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## Some Comments on Choosing Seals & on PSA Label Seals

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## Maxims for Choosing Seals

- There is no “best” seal. The optimal seal depends on details of your application including:
  - Goals
  - Adversaries
  - Consequences of Failure
  - Facilities
  - Personnel
  - Ergonomics
  - Training
  - Containers
  - Hasps & Doors
  - Time & Money Constraints



## Choosing Seals

- There is no such thing as an undefeatable seal.
- Seal manufacturers, vendors, and users will typically (greatly) over-estimate the difficulty of defeating their seals.
- Counterfeiting is usually not the most likely attack. Vulnerabilities associated with lifting (re-using the seal) are more important.




## Choosing Seals

- Counterfeiting is nevertheless often surprisingly easy.
- Typically, however, the adversary needs mimic only the superficial appearance and (perhaps) the apparent performance of the seal. Much easier than true counterfeiting!

Sincerity is everything. If you can fake that, you've got it made.  
-- George Burns (1896-1996)



## Choosing Seals

- The use of an electronic reader often decreases the likelihood of detecting tampering.
- A seal that is complex and difficult to use, that has significant ergonomic problems, and that is resisted by seal installers and inspectors will not provide good tamper detection.




## Choosing Seals

- The unit cost of the seal is usually not the most important economic (or security) issue.
- When considering reusable electronic seals, be sure to factor in:
  - unit failure rates
  - environmental conditions
  - battery lifetime & replacement
  - theft or vandalism of the seal
  - How will the seal be returned to the point of installation for reuse?




### Choosing Seals

- (Ideally the same) serial number should appear on every independent part of a seal. If serial numbers are stamped or embossed on a seal, they should be done deeply enough that they can't be easily buffed off.
- Slapping a high-tech tag (e.g., RFID, Contact Memory Button, hologram) on an existing seal design will usually not improve security.



### Choosing Seals

- Robust seals on moving containers can be a safety hazard.
- With any frangible seal (including brittle adhesive label seals), be sure to consider the thermal fluctuations, other environmental conditions, & rough handling the seal will receive.



### Choosing Seals



- Consider the potential for backdoor & replication attacks:
  - factory security
  - vendor security
  - shipping/receiving security
  - Manufacturer protects logos & SNs?
  - Only authorized personnel can order seals?

### Pressure Sensitive Adhesive Label Seals



- Lifting & Counterfeiting are easy.
- Lifting is usually the most likely attack.
- The difficulty of either attack is almost always greatly over-estimated by seal manufacturers, vendors, & users.

Nothing is like it seems, but everything is exactly like it is.  
-- Yogi Berra

### Installation

- It is essential to feel the surface to check that the adversary hasn't pre-treated it to reduce adhesion.
- The surface should not be cold, wet, or corroded.
- Pre-cleaning the surface with a solvent or detergent is strongly recommended.
- Full adhesion requires 48+ hours. A PSA seal is particularly easy to lift the first few minutes to hours. Heat can help.



### Pressure Sensitive Adhesive Label Seals



- Match the adhesive to the surface. The best adhesive for bare metal is not necessarily the best for painted metal, plastic, wood, cardboard, or glass.
- Ideally, the adhesive, substrate, & ink should be made of the same material, so they dissolve in the same solvents. (Possible but doesn't exist.)
- Carefully examine the surface area outside the perimeter of the label seal.
- Consider covering the label seal with a plastic protective sheet or clear protective spray.

## Inspection

- Smell can be a powerful tool for detecting solvents, adhesives, paints, inks, epoxies, or other foreign material used in an attack. Or use a handheld chemical “sniffer” (\$200-\$9K).
- Always compare the seal side-by-side with an unused seal you have protected. Check size, color, gloss, font, & digit spacing/alignment.
- The best test for tampering is to closely observe how the label seal behaves when it is removed.



## Viable PSA Label Seal Applications

If you don't use a Blink Comparator (or otherwise compare before & after photos), then in the VAT's view, PSA Label Seals are only useful when...

- you are bluffing about tamper detection
- the adversary is extremely disinterested & lazy
- the adversary doesn't care about being surreptitious
- the adversary is < 8 years old (cognition or dexterity)
- you want to remind your staff that the asset is valuable
- used as a flag seal = inventory tag, i.e. there is no adversary
- for nuclear treaty monitoring: the seal "inspection" is an excuse to get observers inside the monitored facility

