

Standard Operating Procedure (SOP) for Entry into Grain Bins

I. Introduction

Evaluation and assessment of hazards associated with grain bin entry on Iowa State University (ISU) Teaching and Research Farms have been made regarding confined spaces as specified in OSHA's Permit-Required Confined Spaces (PRCS) Standard (29 CFR 1910.146). It has been determined that the grain bins do not contain any atmospheric hazards. However, they may contain mechanical energy hazards related to the unloading equipment used to remove grain and they may contain serious engulfment hazards. This SOP outlines the conditions under which a permit is required and conditions under which a grain bin can be re-classified as a non-permit confined space (NPCS) (29 CFR 1910.146(c)(7)) to ensure safe entry can be completed.

II. Overview

Employees may be required to enter grain bins to perform equipment maintenance or inspect grain quality under a variety of conditions. This SOP outlines the following conditions:

1. Side door entry into an empty grain bin
2. Side door entry into partially full grain bin
3. Roof hatch entry into a full grain bin (no grain removed)
4. Roof hatch entry into a partially full grain bin (significant removal with visible "cone" shape)
5. Roof hatch entry into a partially full grain bin (no visible "cone" shape or damaged grain)
6. Roof hatch entry into a hopper-bottom grain bin or bulk bin

Entrants must follow the appropriate procedure outlined based on the contents and conditions of the grain bin at the time of entry. If a grain bin must be entered under a condition not listed, refer to the [EH&S Confined Space Manual](#) and completed training to develop a [Confined Space Entry Permit](#) before entering the grain bin to ensure hazards are controlled.

III. Entry Procedures

1. Side door entry into an empty grain bin is not classified as a confined space provided:
 - a. The side door is unrestricted and secured in an open position, and
 - b. All unloading equipment (sweep auger, unload auger, stirator, etc.) and other mechanical hazards have the energy source turned off and secured to prevent accidental startup if work will be performed on those systems.
2. Side door entry into a partially full grain bin would be considered a PRCS due to the potential mechanical and engulfment hazards and limited egress. The grain bin will be re-classified as a NPCS provided:
 - a. The side door is unrestricted and secured in an open position,
 - b. All unloading equipment (sweep auger, unload auger, stirator, etc.) and other mechanical hazards have the energy source turned off and secured to prevent accidental startup until the side door is completely cleared of grain,

- c. The entrant is not in the grain bin with an operating sweep auger until it has traveled a minimum distance of ten (10) feed around the outside diameter of the grain bin,
 - d. The grain is not moldy or in poor condition, and
 - e. The amount of dust does not restrict visibility to less than five (5) feet.
3. Roof hatch entry into a full grain bin (no grain removed) would be considered a PRCS due to the potential mechanical and engulfment hazards and limited egress. The grain bin will be re-classified as a NPCS provided:
 - a. The roof hatch is secured in an open position,
 - b. All unloading equipment (sweep auger, unload auger, stirator, etc.) and other mechanical hazards have the energy source turned off and secured to prevent accidental startup,
 - c. The grain is not moldy or in poor condition,
 - d. The amount of dust does not restrict visibility to less than five (5) feet,
 - e. The entrant can access the roof hatch by use of an inside ladder or high grain level, and
 - f. It can be verified that no grain has been removed.
4. Roof hatch entry into a partially full grain bin (significant removal with visible “cone” shape) would be considered a PRCS due to the potential mechanical and engulfment hazards and limited egress. The grain bin will be re-classified as a NPCS provided:
 - a. The roof hatch is secured in an open position,
 - b. All unloading equipment (sweep auger, unload auger, stirator, etc.) and other mechanical hazards have the energy source turned off and secured to prevent accidental startup,
 - c. The grain is not moldy or in poor condition,
 - d. The amount of dust does not restrict visibility to less than five (5) feet,
 - e. The entrant can access the roof hatch by use of an inside ladder or high grain level, and
 - f. The grain flows easily and is not clumping or stuck to the walls.
5. Roof hatch entry into a partially full grain bin (no visible “cone” shape or damaged grain) would be considered a PRCS due to the potential mechanical and engulfment hazards and limited egress. **Entry under these conditions is extremely dangerous and should be avoided. If entry must be done, it will be a permit-required entry requiring two (2) people and issuance of an entry permit.** Entry should be completed under the following conditions:
 - a. The roof hatch is secured in an open position,
 - b. All unloading equipment (sweep auger, unload auger, stirator, etc.) and other mechanical hazards have the energy source turned off and secured to prevent accidental startup,
 - c. The amount of dust does not restrict visibility to less than five (5) feet,
 - d. The entrant can access the roof hatch by use of an inside ladder or high grain level,
 - e. The entrant wears a full body harness attached to a retrieval lifeline and tripod,
 - f. The attendant remains in constant communication with the entrant,
 - g. An emergency rescue plan is in place (have 911 address readily available)
 - h. There are no other means to perform the work from the exterior of the grain bin, and
 - i. Ventilation must be used if work performed creates atmospheric hazards.

Refer to the [EH&S Confined Space Manual](#) and completed training to develop a [Confined Space Entry Permit](#) before entering the grain bin.

6. Roof hatch entry into a hopper-bottom grain bin or bulk bin would be considered a permit-required confined space due to the potential mechanical, engulfment, and entrapment hazards. **Entry under these conditions is extremely dangerous and should be avoided. The preferred method is to remove bottom panels to allow interior access. If entry must be done, it will be a permit-required entry requiring two (2) people and issuance of an entry permit.** A confined space entry permit should be initiated after meeting the following minimum conditions:
 - a. The roof hatch is secured in an open position,
 - b. All unloading equipment (sweep auger, unload auger, stirator, etc.) and other mechanical hazards have the energy source turned off and secured to prevent accidental startup,
 - c. The amount of dust does not restrict visibility to less than five (5) feet,
 - d. The entrant wears a full body harness attached to a retrieval lifeline and tripod,
 - e. The attendant remains in constant communication with the entrant, and
 - f. There are no other means to perform the work from the exterior of the grain bin.

Refer to the [EH&S Confined Space Manual](#) and completed training to develop a [Confined Space Entry Permit](#) before entering the grain bin.

IV. Additional Grain Bin Safety Precautions

1. Grain should not be placed in a grain bin for long term storage unless it is in good condition, dry and absent of mold or aflatoxin.
2. Grain should be inspected regularly, from the exterior of the grain bin, if possible, to ensure it remains in good condition.
3. Existing grain bins with ladders greater than 24' high should be equipped with a safety cage.
 - a. New or modified ladders must be equipped with a ladder safety system or steps in accordance with current fall protection regulatory requirements (29 CFR 1910.140)
 - b. Damaged or unsafe ladders should be replaced with stairs where possible and when feasible.
4. Ladders should provide a landing at the roof hatch access or transition point.

V. Confined Space Entry Plan

Use the following form to create an entry plan documenting control of hazards, rescue plan, and authorized entrants before issuing a permit and entering a PRCS. Entry procedures five (5), six (6), and any entries under conditions not explicitly listed in this SOP require an entry plan and may require an entry permit to be completed.

1. Personnel participating in confined space entries (NPCS and PRCS) should receive proper training.
2. Additional rescue or retrieval equipment and/or monitoring may be required for PRCS entries.