small>GROSS</small> 25,10 kg	
<small>EMERGENCIA</small> <small>EMERGENCY</small> 0800-701-0141		00000295373
		
<small>578904520083700000295373</small>		<small>578904520083700000295373</small>

#4 - Granulated product – Bag Label

- Industrial Ink Jet Printers
ID writing in the detonating cords products;



#5 – Detonating cords ID mark on each meter

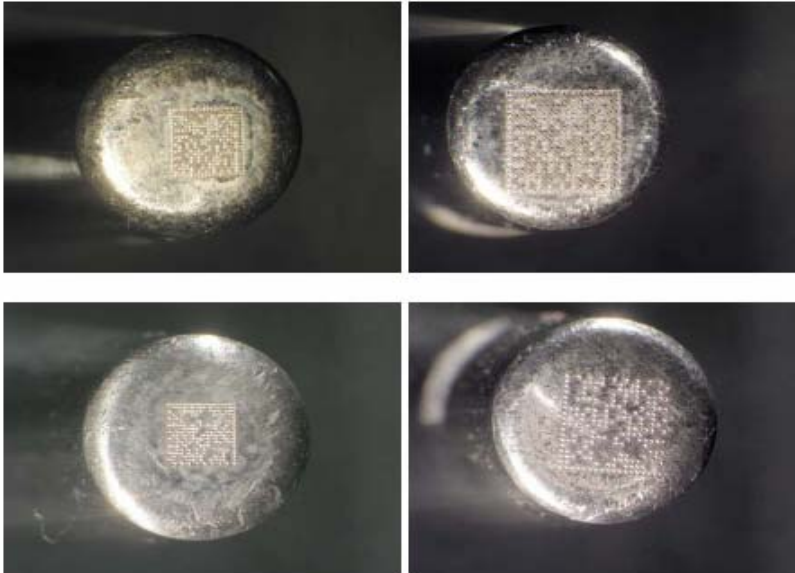


#6 – Detonating cords

- Bar code and Datamatrix readers
Bar code ID reading of parts, boxes, pallets and containers.

Datamatrix ID reading of blasting caps.
- Bar code PDAs
Logistic and production area operation.
- Conveyors
Used in the production line in order to speed up blasting caps reading and product transference between areas.

- Industrial Laser Printer marker
Blasting caps ID marker, before the explosive load.



#7 – Blasting caps ID marker

- Industrial computers
Sealed and protected computer for traceability software cell and peripherals interfaces (printers and readers).



#7 – Sealed production line industrial computer

Conclusion

Through this concept of Traceability applied to an item with exclusive identification, it is possible to trace an item from its fabrication until its final destination.

Through the ownership criteria, when the manufacturer sells a product, a document is issued, transferring the ownership of the product.

The transference of ownership is also informed to the governmental agencies that awaits for the confirmation of transference to the buyers. After the specified term is over, without confirmation, the agency can make a formal investigation.

Since the responsibility in case of deviation lies on the last to have the ownership, there will be interest to inform the governmental agencies about the deviation, insuring a fast and precise investigation.

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- Brazilian Government - DFPC, 2000, “R-105 Regulated Material Investigation Procedures”.
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