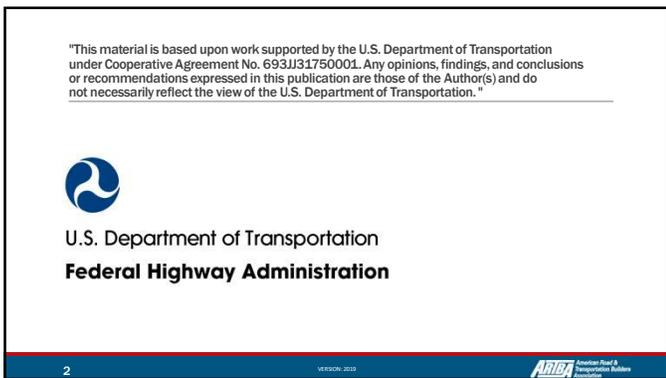
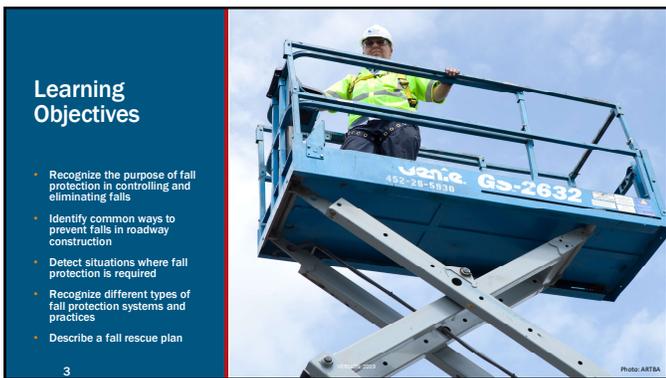


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Video

RISK ASSESSMENT:
HOW CAN WE PREVENT THIS INCIDENT?

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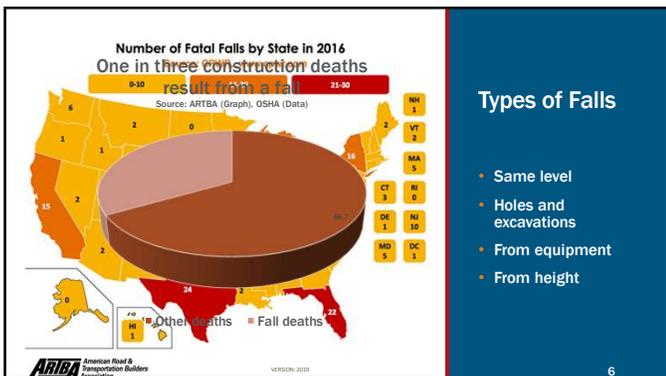
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Video

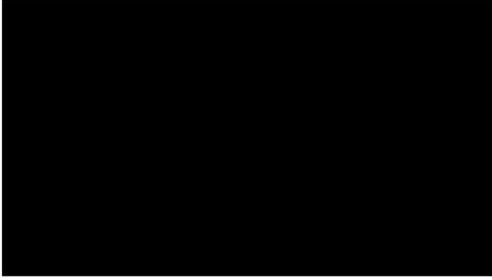
OREGON OSHA - [WHAT IS FALL PROTECTION?](#)

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To Prevent Fall Incidents

Falls can be prevented:
PLAN ahead to get the job done safely.
PROVIDE the right equipment.
TRAIN everyone to use the equipment safely.



osha.gov/stopfalls

1. HAZARD ANALYSIS
2. PLAN
3. PROVIDE PROTECTION
4. TRAIN
5. EVALUATE

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Three Main Categories of Falls

- Falls on the same level
- Falls from equipment
- Falls from elevation
- Other topics like falling from stairways and ladders are covered in a different presentation



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Fall Prevention

- Elimination
- Substitution
- Engineering Controls
- Administrative Controls
- PPE

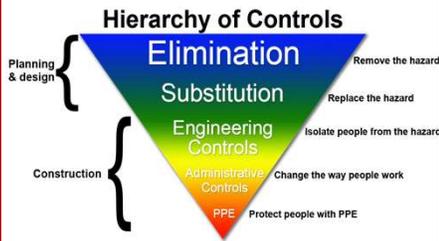


Chart: ARIBA

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First Case: Falls on the Same Level



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Why Do Falls Happen?

Some happen on the same level.

- Tripping over materials or debris (housekeeping)
- Falling on hills or embankments
- Stepping in holes and walking on irregular ground
- Stumbling while carrying loads that blocks vision
- Slips or trips in muddy, wet, and/or icy conditions
- Improper footwear




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Preventing Same Level Falls

Follow 6 basic best practices:

1. Use footwear with ankle support and soles that grip
2. Avoid walking on muddy, wet, or icy surfaces
3. Don't carry heavy loads. Use hauling equipment
4. Fill in, cover and mark, or barricade holes in ground
5. Practice good housekeeping
6. Include walking routes in the Internal Traffic Control Plan (ITCP)




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Second Case: Falls from Equipments





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Why Do Falls Happen?

Some happen from equipment

- Not facing ladders/equipment when going up/down
- Not using hand grabs/rails when going up/down
- Steps, ladders not clear and defect free
- Platform not provided or not properly guarded
- Seatbelts, restraints not used



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ARTBA VIDEO – FALLING FROM A ROLLER

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Preventing Falls off Equipment

Follow 5 basic best practices:

- Use handrails
- Always use 3-point contact
- Make sure steps and ladders are clear and defect-free
- Do not ride on equipment except in provided seats
- Use seatbelts or restraints for riding in cars, trucks, personnel carriers



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Equipment Mounting & Dismounting

- Three points of contact
- At least one hand in contact all the time
- Facing the equipment all the time



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Third Case: Falls from Elevations

- Off Bridges
- Off formwork
- Off Scaffolds
- Off aerial lifts
- Off excavation rims



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Installing Signs



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Renovation & Demolition



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VERSION 2020



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Decking Operations



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VERSION 2020



23

Video

OSHA - [FALLS IN CONSTRUCTION: BRIDGE DECKING](#)

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Preventing Falls from Elevation

Follow 5 basic best practices:

- **Hazard Evaluation** before starting any job
- **Plan** for 100% fall protection
- Develop a written fall protection plan written by a **Qualified Person**
- **Provide** and use proper fall protection systems
- **Train** workers in fall protection
- **Enforce** and evaluate the fall protection program
- **Evaluate** and improve your plan

Use modular erection to avoid work at heights on forms

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Elimination of Fall Hazards by Eliminating the Hazard

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Know the OSHA Standards

Management and the fall protection Competent Person must know the OSHA standards in detail.

Competent Person means "one who is capable of identifying existing and predictable hazards in the surrounding or working conditions ... and who has authorization to take prompt corrective measures to eliminate them."



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Competent Person

- Oversee documented inspections where fall protection measures are used
- Train employees by a competent person qualified in the fall protection measures and program implemented by the company
- Train employees concerning fall protection standards emphasizing the recognition and avoidance of fall hazards
- All employees exposed to fall hazards should be trained in OSHA standard requirements.



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Fall Protection Plan

A fall protection plan is a plan to control fall hazards written by a Qualified Person

The steps in developing a plan include:

- Perform *fall hazard analysis* to determine areas of risk and methods of engineering out hazards
- Select fall protection system(s)
- Identify rescue equipment
- Obtain/develop worker training program
- Describe how the plan will be enforced and evaluated



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Required Training

Workers exposed to fall hazards must be trained by a **Competent Person**.

At a minimum, workers must learn:

- Nature of the fall hazards in the work area
- Correct procedures for erecting, maintaining, disassembling, inspecting fall protection systems
- Use and operation of guardrail systems, PFAS, safety nets, and other protections
- OSHA fall protection standard



Photo: AITBA

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Fall Protection

Two categories of *conventional* fall protection equipment are used in road work:

- Fall *prevention* systems that prevent a fall
 - Examples: guardrails and personal fall restraint
- Fall *arrest* systems that stop a fall after it happens
 - Examples: safety nets and personal fall arrest (PFAS)



Photo: Work Research

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Guardrails

Guardrails are barriers erected to prevent workers falling

Guardrails may be cable, metal, plastic or wood

Guardrails are an engineering control (see *Hazard Control Methods on Trainee Booklet page 14*)

After guardrails are installed, workers do not have to do anything to operate them. Guardrails are classified as passive fall prevention

Highway guardrails may or may not meet OSHA requirements. Often highway guardrails are lower than 42 inches in height.



Photo: AITBA

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Guardrail Requirements

Guardrails must meet OSHA's basic specifications. A standard guardrail consist of:

- Top rail**
 - Must be 39" to 45" above the working surface
 - Must withstand at least 200 pounds of force
 - Midrail**
 - Must withstand at least 150 pounds of force
 - Toeboard**
 - Must be a minimum of 3.5" high
 - Must withstand at least 50 pounds of force
- No more than 8 feet between posts or supports



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Safety Nets

Safety nets are fall arrest systems. Nets are hung beneath/around work areas to catch workers. Nets do not prevent falls and they do not prevent injury.

After safety nets are properly installed, they provide 100% fall protection. Workers have no responsibilities other than to be alert to any changes that reduce effectiveness. That is why safety nets are classified as passive fall protection.



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Safety Net Requirements

A safety net must be installed as close as practicable under working the working surface. And no more than 30 feet below the working surface.

Safety components are:

- Net mesh
- Outriggers
- Support cables
- Cantilever arms
- Mounting brackets
- Various adapters

A Competent Person must inspect safety nets on a frequent/regular basis to ensure continuing effectiveness.

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Personal Fall Restraint Systems (PFRS)

A Personal Fall Restraint System (PFRS) acts as a "leash" to prevent a worker falling.

PFRS is "... composed of ... a body harness along with an anchorage, connectors and other necessary equipment. The other components typically include a lanyard and may also include a lifeline and other devices."



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Video: OSHA

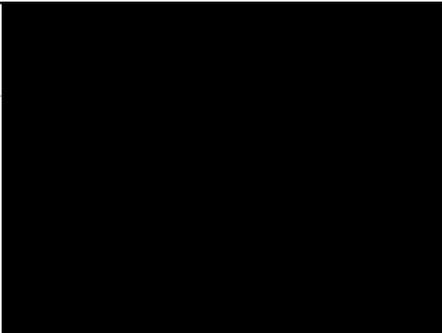
FALL RESTRAINT

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VERSION 2020



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PFRS Requirements

Personal fall restraint systems must meet OSHA's basic specifications. They include:

- Body harness
- Connectors
- Lanyard or lifeline. Line length should not exceed the distance of the anchor from the edge minus < 12 inches

Anchorage must be located to prevent any access to an edge

Anchorage height must be correct for the line length



Photo: Van Housell

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Personal Fall Arrest Systems (PFAS)

A personal fall arrest system must:

Be rigged so that a worker can never free-fall more than 6 feet and cannot hit any lower level.

Limit maximum arresting force on a worker to 1,800 pounds.

Bring a worker to a complete stop and limit the maximum deceleration distance to 3 1/2 feet.

Have enough strength to withstand twice the potential impact energy of a worker free falling a distance of 6 feet or the free fall distance permitted by the system, whichever is less.

The PFAS must hold a fallen worker safely until rescue can be completed.



Photo: ARIBA

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Video: OSHA

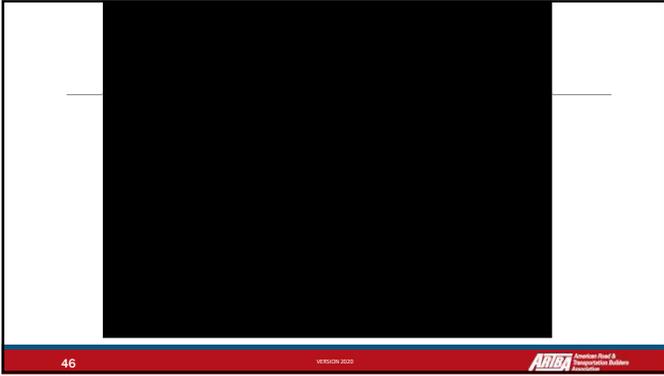
FALL ARREST

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Parts of a PFAS

A PFAS has 4 main components (A-B-C-D):

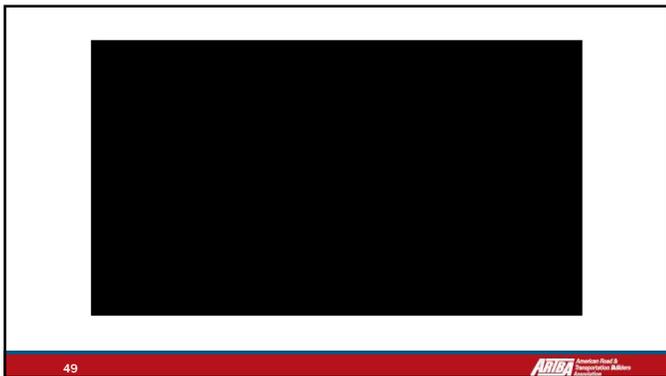
- A = Anchor
- B = Body harness
- C = Connectors
- D = Descent/rescue

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Video: OSHA

ABCD OF THE FALL ARREST/RESTRAIN SYSTEM

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A = Anchor ... B = Body Harness

A = Anchor

Secure point to attach lifeline, lanyard, deceleration device, and/or rescue equipment

Must Support at least 5,000 pounds per worker

B = Body Harness

Shoulder straps, retainer, waist strap, thigh straps, sub-pelvic support, adjustment buckles

Photo: Robinson Vazquez



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C = Connectors ... D = Descent/Rescue

C = Connectors:

D-ring typically located between shoulder blades

Locking carabiners or snap hooks

D = Descent/Rescue Devices

To retrieve or lower a fallen worker



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Photo: ARIBA

Putting on a Harness

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Photo: Robinson Vasquez

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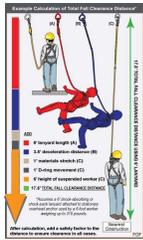
56

Selecting PFAS Lanyards

First, calculate the total fall clearance distance.

Primary factors include:

- Lanyard length- typically 3' to 6'
- Deceleration distance of energy absorber in shock-absorbing or shock-pack lanyard
- Estimated materials stretch
- Estimated D-ring movement
- Height of suspended worker



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Lanyard Specifications

Lanyards must display approval by the American National Standards Institute (ANSI) or the American National Standards Institute/American Society of Safety Engineer's (ANSI/ASSE).

Lanyards meeting the specifications of ANSI A10.32, ANSI/ASSEZ359.1 or ANSI/ASSE Z359.13 are permitted in the construction industry.

ANSI/ASSE Z359.1 and Z359.13 are more stringent and more comprehensive than the ANSI A10.32.



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Optional Factors

- Vertical lifeline: calculation should include rope grab slip and lifeline stretch;
- Horizontal lifeline: include displacement and lifeline stretch;
- Anchor below D-ring level: control arresting force by calculating a larger shock-pack;



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Selecting PFAS Connectors

- A connector must suit the connection being made;
- Snap hooks and carabiners are best for vertical or horizontal lifelines;
- Web loops are suitable for wrapping around beams;
- Scaffold hooks are good for anchors of convenience, such as rebar;
- Ascender/descender devices may be the correct connector when connecting to a lifeline.



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Connector Specifications

All acceptable snap hooks or carabiners have a kilo-Newton (kN) rating engraved into the spine. Since 2007, the newest ANSI (American National Standards Institute) standard requires all fall protection hardware to have a minimum 16 kN (3,600 pounds) rating for the gate and 22.5 kN, (5,000 pounds) tensile load.



Photo: 3M

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Horizontal Lifelines

A horizontal lifeline is a lifeline anchored at both ends.



Photo: Van Housell

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Horizontal Lifelines Installation and Use

Features include:

- May be temporary or permanent
- Enables flexible movement
- Ensures 100% fall protection



Photo: ARIBA

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Self-Retracting Lines (SRLs)

An SRL is a deceleration device.

Components include:

Drum-wound line
extracted/retracted from/onto a
drum under
slight tension

Drum locks automatically in a fall



Photo: Robinson Vandenput

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Video

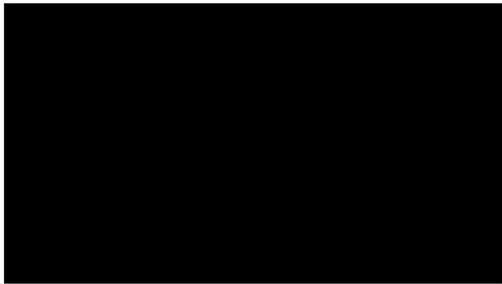
ARTBA Just in Time Video Series - [Fall Protection Rescue and Suspension Trauma](#)

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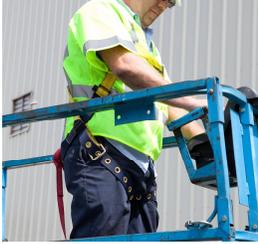
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Suspension Trauma



Suspension trauma is *orthostatic shock* from hanging in harness. It happens because:

- Harness straps act like *tourniquets* on the veins in the backs of the leg;
- Straps prevent used (deoxygenated) blood returning to the heart to become oxygenated.

Suspension trauma can be fatal in as little as 10 minutes (typically 15 to 40 minutes).

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Reduce the Risk of Suspension Trauma



A fallen worker should stand in *relief straps* or on a structural member

The onsite rescue team should bring equipment such as a ladder, an aerial lift, etc.



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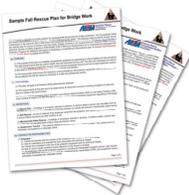
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Rescue Plans

The company must have a plan to rescue the suspended worker in **less than 5 minutes**.

Rescuers must take care in handling a fallen worker to avoid post-rescue death caused by the heart's inability to tolerate an abrupt increase in the flow of carbon dioxide-saturated blood from the legs.

Place rescued workers in the 'W' position for at least 30 minutes.



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Emergency Medical Services (EMS)

Inform the EMS team how long the worker was suspended.
Ensure the EMS team knows how to treat suspension trauma.



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Fall Prevention Plan

- Site specific written plan
- Site specific rescue plan
- Plans are developed by a qualified person
- Plans are implemented by a competent person
- Workers are trained by a competent person qualified in fall protection

www.workzonesafety.org/training-resources/fall-prevention-fact-sheets/

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Discussion: Written Fall Prevention Plan

Activity instructions: Ask the group what they think should be included in a written fall protection plan. Record the group's items on a flip chart.

Next, review the sample plan in the Student Workbook. Compare the list with the sample.



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Activity:
Examine Fall Arrest Gear

Activity instructions: Place all the components of a fall arrest system out for the trainees to examine. Use a volunteer to demonstrate how to put on the gear.



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Falls Summary

- Recognize the purpose of fall protection in controlling and eliminating falls
- Identify common ways to prevent falls in roadway construction
- Detect situations where fall protection is required
- Recognize different types of fall protection systems and practices
- Describe a fall rescue plan



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Break

Questions?
Poll

Please return in 5 minutes



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