

APPLYING OSHA'S WALKING & WORKING SURFACES STANDARD TO FIELD GAS COMPRESSION

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Objectives

- * **New requirements and recent data**
- * **Common challenges faced**
- * **Evaluations and Inspections**
- * **Solutions**
- * **Resources**



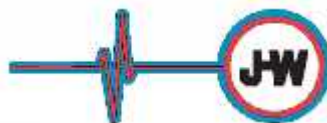
Walking/Working Surfaces

- **In January 2017, OSHA's Revised CFR 1910, Subpart D, Walking and Working Surfaces rules took effect.**
- **Purpose is to prevent slips, trips, and falls in general industry workplaces**
- **Covers U.S. Oil and Gas industry**
- **Offices, facilities, field locations and equipment are all affected**



Walking/Working Surfaces

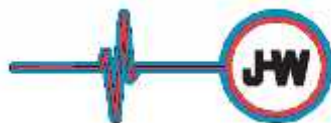
- *WWS safety practices have become part of normal life in an office or shop environment. In the field? Not always**
- *Most on-shore oil/gas production locations have numerous types of equipment, storage tanks and surface piping, contributing to a high level of slip, trip and fall injuries**
- *Organizations such as the BLS, AESC, NSC and insurance companies list slips, trips and falls (same level), and falls (lower level) as leading causes of injury and/or fatality in the U.S. Oil & Gas industry.**
- *Most occur at rural field locations**
- *Field gas compression equipment in particular requires constant service and maintenance, often above surface height**



Walking/Working Surfaces

- * Proper work surfaces are required where employees are performing frequent work, as free of hazards as possible**
- * Non-slip platforms/work surfaces in routine maintenance areas on the package (beside engines, at valves, filter bottles, etc.)**
- * Proper stairways, steps or ladders are required to access any work platform/surface where a “step up” of 19 inches or more is present***
- * A guard rail system or other acceptable form of fall protection is required for all work platforms where an employee could fall 48 inches or more to the surface below. (on top of coolers, at air intakes, beside engines)**
- * When fixed ladders or stairs are not practical, other acceptable methods must be used***

(*not part of Revised Subpart D regs)



Industry Standard

- 2017 GMRC Guideline. GCA partnership for:
- Section 12 - OSHA WWS for the equipment itself
- Section 14 - WWS issues up to/around the compressor

GMRC HIGH-SPEED COMPRESSOR PACKAGE GUIDELINE FOR FIELD GAS APPLICATIONS

Rev. 0
August 8, 2017

Gas Machinery Research Council
ACI Services Inc.



RECOMMENDED PRACTICES FOR EQUIPMENT SAFETY, ACCESSIBILITY AND MAINTAINABILITY

Rev.0, February 15, 2018

For distribution only by GCA member companies to their customers.

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Statistics

Slips, trips and falls are a major cause of workplace injuries. Unsafe conditions and behaviors, along with a lack of safety awareness, can lead to these types of accidents.



SLIPS, TRIPS & FALLS:
15% of all accidents*

SLIPS, TRIPS & FALLS
on the same level are the
2nd LEADING
CAUSE OF
INJURY**

25,000
SLIP, TRIP & FALL
ACCIDENTS occur DAILY
in the US*

* National Safety Council ** Bureau of Labor Statistics

Fall Type:

On same level - 137,079

Floors

Walkways

Other surfaces

To lower level - 48,379

Stairs or steps

Docks

Ladders

Roofs

Nonmoving vehicles



Common Challenges

Safe access to engine service platform, platform dimensions, lack of protective railing

Safe access to elevated components – valves, level kills, surge tanks, exhaust catalyst elements

Special situations

Access to the compressor package

Also:

On-skid piping, conduit/wiring, etc. obstructing access

Oil, antifreeze, chemicals on skid; weather (non-slip tread/surfaces)



Common Challenges

Engine service platforms



Common Challenges

Elevated components



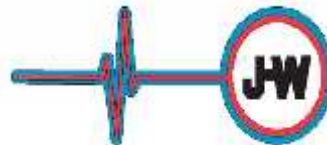
Common Challenges

Special situations – units in buildings or noise containment; trailer-mounts



Why such challenges?

- * **Age of units - built at different times, different standards**
- * **Many, many compressor unit packagers**
- * **Units bought/sold, acquisitions and mergers**
- * **Modifications by field shops/techs**
- * **Requirements of End Users, manner set**
- * **Engineering/manufacture requirements, such as catalyst temps**
- * **Ladders, other WWS items lost during unit moves**
- * **Need to maintain portability – low height/width/weight**



Evaluations and Inspections

Now Required: WWS Inspections

WWS Equipment Assessments and Forms (Not required, but best practice)

Document existing compliance, needed improvements, measurements

Before/after photos

[illegible]

Evaluations and Inspections

Regular Inspections

On a schedule adequate enough to identify hazards

As Needed Inspections

When conditions, circumstances, or events occur that warrant an additional check to ensure that WWS are safe for use

Existing Tools – Field audits by HSE/Supervision, PM/Service Reports, JSAs, BBS Observations

Standing on piping and pressure vessels to perform work tasks is not best practice...



SOLUTIONS

What are our Goals?



- **Make our equipment safer for our employees and OSHA-compliant.**
 - What is safest may not always be required by OSHA
 - Analyze tasks, identify hazards, speak with Service Techs
- **Determine the safest and most cost-effective solutions, and utilize them going forward, across the board.**
 - Use hazard controls hierarchy: Engineering, Administrative, PPE
 - Balance highest level of safety with responsible use of resources
 - Upgrades in the shop vs. field

Work Platforms



- Must be sturdy, and a non-slip surface (metal grating is best)
- At least 22 inches wide, 30 in. depth
- **If access to the platform requires a step up of 19 in. or more, steps or a stairway are needed**
- If the platform is 48 in. or more above the ground, guard rails are required
- Rails are best practice for exposed edges, even when < 48 in.
- Toeboards often not required

Steps/Stairways

- Must be sturdy, non-slip surface and at least 22 in. wide
- 9.5 in. tread depth
- **4 or more risers need railings**
- Max height of 9.5in between risers



Elevated Components



- Engineering – Administrative – PPE
- **Is there a way to eliminate the need to climb up? (Engineer out the hazard!)**
- Coolant tanks, level safety kills and exhaust catalysts are three primary concerns. How can engineering/ design changes address these?



Selfie stick!

Engineering Controls To Allow Access From Ground/Skid



Coolant level kill switch tested by nylon string



Engineering Controls To Allow Access From Ground/Skid



L-150 level kill within
reach from the ground



Coolant tank vented via
tubing line and ball valve



Engineering Controls To Allow Access From Ground/Skid



Catalyst rotated 90
degrees, or...



Company

Replaced with
different style



Ladders and Railing



- Rungs min. diameter 3/4 in.
- Distance between rungs no more than 12 in.
- At least 16 in. wide, foot not able to slip off end
- Painted or treated for corrosion
- Equipped with a landing or work platform at top
- Platforms 22 in. x 30 in. minimum (landings can be smaller)
- Equipped with self-closing gate or offset landing
- Ladder to platform distance less than 12 in.



Ladders and Railing



- Top rail must be 42 in. high
- Mid rail 21 in. high
- 4 in. toe board required if potential for employees below, or rotating equipment (i.e., cooler fans)
- Sturdy construction – withstand 200 lbs. force outward force, anywhere along top rail
- No gaps a person could fall through



**Notice
retaining
pins for
removal or
fold-down
of rails/
toeboards**

J-W Energy Company - HS



Ladder Fall Protection



- Fixed ladders reaching 24 ft. or higher required to have cage or other fall protection*.
- Many shorter ladders already have cages. It is fine to leave them.
- All fixed ladder cages or rails must extend at least 42 in. above work surface



Ladder Fall Protection



- During inspections, ensure fixed ladders are as safe for the user as possible:
- Ladder rails easy to grasp and use; ladder rungs non-slip surface; NO objects blocking access below or up top.



Ladder Fall Protection



- ***OSHA has a series of dates phasing out ladder cages as the sole method of fall protection*.**
- **For gas compression, affects mainly large horsepower (24 ft. or higher.)**
- **Personal fall arrest or ladder safety systems must be used after 11/19/2018**



Energy Company - HS



Fully Enclosed Railing

Large HP



Fully Enclosed Railing

Large HP



Fully Enclosed Railing *Medium HP*



Fully Enclosed Railing

Medium HP



Fully Enclosed Railing

Small HP



Fully Enclosed Railing Fold-Down Rails



Fully Enclosed Railing All-in-One Removable Basket



J-W Energy Co

Fully Enclosed Railing All-in-One Removable Basket



J-W Energy Company - HSE Group

Fully Enclosed Railing All-in-One Removable Basket



J-W Energy C

ACCESS TO THE PACKAGE

- Same basic WWS practices apply up to and around the unit
- Cross-overs installed when needed
- Raised grating floors are an excellent work surface



SPECIAL SITUATIONS

- In buildings, explore options: cooler outside, higher roof/remove roof, PPE vs. railing, etc. Above all, Plan Ahead!
- For trailer-mounts, install platforms/railing when skid height at or above 4 ft.



What about critical units running on location?

Platform With Safety Gate for Coalescing Filters Access



Platform not compliant



Energy Company -

Fixed ladder instead of a work surface



Platform With Safety Gate for Coalescing Filters Access



First one,
below 4'
floor
height



Second
one,
almost 6'
floor height



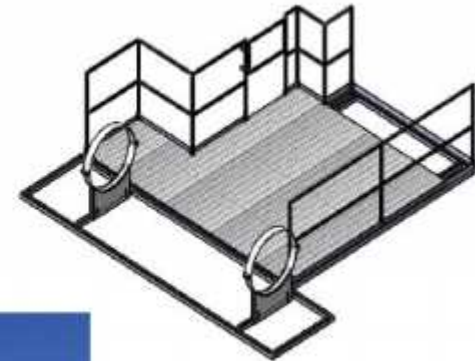
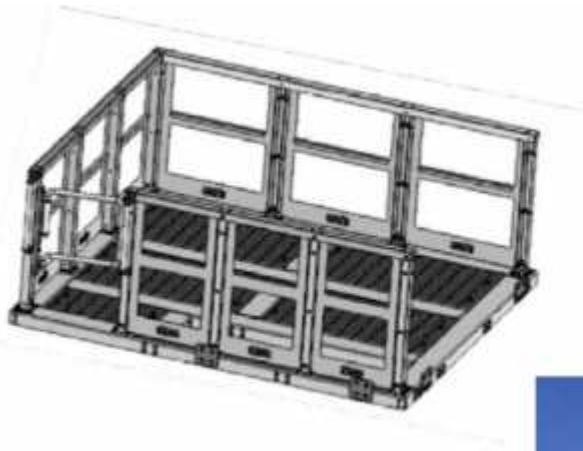


PURCHASING PRE-FAB PARTS

- Acquiring pre-fab items like platforms and railing systems may help with WWS compliance challenges.
- Advantages:
 - Many products, suppliers, across the country
 - Cut welding time/materials, lower cost?
 - Engineered products, OSHA compliant
- Disadvantages:
 - Shipping/inventory/logistics challenges
 - Possible Hot Work for installation in field
 - Possible modification needed

PURCHASING PRE-FAB PARTS

- Several compressor exhaust/catalyst vendors* now offer an enclosed, removable platform for servicing their products
- Numerous vendors offer stairways, railing and grating



*Check out
some of these,
at the booths in
the exhibit hall!



PURCHASING PRE-FAB PARTS

- Pre-Fab stairs and railing on CAT 3606 units



PORTABLE LADDERS

- Using portable ladders may work in some cases.
- Advantages:
 - Many different types and models
 - Easily obtained and transported
 - Rolling stairway-ladders have hand and guard rails
- Disadvantages:
 - Must be maintained in safe condition
 - Must be properly set up and used
 - Take up space in service trucks





MECHANICAL LIFTS

- Using Aerial Work Platforms (AWP) can be a good choice.
- Advantages:
 - Small, trailer-mounted models available
 - Large number of rental companies to choose from, no need to cross borders (DOT issues)
 - Simple to use; in-house training by HSE Instructors
 - Properly used, a very safe manner of accessing elevated surfaces
- Disadvantages:
 - Balancing rent vs. own, ownership costs
 - Prior planning for rental
 - Adequate surface for set-up
 - Operator training is a MUST, two people on site safer and preferred

MECHANICAL LIFTS





PERSONAL FALL PROTECTION EQUIPMENT AND ANCHOR POINTS

- Using personal fall protection is a good solution for unexpected/non-routine tasks. Should not take the place of platforms/railing in frequent maintenance areas.
- Advantages:
 - Large assortment of accessories/options
 - Lower cost compared to other solutions
 - Easily trained on, transported, and used



PERSONAL FALL PROTECTION EQUIPMENT AND ANCHOR POINTS

- Disadvantages:
 - Must be properly installed, maintained and used
 - Anchor points in the right locations
 - PPE is last choice in hazard control selection



Summary

Slip, Trip and Fall hazards exist for workers servicing field gas compression.

New Federal Regulations and Industry Standards address these.

For various reasons, several challenges must be considered.

Numerous methods exist for upgrading compression to the new WWS standards.

Modifying compressors in the shop is best; options exist for mission-critical units awaiting retrofit.

These hazards can be controlled!





THE END



Teamwork: Common people working together towards a common vision to achieve uncommon results!