ACU-ROPE-10P009 R01

ROPE ACCESS HOT WORK

ROPE ACCESS MANAGEMENT SYSTEM

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Approval & Authority			
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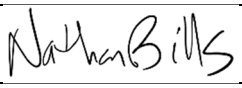
Rope Access Compliance	Nathan Bills		July 27, 2021

Feedback/Comments

"RAISING ROPE SAFETY TO NEW HEIGHTS"

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Revision Summary		
Revision No.	**Date**	**Description**
00	Jan 1, 2020	Replaces CAN-ROPE-10P009 and previous MSP-015 and CAN-SMS-10P026
01	July 22, 2021	Updates to requirements for backup attachment points

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1.0 PURPOSE

1.1 To plan, manage, and carry out hot work when using rope access methods.

1.2 To provide the minimum standard of protection when Acuren is required to perform hot work within the envelope of the deployed rope access system.

2.0 SCOPE

2.1 This procedure applies to all employees of Acuren and their affiliates Acuren Inspection Inc., Acuren Group Inc., Tacten Industrial Inc., and their affiliates collectively, the "ACUREN" and covers all rope access training conducted on behalf of Acuren and others.

2.2 Hot work encompasses one or more activities which could create sufficient heat to burn rope access equipment or cause direct injury to the technician or those around and below them.

2.3 Hot Work is defined as any employee or contractor undertaking a maintenance and repair work activity within an operating facility, or within a confined space, requiring the use of any of the following items:

2.3.1 Tiger Torch

2.3.2 Portable Grinder

2.3.3 Welding or Brazing

2.3.4 Flame Cutting

2.3.5 Open Flame

2.3.6 Gouging

2.4 This procedure is intended to comply with the requirements of the:

2.4.1 Industrial Rope Access Trade Association (IRATA) Code of Practice (ICOP) Document

2.4.2 Society for Professional Rope Access Technicians Safe Work Practices Document

2.4.3 CSA Standard W117.2-94.

2.4.4 OSHA Standard 1910

3.0 HAZARDS AND RISK REDUCTION

3.1 This procedure will reduce risk by mitigating the following hazards:

3.1.1 Damaged rope or rope access equipment due to exposure to a heat source.

3.1.2 Dropped objects due to:

a) Loss of material security due to safeguard damage from hot work activity,

b) Improper material handling with inadequate rigging that could be damaged by the hot work activity, or

c) Improper tethering of equipment.

3.1.3 An ignition source which could ignite adjacent flammable material.

3.1.4 Lacerations from sharp edges debris or use of the grinder.

3.1.5 Hazardous atmosphere due to the accumulation of combustible gas or an asphyxiant.

3.1.6 Conflicting work practice without proper permitting and simultaneous operations.

4.0 DEFINITIONS

4.1 **Heat Source:** Any source with potential for temperatures above 180°F (82°C), is considered a high-temperature hazard.

4.2 **Hot Work:** Any "temporary" work producing conditions such as sparks, flame, or hot material. For example, welding, burning, soldering, brazing, grinding, cutting metal, using torches, etc.

4.3 **Hot Work Permit**: Acuren utilizes the Safe Work Permit which includes Hot Work.

4.4 **Hot Work Zone:** a designated area that is permanently maintained as a hot work site. Hot work performed in these zones does not require a permit.

4.5 **Inerting or Purging** – Rendering the atmosphere non-flammable, non-explosive or otherwise chemically non-reactive by displacing or diluting the original atmosphere with steam or gas that is non-reactive; an atmosphere that reduces or eliminates combustible constituents and/or displaces oxygen or lowers oxygen content when represented as a percentage of the atmosphere.

4.6 **Isolation** – The separation of a permit space from unwanted forms of energy that could be a serious hazard to permit space entrants.

4.6.1 Isolation is usually accomplished by blanking or blinding; removal or misalignment of pipe sections or spool pieces; a double block and bleed; or lockout and tagout.

4.7 **Lower explosive limit (LEL)-** refers to the lowest concentration of flammable gas mixed with air that will support combustion and allow a flame to spread away from the ignition source at ambient temperature and pressure. Combustible levels will be expressed in % of LEL.

4.8 **Rope Access-** is the means of access, egress, or support when working heights. At heights, it provides a work positioning technique, which protects from falls.

4.8.1 Work performed from a rope access system shall be accompanied with technique methodology procedures.

4.9 **Upper Explosive Limit (UEL)**- refers to the concentration of flammable gas in the air above which combustion will not occur (e.g., the mixture is too rich to support combustion)

5.0 ROLES AND RESPONSIBILITY

5.1 Rope Access Technicians

5.1.1 Monitoring the rope access system integrity while working with, and adjacent to, hot work.

5.2 Rope Access Field Supervisors "Designated Level 3"

5.2.1 Must incorporate hot work requirements into the Safe Job Plans (SJP's) to ensure necessary equipment is available for the work.

5.2.2 Shall address, with control measures, all identified field hazards associated with the hot work within the Field Level Risk Assessment (FLRA) and review with the Rope Access Team.

5.2.3 Instruct and train employees, on the job, under their supervision. Key items to address:

a) Rigging to take into consideration sparks and flames, etc. associated with hot work.

b) Rope and equipment protection while performing hot work.

5.2.4 Set up welding equipment to avoid arcing on rope access system components.

5.2.5 Material rigging to ensure stability during welding, grinding, or cutting.

5.2.6 Rescue plan to isolate hot work source before deploying rescue.

5.3 Designated Fire Watch

5.3.1 Conform to the Fire Watch Plan and notify the Site Supervisor of any deviation from the plan.

5.3.2 Utilize the Emergency Response Plan in the event of a fire

5.3.3 Use the Incident Notification Process in the event of a fire.

5.4 Division/Project Manager/Superintendent

5.4.1 Shall provide resources to assess and implement the necessary controls for hot work.

5.4.2 Shall designate facility space to erect a Hot Work Zone for facilities that regularly perform hot work.

5.4.3 If required, will facilitate the Emergency Response and Fire Watch Plan.

5.5 Site Supervisor/Foreman

5.5.1 Shall conduct the Safe Job Plan to determine if hot work is required. The Safe Job Plan shall consider sources of flammable or combustible products.

5.5.2 Ensure Lockout/Tagout (LOTO) has been implemented for energized systems.

5.5.3 Ensure Fire Extinguishers are available, within inspection dates, and of the proper class for the task at hand.

5.5.4 Ensure employees conducting hot work have their Certification of Qualifications (CofQ)

5.5.5 Arrange for a competent person to perform atmospheric testing.

5.5.6 Issue the Hot Work Permit for company facilities; most clients will issue their permit.

a) The Manager can assign a designated competent person to issue the Hot Work Permit.

5.5.7 Ensure a Fire Watch has been assigned to the site upon completion of the work.

5.6 Regional Safety Representative

5.6.1 Assist with SJP, Hot Work Permit, and atmospheric testing

5.6.2 Develop and implement the Emergency Response and Fire Watch Plan.

5.6.3 Facilitate the creation of a Hot Work Zone.

5.6.4 Conduct a Site Safety Audit based upon the conditions listed in the Hot Work Permit, Emergency Response, and Fire Watch Plan.

6.0 SAFE JOB PLAN:

6.1 The Hot Work Safe Job Plan (SJP) will include initial and residual risk assignments, roles and responsibilities, PPE, risk-mitigating measures such as protective barriers, exclusion zones, communications, and rope protection.

6.2 Assess the anchorage points and the rope path to determine the potential for exposure to a heat source.

6.2.1 Safe Job Plan (SJP) must include mitigation measures where a heat source exists that may impact the integrity of the rope access system.

6.2.2 Utilize temperature guns to evaluate temperatures.

6.2.3 Determine if temperatures fluctuate throughout the day.

6.2.4 Look for vents, release valves, bypass piping or any insulation which has been removed.

6.3 If the assessment determines the harness or ropes could be damaged by high temperatures or cutting tools additional precautions are required. These are listed in the work positioning section of the SJP.

6.4 The assessment must determine the necessary PPE and other equipment to be utilized during the hot work assignment.

6.5 Assess the task before commencing hot work to minimize the risk of fire or damage to property or injury to personnel. These actions include but may not be limited to:

6.5.1 Identify adequate precautions such as flammable liquid piping shutoffs, dust or lint suppression systems, LEL measurements (flammable/explosive vapours detection), blocking or blinding of piping and fixed equipment, LOTO measures, etc.

6.5.2 When work is to be conducted within a tank or vessel that had contained an explosive or flammable substance, ensure the vessel has been purged and aerated to reduce the possibility of offgassing.

6.5.3 Check fire protection equipment (sprinklers, extinguishers) to ensure that they will function properly and that sprinkler valves are in the open position. Fire extinguishers are required to have a valid inspection tag affixed to the extinguisher.

6.5.4 Check hot work equipment (torches, etc.) to ensure proper function.

6.5.5 Creating and enforcing rules and procedures to demonstrate that Management is committed to reducing the risk of hot work.

6.5.6 Ensure an exclusion zone of 35 ft (minimum) radius of the hot work with the following conditions:

a) All flammable liquids or material are kept outside of the 35 ft radius

b) Fire-resistive material is used to protect combustibles that cannot be moved, including storage or machinery with grease or lint deposits;

c) Combustible floors (wood, carpet, etc.) are covered with fire resistant/non-combustible material;

d) Openings in walls, floors or equipment where a spark could enter are covered;

e) Ceilings exposed to hot work are protected (e.g., use a fire-resistant tarpaulin);

f) Floor openings are plugged and ducting sealed;

g) Working and inspected portable fire extinguishers are available or brought to the area.

6.5.7 Determine if a screened-off hot work area to prevent sparks from escaping is warranted.

6.6 The following safety documentation is required before commencing with any hot work conducted within hot work restricted areas.

6.6.1 Hot Work Permit (or equivalent/client approved)

6.6.2 Safe Job Plan (SJP)

6.6.3 Field Level Risk Assessment (FLRA)

6.6.4 Rescue Plan

6.6.5 Toolbox Talk

6.6.6 Fire Watch Plan

6.7 The assessment must take into consideration the precautions for third party safety personnel and may include the erection of a suitable barrier system.

6.7.1 All affected parties shall be notified of the need to perform hot work within hot work restricted areas. This notification should include:

a) The constructor or general contractor

b) Any affected crafts

c) Building management and building engineering

d) The Tenant, owner, and end user

6.8 Work may require authorization from the owner or the constructor / general contractor.

6.8.1 A copy of the Hot Work Permit, Safe Job Plan, and Field Level Risk Assessment (FLRA) must be submitted in advance for review by the owner/constructor.

7.0 ATMOSPHERIC MONITORING

7.1 Atmospheric monitoring must always be done before commencing work and continuously if there is a potential source of flammable fumes or gasses.

7.1.1 Monitor atmosphere:

a) Flammable gasses or vapors shall be below 10% lower explosive limit (LEL).

- No hot work will be performed if LEL is above 20%
- Oxygen content shall be between 19% and 23%

8.0 HOT WORK PERMIT:

8.1 Before working on or issuing a Hot Work Permit, the following requirements must be met:

8.1.1 For Sites with hot work restrictions:

a) The site-specific orientation shall include identification of ignition sources, possible areas containing flammable and combustible material, fire suppression systems and the hot work permit process.

b) Field Level Risk Assessment (FLRA) must be updated to reflect restrictions and specific requirements

c) Review the potential fire protection measures with all employees via a safety meeting.

8.2 Qualifications

8.2.1 Ensure that all employees performing work have been deemed competent on the tool they will be using.

8.2.2 Welders have a valid Certificate of Qualifications (CofQ).

8.2.3 Atmospheric testing must be performed by a competent person.

8.2.4 Fire Watch working directly for Acuren must receive Fire Watch and Fire Extinguisher training.

9.0 PERSONAL PROTECTIVE EQUIPMENT:

9.1 When conducting hot work within a hot work restricted area, the following minimal approved protective devices are required for persons conducting the hot work**:**

9.1.1 Flame resistant gauntlet gloves

9.1.2 Aprons made of leather or another flame-resistant material

9.1.3 Face shields

9.1.4 Flame resistant legging

9.1.5 Flame resistant cape-sleeves or shoulder covers with bibs

10.0 JOB REQUIREMENTS:

10.1 Obtaining a Acuren Issued Hot Work Permit

10.1.1 Through the Safe Job Plan (SJP), it will be determined if a Hot Work Permit is required.

10.1.2 The supervisor or designee is responsible for issuing the Hot Work permit.

a) The employee who issued the Hot Work Permit is responsible for adhering to the terms and conditions of the permit.

10.1.3 If any of the conditions change as work progress:

a) Stop work,

b) Re-assess condition and

c) The existing hot work permit is voided, and a new Hot Work Permit must be issued.

10.1.4 If the work cannot be completed within a workday or a second shift takes over, a new Hot Work Permit must be issued.

10.2 A Hot Work Permit must be obtained before undertaking the task.

10.2.1 Unless the area is designated a Hot Work Zone.

10.3 Before issuing a permit, the following must be completed:

10.3.1 The Safe Job Plan (SJP) must be revised to incorporate the Hot Work activity and provide the mitigation measures that will be put in place for the duration of the project.

10.3.2 Rescue and Fire Watch Plan.

10.3.3 A Field Level Risk Assessment (FLRA) by the employees performing the hot work.

10.4 Hot Work Permit Issuer:

10.4.1 The permit will be completed and issued by a competent person, such as the trained permit issuing manager, supervisor, or designate, who is familiar with the work and has control over the work area.

10.5 Team Issued a Hot Work Permit:

10.5.1 The permit is to be fully completed and is valid only for the authorized time frame and conditions at time of issuance.

10.5.2 Both the issuer and permit receiver sign the permit, and a copy is provided to the receiver and the original remains with the issuer to ensure the permit conditions are met, and that work ceases as per the permit authorization.

10.5.3 The receiver's copy of the Permit is posted in the work area.

10.6 Fire Watch

10.6.1 A trained employee will be assigned the duty of fire watch for the duration of and up to one hour after (or longer as conditions warrant) as prescribed by the Fire Watch Plan.

10.6.2 If a fire occurs, the Fire Watch will deploy the Emergency Response Plan, and will follow the incident management process.

10.7 Completion of Work/Task

10.7.1 At the end of the shift or completion of the work or upon expiry of the time limit; the permit is returned to the issuer.

10.7.2 The permit issuer and the permit receiver are to sign off at completion or the time limitation of the permit.

a) Identify and document the hazards of the work site as per the FLRA or SJP.

b) Discuss and document in detail the hazard controls and evacuation plan with the person receiving the permit.

11.0 ANCHORAGE AND RIGGING

11.1 Protection of Anchor Ropes

11.1.1 Use heat resistant rope protection.

11.1.2 Use wire cable to minimize the impact of contact with heat source it contact were to occur.

11.2 Rigging

11.2.1 Rope protection shall be maintained at all times during hot work keeping all ropes away from any heat source (i.e., tying spare rope away from the "splatter" area when welding).

a) Also, standard approved rope protection, such as canvas rope protection or split fire hose protectors, shall be placed above the descender to further protect the ropes.

11.2.2 Rigging shall take into consideration and mitigate the potential for out of control swings.

11.3 Hot Process Pipe Work

11.3.1 Avoid using hot process pipework for the rigging of ropes. Where the use of pipework operating at high temperature, the use of the techniques discussed in 11.3.3 below shall be employed.

11.3.2 A clear understanding of the nature of the process piping and its potential to change condition, i.e., cold to hot, must be documented on the Field Level Risk Assessment (FLRA).

a) Full isolation may be required if heat cycling piping is one or both of the only practical anchor points available.

11.3.3 When avoiding process pipework is not practical, the following minimum criteria shall apply:

a) Wire slings (stranded steel rope with wire core) must **NOT** be exposed continuously to temperatures higher than 200°C (392°F), as the steel wire will become brittle above this temperature.

b) If rigged on insulated pipes, rigging must be deployed at a lateral distance of at least 1m (3') away from exposed high-temperature piping.

- Where the risk of heat exists, a temperature measuring device will be used to ascertain the temperature of exposed pipe work prior to the determination of rigging method or rigging location.

Table 1- Nylon Rope Thermal Surface Requirements

CONDITION	TEMPERATURE
Contact surface high-temperature work limit for nylon ropes.	180°F (82°C)
Contact surface low-temperature work limit for nylon ropes.	-70°F (-56°C)
Melting point temperature for nylon ropes.	420°F (215°C)

12.0 WORK POSITIONING

12.1 If the Safe Job Plan (SJP) or Field Level Risk Assessment (FLRA) determines the harness or ropes could be damaged by high temperatures or cutting tools, additional precautions must be implemented for the protection of the Technician, including, but not be limited to:

12.1.1 Adding one of the following to the backup device connection:

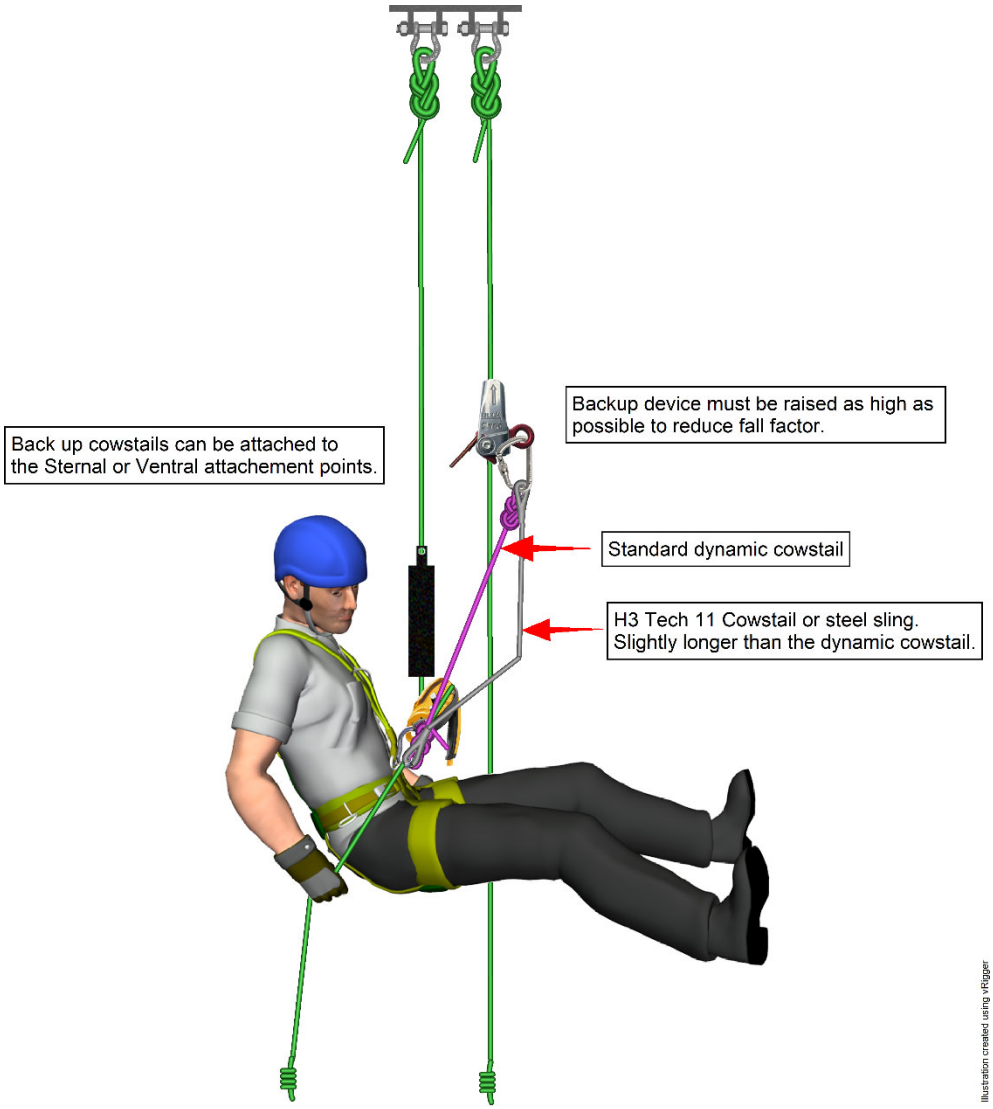
a) An additional cowstail that is made of H3 Tech 11 high temp rope.

b) A steel sling

- The additional lanyards must be slightly longer than the existing dynamic cowstail.
- The backup device shall be placed as high as possible to reduce the Fall Factor as much as possible.

12.1.2 The use of “Sterling Tech 11, High Temp Rope”, or equivalent, for the main line, the back-up line or both lines.

12.2 Diagram 1:



12.3 Where hot work may impact adjacent Technicians, or to third parties who may be in, or pass within, the exclusion zone, the following items must be erected:

12.3.1 Suspended fire barriers or blankets

13.0 MONITORING

13.1 Communication with Technicians must be established and maintained, such that the Fire Watch or Designated L3 can stop work immediately.

13.1.1 It is imperative that the crew is briefed on their roles and responsibilities before any hot work takes place.

13.1.2 A clear understanding of the risks identified on the SJP and FLRA must be communicated and confirmation of this understanding by each affected employee must be documented.

13.2 Fire Watch

13.2.1 A Fire Watch must be assigned who is separate than the person performing the hot work.

13.2.2 The Fire Watch shall be trained and deemed competent to conduct atmospheric testing and shall conduct periodic atmospheric testing.

13.2.3 The Fire Watch monitors the area during hot work for unsafe conditions and reacts by implementing emergency response procedures or stopping work, if necessary.

13.2.4 This person should maintain the “fire watch” for up to one hour afterward (or longer as circumstances dictate) and be equipped with a means of communication to report an emergency.

13.2.5 If a fire occurs, during or after completion of the work, the emergency response plan and the incident management process will be enacted.

13.3 Rope Deviation Observer

13.3.1 A Qualified Rope Technician who monitors the rope paths adjacent to the heat source and implements stop work when the rope may becom jeopardized.

13.4 Field Observations

13.4.1 As part of the Acuren’s Safety Observation program Technicians will be periodically evaluated for compliance with this procedure.

14.0 REFERENCES

14.1 ACU-ROPE-10S001 Heat Source Assessment Process Map

14.2 ACU-ROPE-10M001 Rope Access Management System

14.3 ACU-ROPE-10P002 Rope Access Safe Job Planning

14.3.1 Acuren Safe Job Plan (SJP)

14.3.2 Acuren Safe Work Permit

14.4 ACU-ROPE-10P006 Rope Access System Deployment

14.5 ACU-ROPE-10P007 Rope Access Rescue

14.6 Acuren Loss Prevention Observation (LPO)

14.7 Acuren Field Level Risk Assessment (FLRA)