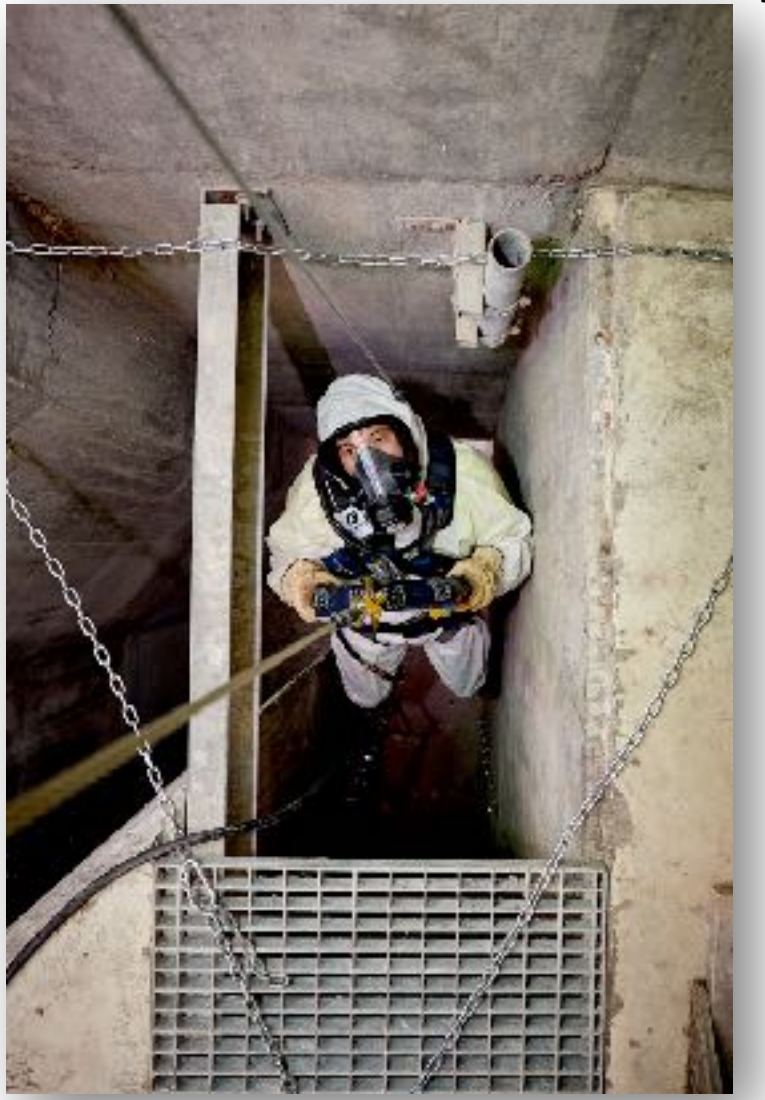
Confined Space Solutions

Nathan Meyer
3M Fall Protection

What is a “Confined Space” ?



Step 1: Three questions to consider about the space

1. Is it large enough and so configured that an employee **can bodily enter** and perform assigned work?
2. Does it have limited or **restricted means for entry or exit?**
3. Is it **not designed for continuous** employee occupancy?

No to any → **Non- Enclosed Space**
US Non-Confined Space

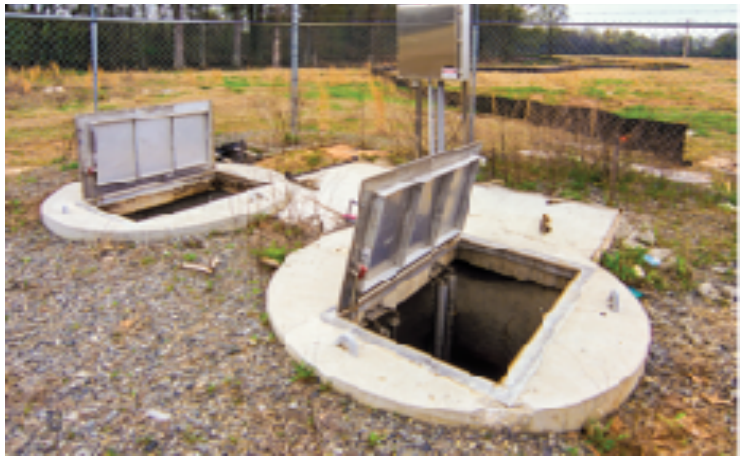
Yes to all → **Step 2: Consider additional risks**

Does the space have any other serious health or safety hazard, such as engulfment, entrapment, asphyxiation, atmospheric hazards, etc.

No → **Enclosed Space**
US Non-Permit CS

Yes → **Confined Space**
US Permit CS

Examples of Confined Spaces



Who goes into a Confined Space?

- Host Employer
- Specialist Contractor
- Rescue Team

1.6M workers enter 4.8M confined spaces each year*

Office of Federal Register, 1993

What hazards can exist within a confined space?

The hazards found inside confined spaces can be divided into three categories. These need to be understood and controlled prior to rescue.

Atmospheric Hazards

Physical Hazards

Configuration Hazards

What are the risks?

Deaths occur each year

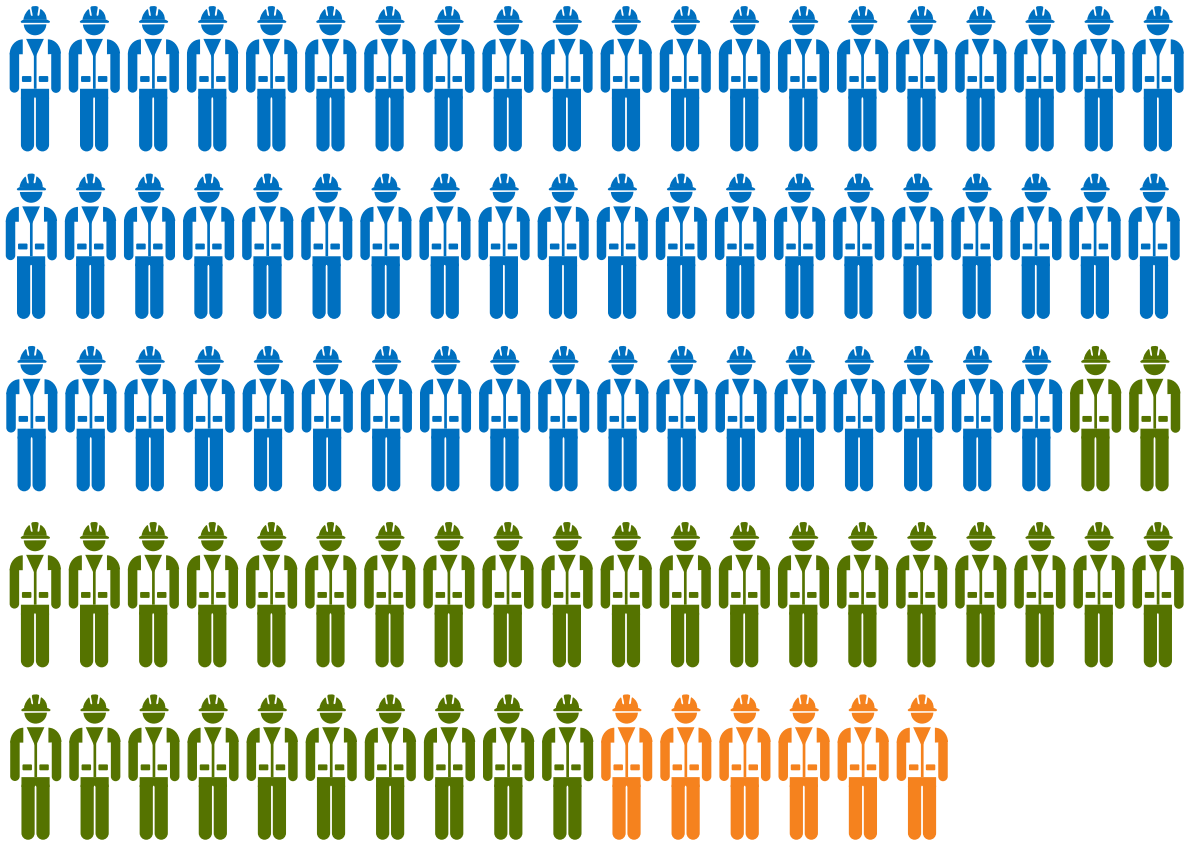
96 in the USA alone

(OSHA, 2005-2009)[1]

The first documented case of deaths in confined space was in the year 1812. (Kletz, 1996)

Sources:
1) http://www.rocorescue.com/roco-rescue-blog/confined-space-fatalities-a-closer-look-at-the-numbers#.WKRkYFUrL3g;
2) OSHA, https://www.osha.gov/dte/grant_materials/fy10/sh-21000-10/Confined_Space_Entry_Awareness.pptx;

What are the risks?



61% from Physical Hazards:

engulfment, falls, “stuck by”, electrocution, heat, etc.

34% from Atmospheric Hazards: toxic chemicals, oxygen deficiency, combustible dusts, etc.

Sources:

1) http://www.rocorescue.com/roco-rescue-blog/confined-space-fatalities-a-closer-look-at-the-numbers#.WKRkYFUrL3g;

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What are the risks?

60% of deaths are would-be rescuers:

More people die attempting to rescue others than the initial afflicted entrants

90% from atmospheric hazards (J. Selman et al. 2018)

In 1895 in England, 5 Workers died one after the other after entering the space to save the first.

(Bond 1986)

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1) http://www.rocorescue.com/roco-rescue-blog/confined-space-fatalities-a-closer-look-at-the-numbers#.WKRkYFUrL3g;
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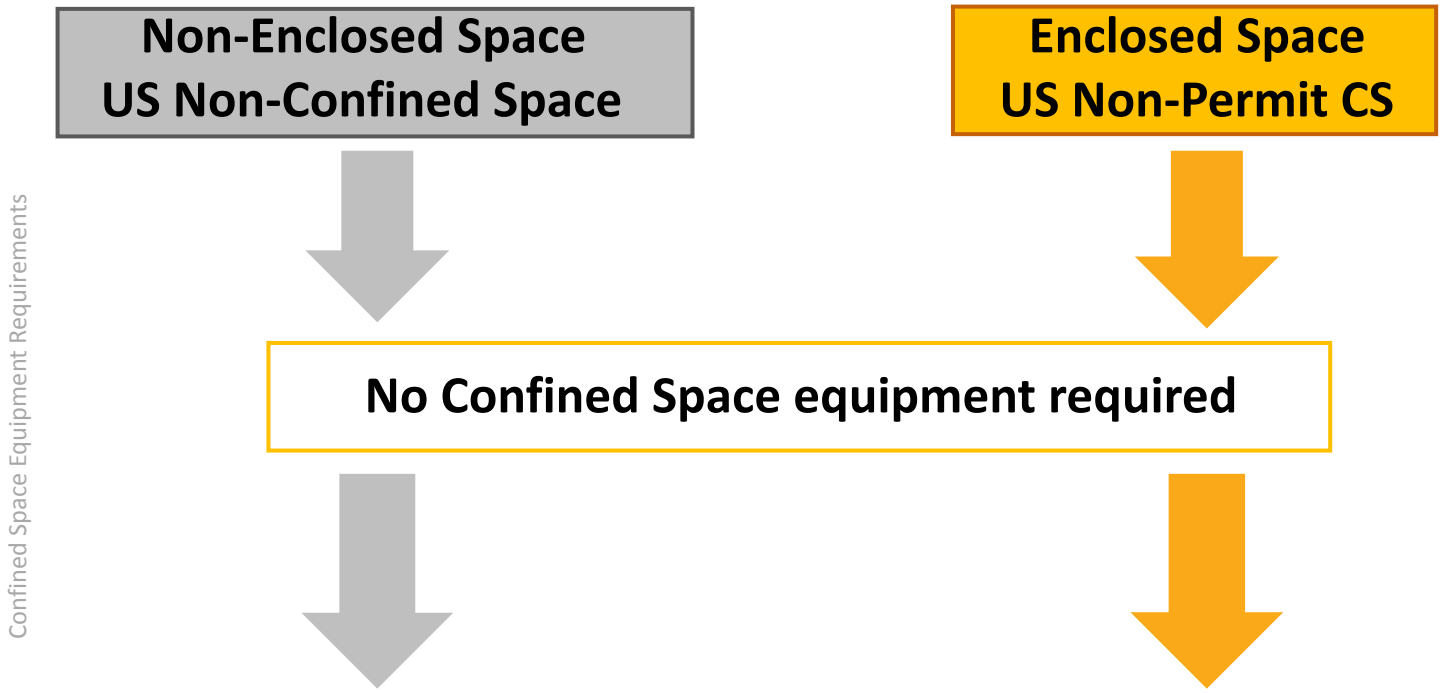
Do regulations require use of Confined Space products?



Confined Space equipment ***can still help*** when accessing these areas

Do regulations require use of Confined Space products?

Confined Space
US Permit Required CS

A – Anchorage
B – Body Support
C – Connector
D – Detection
E – Education

Confined Space equipment is ***required*** when accessing these areas

- **Anchorage:** Mechanical device or fixed point; mechanical device needed if space is > 5ft deep

- **Body Support:** Chest or full-body harness

- **Connector:** Retrieval line connected at center of back, near, or above shoulders

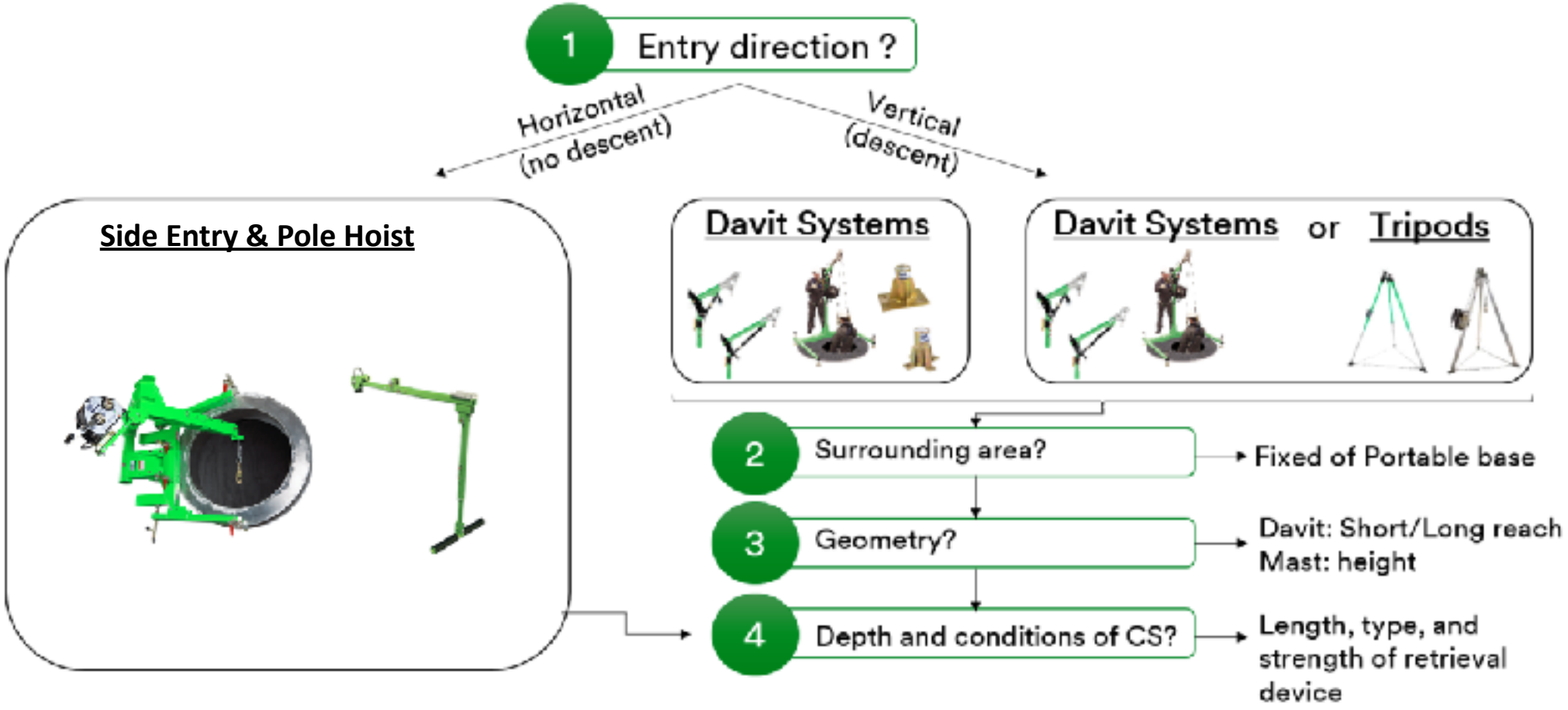
- **Detection**: Air within the confined space must be evaluated with gas detection. In some Instances an "escape" air supply is required

- **Education**: Employees must be trained

Why implement an effective confined space plan?

With proper planning, confined space incidents & deaths can be prevented

Choosing the right equipment – “A” Anchors



Choosing the right equipment – “A” Anchors

Vertical Entry Examples

Tripods

Davit Arms

Choosing the right equipment – “A” Anchors

Horizontal Entry Examples

Pole Hoists

Side Entry Systems

Choosing the right equipment – “B” Body Support

Choosing the right equipment – “B” Body Support

Primary Confined Entry / Retrieval Harnesses

ExoFit Nex | Delta | Protecta

Attachment points **on each shoulder** facilitate upright retrieval.

Intended to be used with Y-Lanyard

Additional Options for Descent

Harnesses

Harnesses with seat sling attachments can add comfort for vertical descent

ExoFit NEX Tower Climbing Harness

ExoFit NEX Oil & Gas Harness

Accessories

Suspended Workman’s Chair

Bosun Chair

Retrieval Wristlets (if entrant did not have harness and is in need of rescue)

Choosing the right equipment – “C” Connectors

Winches

Retrieval SRL’s

Choosing the right equipment – “D” Detection

The definition of ‘atmospheric hazards’ is quite consistent

“Atmospheric hazard” means:

a) Flammable or combustible or explosive agents
b) Oxygen content less than 19.5% or more than 23% by volume
c) Toxic contaminants (gases, vapors, fumes, dusts or mists) that could:

(i) result in acute health effects that pose an immediate threat to life

(ii) interfere with a person’s ability to escape unaided from a confined space.

Choosing the right equipment – “D” Detection

Portable Monitoring

(Personal Use, Standard 4-gas)

Portable Area Monitoring

(Continuous Area Monitoring, multiple gas options)

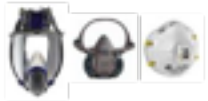
Fixed Area Monitoring

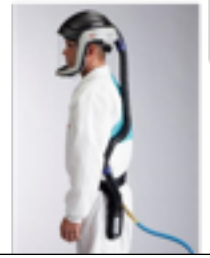
(Continuous Area Monitoring, multiple gas and specialty gas)

“E” Education

Choosing the right equipment - “F” Full Body Protection (PPE)

Respiratory Protection




Escape, Supplied Air, and Self-Contained Breathing Apparatus



Hearing Protection


Head, Eye, and Face Protection


Body Protection



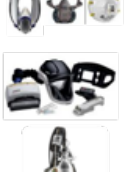
Communications

- Everyone inside the space
- Those inside and outside the space
- Rescuers and the Emergency Services

- Internal communications can be audible, via radios or cable-intercoms, or even tugs on a rope, but:
  - They must be effective and understood by everyone
  - They must be safe (such as in explosive atmospheres)



Challenges Implementing Confined Space Solutions



3M using technology to make the process easier…

Live Demonstration