# Application of Dual Energy CT Technology in liquid explosive detection

NUCTECH COMPANY LIMITED
FAN, Ying
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IAD
NO LIQUID
OR GELS
PERMITTED
BEYOND
SECURITY

# Lost caused by Liquid Restriction


# Crash caused by liquid Explosives

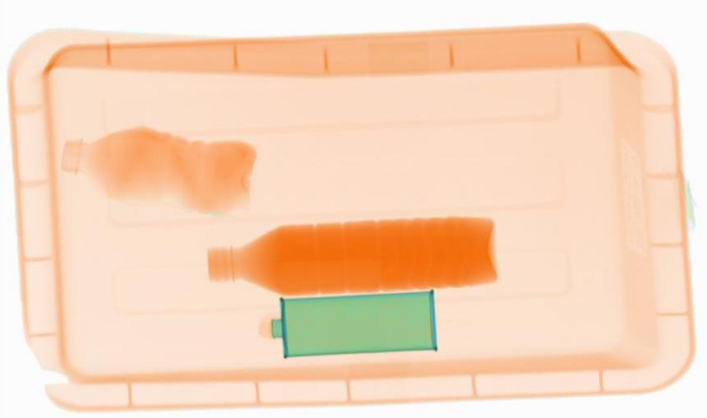
May 2002，Dalian，China

# Airports concerns

- Safety consideration
- Throughput
- Satisfactory experience of passengers （convenience, privacy, quick）


# Why Liquid Explosives?

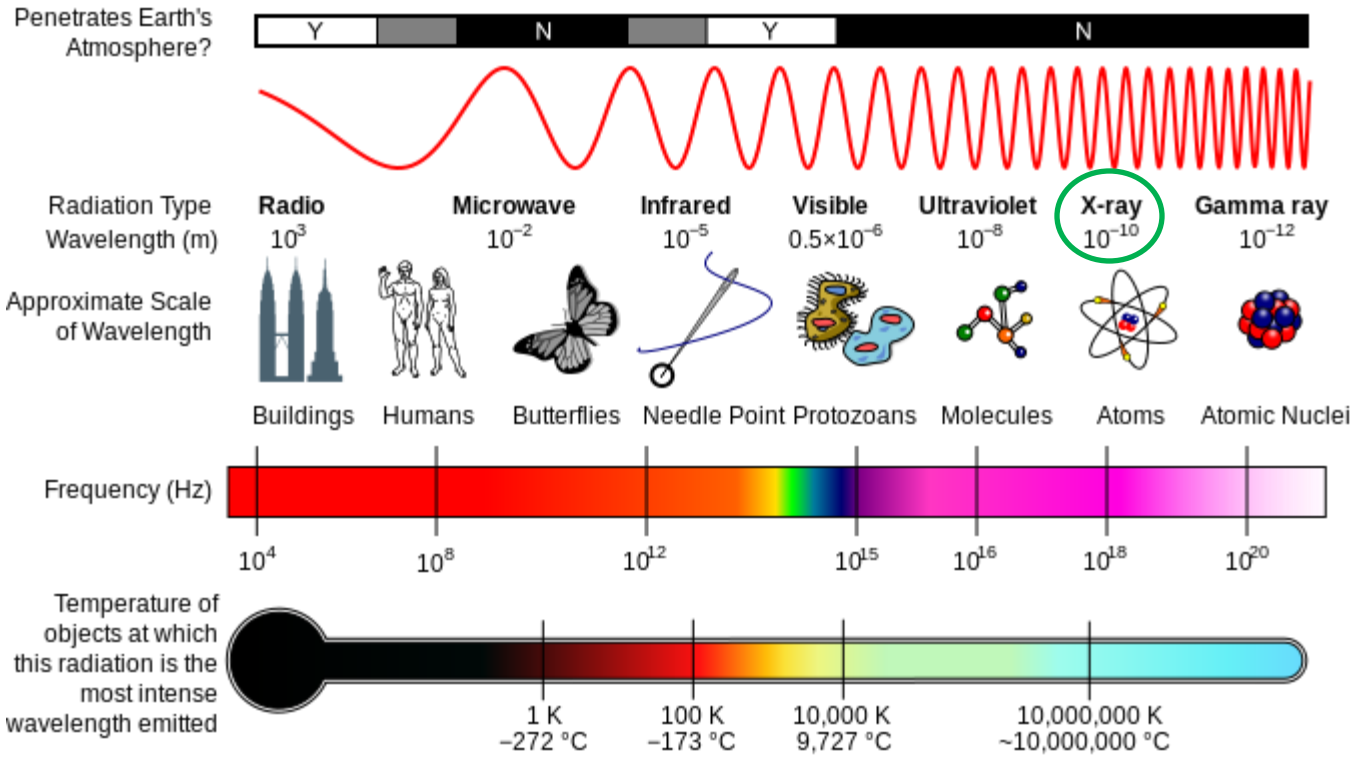
A. Hard to be distinguished from safe liquid in the conventional X-ray image;



B. Chemical reaction by mixing of harmless substance;

C. Easy to be obtained

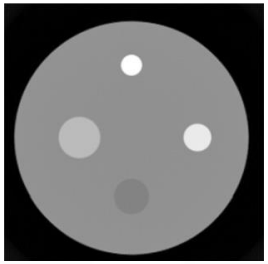
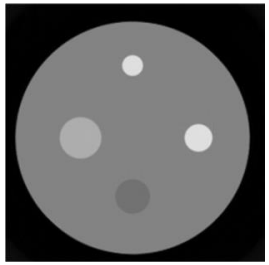
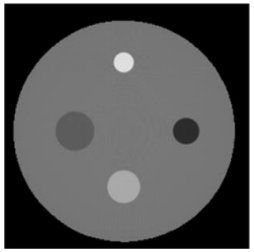
# Liquid Inspection Technology



**Single energy** **Dual energy**

$$\mu\left(E,\rho_e,z_{eff}\right)=K_{ph}\frac{\rho_e z^3}{E^3}+K_{co}f_{KN}\left(E\right)\rho_e$$

Attenuation coefficient Electron density Atom number


# CT Liquid Explosive Inspection system

XT2080


XT2080SI


EDS+LEDS


LS1516BA

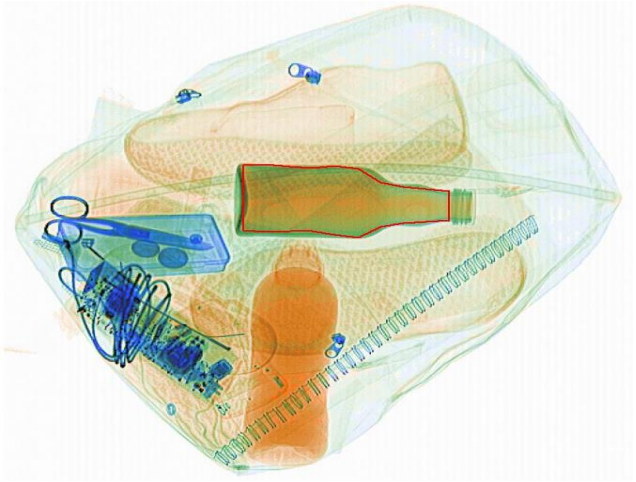

XT2080AD

# Type B/ C， D/D+

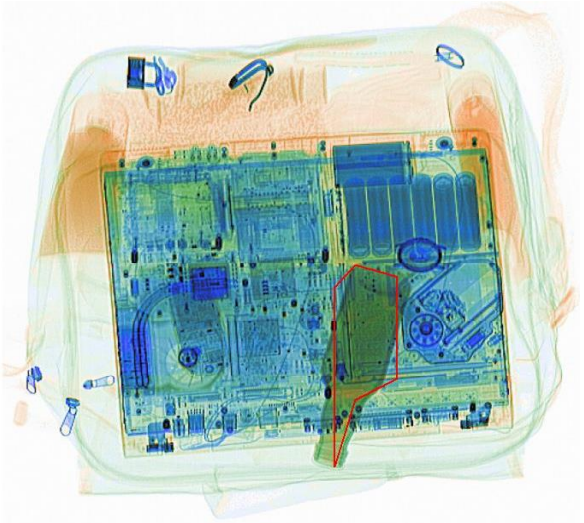
## ECAC Type B, Standard 3；


## ECAC Type C, Standard 2


## ECAC Type D, Standard 2；



## ECAC Type D+, Standard 2



# Combination of Type B/C



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When replying, please quote: EC 9/8.3/83 — 0724 14 August 2014

**Subject: ECAC Common Evaluation Process of security equipment (CEP)**
**Liquid Explosive Detection Systems – Simulator re-test results (2014-LEDS-SRT-006)**

Dear Madam,

In accordance with the ECAC Common Testing Methodology for LEDS, TNO (Netherlands) completed the test of the following equipment on 23 July 2014. The test was a simulator re-test of a new software configuration using data obtained in an earlier full test of the equipment completed on 24 August 2010 by Fraunhofer ICT (Germany):

| | |
|---|---|
| Model: | LS1516BA |
| Detection Hardware Version: | HV1002 (DHV 1.0) |
| Algorithm Version: | AV 3.2.2.0 |
| CONOPS Version: | 2010-06-01 CONOPS-V1-C |

The Concept of Operations (CONOPS) inferred a test according to **Type B**.

The results of the test were considered by the ECAC CEP Management Group, which endorsed that this LEDS met the performance requirements of **Standard 3** for equipment to be used for the screening of Liquids, Aerosols and Gels, as defined in ECAC Doc 30, Part II (13th edition/May 2010). These performance requirements are identical to the performance requirements in the EU aviation security legislation currently in force. I understand that the Test Centre provided you with relevant technical information on the test proceedings during a debriefing meeting after the test completion.

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**Type B**
**Standard 3**

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When replying, please quote: EC 9/8.3/83 — 0726 14 August 2014

**Subject: ECAC Common Evaluation Process of security equipment (CEP)**
**Liquid Explosive Detection Systems – Simulator re-test results (2014-LEDS-SRT-007)**

Dear Madam,

In accordance with the ECAC Common Testing Methodology for LEDS, TNO (Netherlands) completed the test of the following equipment on 14 July 2014. The test was a simulator re-test of a new software configuration using data obtained in an earlier full test of the equipment completed in 21 November 2013 by armasuisse, Science & Technology (Switzerland):

| | |
|---|---|
| Model: | LS1516BA |
| Detection Hardware Version: | HV1002 (DHV 1.0) |
| Algorithm Version: | AV 3.2.2.0 |
| CONOPS Version: | CONOPS-V2-B2013-11-06 |

The Concept of Operations (CONOPS) inferred a test according to **Type C**.

The results of the test were considered by the ECAC CEP Management Group, which endorsed that this LEDS met the performance requirements of **Standard 2** for equipment to be used for the screening of Liquids, Aerosols and Gels, as defined in ECAC Doc 30, Part II (13th edition/May 2010). These performance requirements are identical to the performance requirements in the EU aviation security legislation currently in force. I understand that the Test Centre provided you with relevant technical information on the test proceedings during a debriefing meeting after the test completion.

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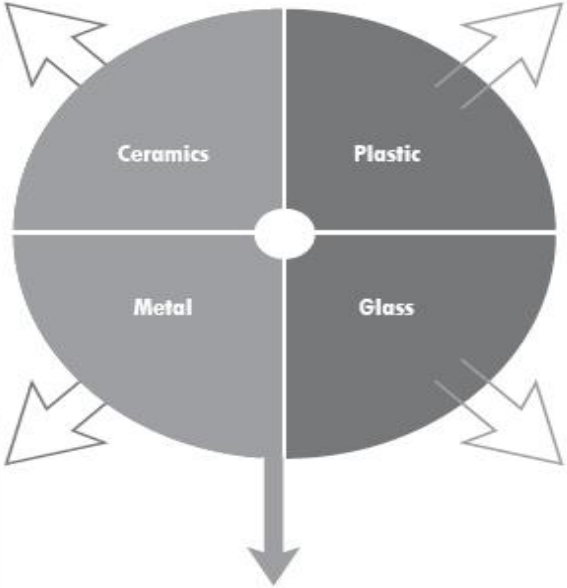
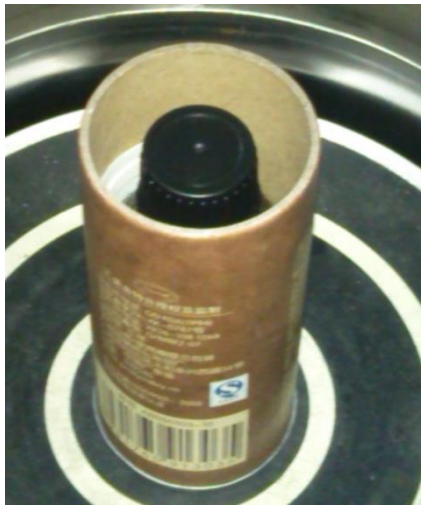
**Type C**
**Standard 2**

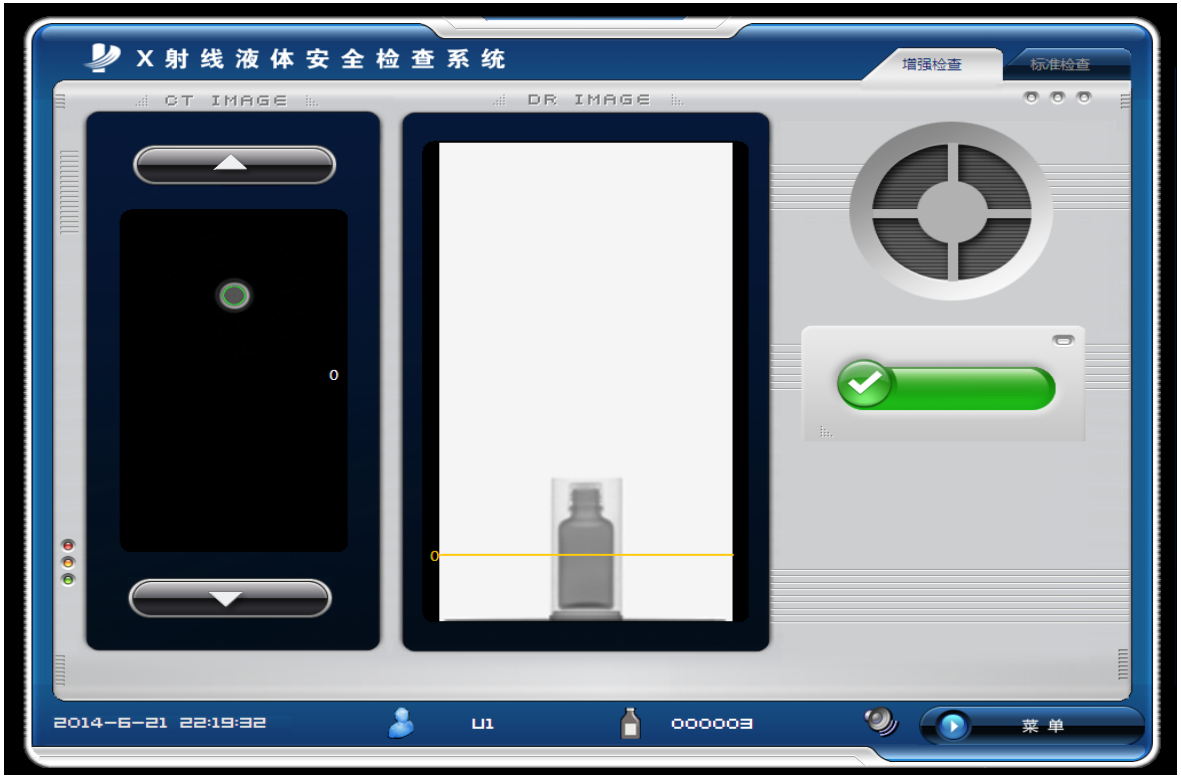
# No limitation of Container

## -Any material and shape

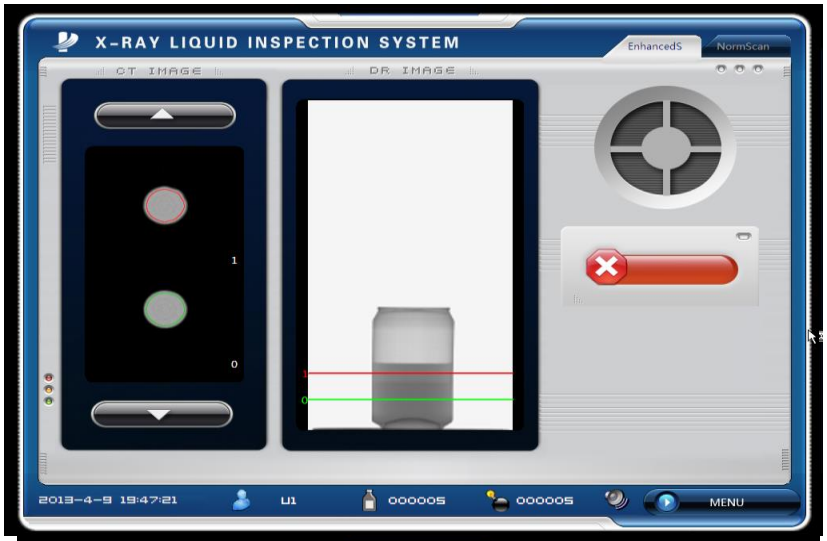

# No need to remove Outer package

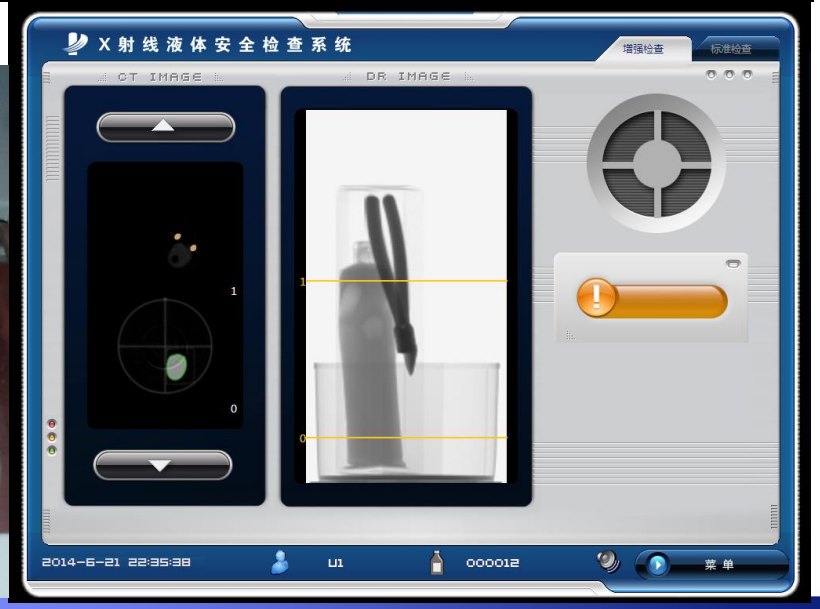


# Rich Information

## -Inspection of Multiple layer Liquid & contraband





# Summary of Advantages of LS1516BA

- No Limitation of the container material of shapes;
- Without opening the outer package of LAGs;
- Intuition of the operation interface;
- Two Scan Mode provide more information, inclusive the hidden items in the container;
- Expanding Threat library Function, networking capability and Centralized Management function benefit the clients;

# LET'S MAKE PROGRESS TOGETHER!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