



## INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS

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Steve Weisz CSP, P. E.  
Safety and Occupational Health Specialist  
Assistant Secretary for Occupational Safety and Health  
Director, Office of Technical Programs and Coordination Activities  
Occupational Safety and Health Administration  
US Department of Labor  
Room N-3655  
200 Constitution Ave., NW  
Washington, DC 20210

Dear Mr. Weisz

IADC is a trade association representing the interests of onshore and offshore drilling contractors operating worldwide. Founded in 1940, IADC's mission is to improve industry health, safety and environmental practices; advance drilling and completion technology; and champion responsible standards, practices, legislation and regulations that provide for safe, efficient and environmentally sound drilling operations worldwide. IADC drilling contractor membership represents approximately eighty percent of the land drilling rigs operating in the United States.

In 1973 38 Federal Register 28993 OSHA issued an interim variance which was to be in effect until OSHA ruled on the permanent variance that was applied for by IADC. In issuing the interim variance in 38 Federal Register 28993 it stated that "member companies of the International Association of Drilling Contractors be and hereby, authorized to continue using the derricks referred to in the application for a variance, provided that ladder safety devices are also used, in lieu of complying with 29 CFR 1910.27 (b) (1) (i), (ii), (iii) and (c) (4)" at all workplaces indicated in this notice. Companies implemented safety systems on derrick ladders and carried out the other engineering and administrative requirements that were required by the interim variance.

The success demonstrated by the industry in following the requirements of the interim variance indicate that workers can safely use mast (derrick) ladders that do not specifically follow 29 CFR 1910.27 (b) (1) (i), (ii), (iii) and (c) (4). Because of the success of the programs, IADC asked that the interim variance be made permanent and submitted data in December 2012, and then in November 2013 additional information was requested from your office.

The following is a summary of the responses IADC received from the questions supplied to our members.

Responses and review of rigs operating in the United States indicate that there are about three thousand masts (derricks) that may have ladders that do not fully meet 29 requirements of CFR 1910.27 (b) (1) (i), (ii), (iii) and (c) (4).

Telescopic carrier or trailer mounted rigs have specific design factors that must be met to direct the vertical load path from the crown to the base of the mast (derrick). Close tolerance between the upper section(s) to the lower section is needed to maintain the load path. Manufacturers have reviewed different engineering design changes, but due to the need for close fit and load path from the upper mast (derrick) section to the lower mast (derrick) section, these have proved unsatisfactory. Consideration was given to make the bottom section wider to fit the ladder standoff from the top section also creates unsafe design to the load path.

Carrier mounted rigs have specific requirements they must meet in order to be transported on highways in the United States and rigs that may move back and forth to Canada have specific requirements that limit changing the mast (derrick) ladder to fully meet the standard. A larger wider lower mast (derrick) section will cause the rig to exceed load weights and widths which permit them to travel on US highways.

There have been numerous efforts to modify mast (derrick) ladders to meet the seven inch standoff requirement, but they have been found to be unsafe. Carrier mounted masts (derricks) have specific engineering requirements that do not allow for modification to the ladders. To achieve the seven inch standoff, there were attempts to use ladders that will fold up and down. Experiences with folding ladders proved them to be unsafe. The action of folding up and down resulted with the ladders being damaged and became unsafe. Hinges for the folding ladders also proved to be problematic. The hinges would rust and hinge pins wear or fall out creating a dropped object hazard as well as making the ladder unsafe. Some effort was given to use stainless steel hinges, but they also proved to be a problem. When ladders fail or are damaged hazards are created for workers as they attempt to repair or use them. Removable ladders were considered, but the risk assessment determined that their use would create additional hazards when an employee must climb the mast (derrick) once it is telescoped to it full height to secure the top of the.

Although the ladders are mounted directly to the mast (derrick), due to the open spaces between cross braces and beams, there is space behind the most of the ladder for the worker to fully place their foot on the ladder rung. (See the attached pictures.)

IADC has not found data to indicate that derrick ladders as currently designed along with the use of derrick climbing assist devices and/or fall arrest systems, have created an increased workplace hazard. As was the case in 1973, derricks are produced by various manufacturers with different designs and requirements; therefore some derrick ladders may not fully comply with requirements of the standard.

IADC believes that a ladder in good condition, although not fully in compliance with 29 CFR 1910.27 (b) (1) (i), (ii), (iii) and (c) (4), when used in conjunction with a fall arrest or prevention system is safe.

International Association of Drilling Contractors is seeking a permanent variance from 29 CFR 1910.27 (b) (1) (i), (ii), (iii) and (c) (4) for all companies whose mast (derrick) ladders cannot meet the regulation.

Sincerely



Joseph Hurt  
Vice President Onshore Division

**Comments received from industry:**

Based on the results the preliminary technical review and the anticipated publication of new Subpart D regulations, OSHA's Office of Technical Programs and Coordination Activities (OTPCA) is requesting that IADC provide the following additional information and documentation in support of the proposed levels of equivalent worker protection described in its variance application:

1. IADC's variance application asserts that due to the configuration of derricks used by the member companies, the ladders are permanently affixed flush to the cross members of the derricks, "so that the 7 inch clearance required by 29 CFR 1910.27(c)(4) is not always met. . ."Please provide the number of derricks operated by your company that fail to meet the standards from which the variance is sought and the number of derricks that are in compliance";

***Number of rigs: There are approximately 3,000 oil and gas rig masts (derricks) in the United States upstream industry that will not meet the 7" ladder standoff from the derrick.***

2. For the derricks operated by each applicant that fail to meet the standards from which the variance is sought, please provide a description and engineering documentation for the claim that "if the ladders were extended 7 inches from the derrick, this would greatly increase the danger of structural damage to the ladders when the derricks are moved." What are the hazards (describe why/how the structural damage is caused) and what steps have been taken to eliminate/mitigate them (what innovative engineering solutions have been investigated)?

***In order to provide the required load line transfer from the upper section to the lower section of the mast (derrick) there are close tolerances that must be met. It is not feasible to widen the lower section of the mast (derrick) to make room for the ladder just as it is not feasible to make the upper section narrower. Changes in either will result in a mismatch of the sections and create a hazard of the mast (derrick) collapsing.***

***Initially manufacturers attempted to the use of folding ladders, but they failed at the hinges or were caught and bent or otherwise damaged and became unsafe. There were some different designs attempted such as heaver hinges or ladders, stainless steel hinges, but these also failed and created additional hazards. Thought was given to developing removable ladder, but the risk of a worker having to climb the derrick once it was telescoped up was determined to be not acceptable. The decision was made to go to ladders that were attached directly to the derrick and passed between the upper section and the lower section.***

**Comments from one rig owner:**

***"All of the rigs are mobile, self-propelled rigs with telescoping masts. The upper section of the mast scopes down hydraulically within the lower section of the mast and then pivots to the horizontal position for transport. The crown block of the mast is centered above the structural members of the 3 sided mast. The well side of the mast is open to allow the traveling block to move unobstructed as the mast operates at a design angle of 2.5 to 4 degree tilt off of vertical. The inside/upper section of the mast is tight fitting within the lower section for structural stability. The close-fitting upper and lower mast sections prohibit installation of a ladder on the top section in any other manner except flush with the upper section structure. Otherwise, damage to the ladder and/or the upper and lower structural components will result."***

**Describe innovate engineering solutions that have been investigated to prevent damage to ladders:**

***"Hinged ladders were attempted that dropped down into position after the top section telescoped up. These "folding" ladders routinely failed to fully retract resulting in physical damage to the mast (derrick) or ladder while scoping down. The ladders also routinely failed to fully extend until***

**personnel mounted the ladder resulting in the ladder shifting with personnel on the ladder. The necessary multiple pivot point created increased complexity with multiple potential failure points.**

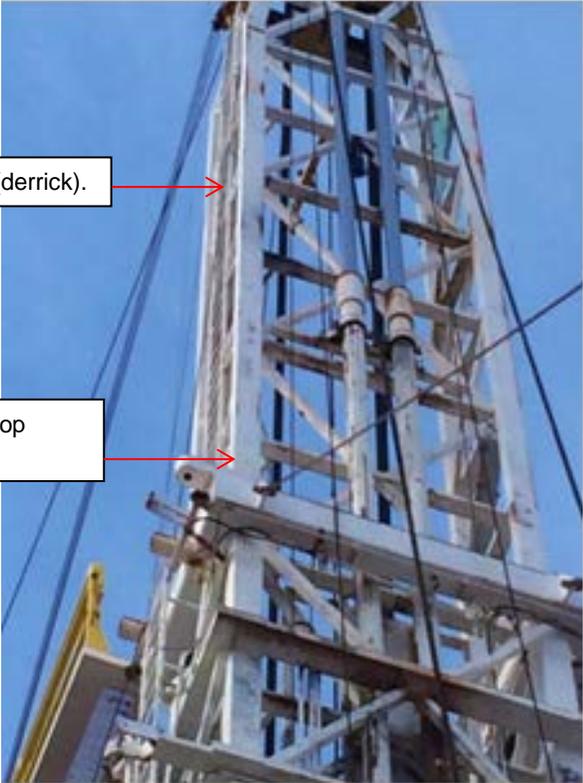
**Another option was investigated was to narrow the inner/upper telescoping section of the mast to allow clearance for the ladder. This creates multiple issues. 1) The load path is inset at the load transfer point between the upper and lower mast sections changing the force from a shearing force for the load transfer with flush sections to a leveraged force with offset sections. 2) The upper cross section is narrowed increasing the potential for the traveling assembly to strike the mast due to normal wind deflection and block deviation with differential sheave tension and drill line torque.”**

**See the following picture showing the close tolerance required between the upper and lower section of the mast (derrick).**



Note the ladder mounted to the mast (derrick).

Note the close tolerance between the top section and the bottom section.





3. A description of the of the steps that your company has taken since the grant of the interim order to inform and educate derrick manufacturers that their products do not meet applicable OSHA design standards and that IADC and its members will not be purchasing any more non-compliant equipment;

***Members purchasing new rigs anticipate that the manufacturer will engineer and design the mast (derrick) to meet engineering and regulatory standards. The manufacturers were aware of the problem with ladder standoff and after reviewing different designs determined that the safest method was to build the ladder as a part of the mast (derrick) structure.***

4. A description of the steps taken by your company to ensure that new and replacement derricks purchased comply with the applicable requirements. Please be specific and provide the numbers of each type of derrick being acquired each year;

***Members purchasing new rigs anticipate that the manufacturer will engineer and design the derrick to meet engineering and regulatory standards. A number of members indicated that they***

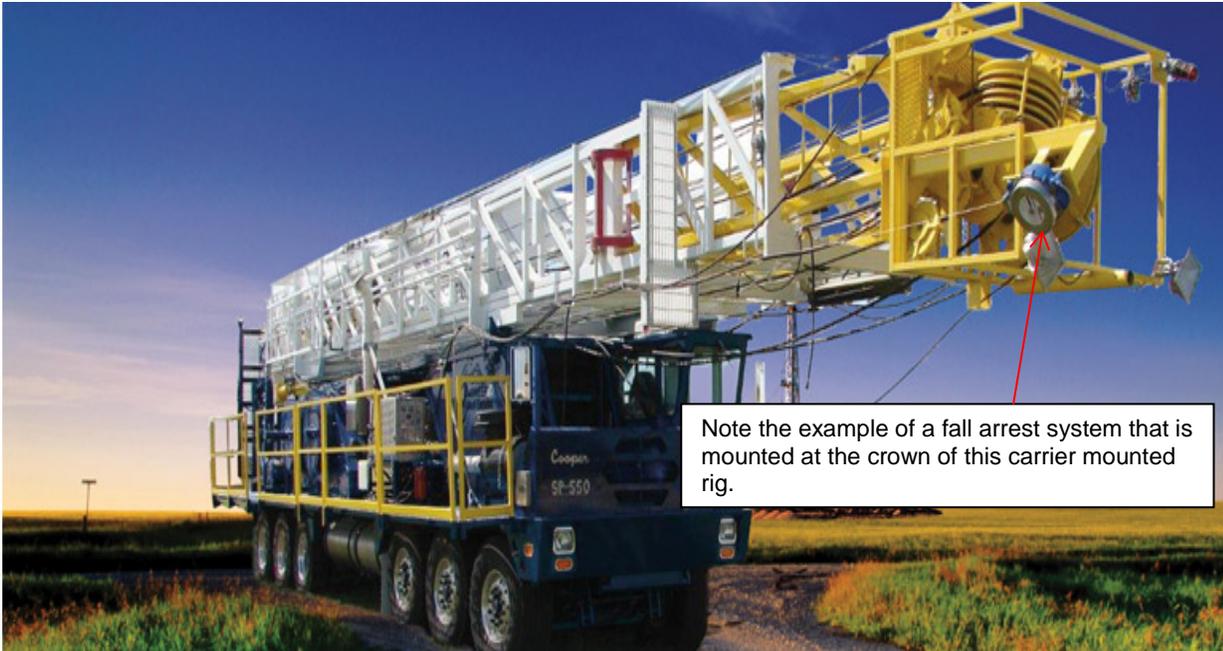
**are not purchasing new rigs and do not have any future rig expansion plans. One manufacturer has indicated that there over 500 new rigs recently entered the upstream industry that meet good engineering standards, but due to the close tolerance required, other restrictions, and past experience with failed designs of folding ladders they have not reviewed redesign of the ladders.**

**All member companies have indicated that they are using fall protection systems on derrick ladders. They believe that the use of fall protection is more critical to the safety of their workers than having a ladder with seven inch standoff that could be damaged when telescoping out or in of the derrick sections. None of the companies responding reported any incidents that were the result of a derrick ladder that was not fully in compliance with the regulations.**

Note the fall arrest device that is attached to the crown structure of the mast (derrick).



Fall arrest system and notice to personnel that fall protection is required when climbing or working in the derrick.



5. Have IADC and its members developed a phase out plan for the use of non-compliant equipment? If so, what is the projected completion date?

***IADC members who utilize the smaller mobile carrier or trailer mounted rigs with telescoping masts have determined that due to design issues, there is not a feasible alternative that could be used to phase out non-compliant ladders.***

***Other members with larger rigs in which the design can be re-engineered and still have proper distribution of the load path have commented that it may be possible to phase out the non-compliant ladders over the mast's ten to fifteen year inspection and repair schedule.***

6. If no phase out plan is in place, and non-compliant equipment is still being purchased, please provide the rationale for doing so;

***The main reason for not implementing a phase out plan is that there is no engineering alternative to the use of ladders attached directly to the upper section of the mast. Other methods of attachment have proven to be unsafe. Companies have been utilizing fall protection devices on the ladders and have determined that the safety of the worker is more dependent on the use of fall protection than a ladder that may be out of the seven inch standoff requirement.***

**Member comments:**

***"Telescoping masts are equipped with ladders. These ladders are used in conjunction with self-retracting lifelines or other fall protection devices that provide personal fall protection for the climbers. These ladders have been used in the drilling and well servicing industry for mast/derrick access in conjunction with the OSHA variance for 40 years without incident or injuries to Company personnel associated with ascending or descending the masts."***

7. A description of the potential impact on your company in the event that OSHA determines to deny IADC's application for variance (especially in view of the expected publication of final Subpart D regulations (see 75 FR 28861; May 24, 2010 (<http://www.gpo.gov/fdsys/pkg/FR-2010-05-24/html/2010-10418.htm>)); and describe the potential impact on your company should OSHA deny the variance:

***If OSHA denies IADC's variance there will be potentially 3,000 rigs that will not be in compliance and may have to be removed from service or redesigned. This will result in a loss of***

**approximately 60,000 direct jobs. It is estimated that in addition to direct jobs, there are 100 jobs indirect jobs created for each operating rig in the local economy or 300,000 jobs nationwide.**

**Companies with telescoping masts will have to replace their ladders with folding ladders. This will increase the risk of worker injury due to having to use ladders that may be damaged and failures of the folding hinges. This has high potential of raising the recordable incident rate in the industry.**

**Companies who can update their ladders estimate that it will cost to be \$40,000 to \$110,000 per rig for analysis of the mast, ladder design, construction and installation. This cost does not include loss of revenue or down time and loss of wages to employees while the rig is out of service.**

**Member comments:**

**Alternatively – Eliminate telescoping masts resulting in elimination of self-propelled well service units. This necessitate replacing self-raising self-propelled well service units with multi-load rigs with independent masts that require multiple truck loads to move, require separate cranes for assembly, and require 5 to 10 times the rig up and rig down time of a self-contained service rig. Estimating the cost in loss of productivity and capital investment necessary to produce the direct and associated support equipment to make this change would require an extensive study.”**

**IADC comments: The alternative method would increase the risk of injury to workers since the mast would be assembled on site, it would require coordination from multiple crews (rig crew, moving crew and crane operator).**

8. If OSHA determines to grant a permanent variance (subsequent to publication of final Subpart D regulations and IADC submitting an amended variance application addressing the applicable portions of the new rule), what is the anticipated impact if the grant includes a condition requiring that in 10 or 15 years (from the variance grant date) only compliant masts may be used?

**Approximately 76 of the total number of rigs reported to IADC could have their ladders modified to meet the standard and not create additional hazards. This would take between ten to fifteen years as they rotate through their American Petroleum Institute (API) Category IV inspection schedule. The upgrade costs would be based on the above cost estimates. Most of the rest of the reported rigs could be upgraded for the higher cost, but the ladders would create additional hazards. A number of the rigs would become non economical and would be taken out of service resulting in some small drilling contractors going out of business.**