

FIRE DEPARTMENT • CITY OF NEW YORK



**STUDY MATERIAL FOR THE EXAMINATION FOR
CERTIFICATE OF FITNESS
FOR
Supervision of Crane Aerial Fueling Operations
At Construction Site
P-54**

Last updated 3-10-10

ALSO INCLUDED IN THIS BOOKLET YOU WILL FIND THE FOLLOWING:
NOTICE OF EXAMINATION (NOE)

NOTICE OF EXAMINATION

Title: Examination for Certificate of Fitness for Supervision of Crane Aerial Fueling Operations at Construction Site (P-54)

Date of Test: Written tests are conducted Monday through Friday (except legal holidays) 8:00 AM to 2:30 PM.

QUALIFICATION REQUIREMENTS

1. Applicants must be at least 18 years of age.
2. Applicants must have a reasonable understanding of the English language.
3. Applicants must present a letter of recommendation from his/her employer. The letter must be on official letterhead and must state the applicant's full name, character, physical condition, experience, and address of premises where applicant will be employed.
4. Applicant must provide two forms of government issued photo identification, such as a State-issued Drivers' License or Non Drivers License or a passport.

APPLICATION INFORMATION

Application Fees: \$25.00 for originals and \$15.00 for renewals. The fee may be paid by credit card (no debit), in cash, money order, or personal check payable to New York City Fire Department. The \$25.00 fee must be payable by all applicants prior to taking the Certificate of Fitness test. Application forms are available at the Public Certification Unit, 1st floor, 9 Metro Tech Center, Brooklyn, NY 11201.

TEST INFORMATION

Test: The test will be of the written, multiple choice type. A passing score of at least 70% is required in order to secure a Certificate of Fitness. Call 718-999-1988, or 2504 for additional information and forms or email pubcert@fdny.nyc.gov.

Website: WWW.NYC.GOV/FDNY

About The Study Material

These study materials will help you prepare for the written examination for the certificate of fitness for supervision of crane aerial fueling operations. The study materials include information taken from the New York City Fire Code (FC) and Fire Department rules. The study material does not contain all the information you need to know in order to perform the responsibilities of conducting crane aerial fueling operations safely. It is your responsibility to become familiar with all applicable laws, rules and regulations of the federal, state and city agencies having jurisdiction, even though such requirements are not included in this study material. You need to be familiar with Rules of the Fire Code § 1405-01 for Crane Aerial Fueling Operations and FC22 & FC34, Section 3406.2 - 3406.2.8 which regulates the storage, handling and use of flammable and combustible liquids in order to adequately prepare for the exam. **It is critical that you read and understand this booklet to help increase your chance of passing this exam.**

About the Test

You must pass a multiple choice test to qualify for the certificate of fitness. A score of 70% correct is required in order to pass the test. All questions have four answer options. Only **one** answer is correct for each question. If you do not answer a question, or if you mark more than one answer to a single question, your answer to that question will be scored as incorrect. Read each question carefully before marking your answer. There is no penalty for guessing.

Sample Questions

1. Who was the first president of the United States?

- (A) George Washington.
- (B) Winston Churchill.
- (C) Abraham Lincoln.
- (D) Barack Obama.

The correct answer is "A". You would mark "A" on your touch-screen terminal.

2. What sports team plays at Madison Square Garden?

- (A) Yankees.
- (B) Mets.
- (C) Cardinals.
- (D) Knicks.

The correct answer is "D". You would mark "D" on your touch-screen terminal.

I. Introduction

This document outlines New York City Fire Department regulations for aerial fueling of cranes with diesel fuel or other combustible liquids at construction sites and other locations. Cranes are used for heavy steel and concrete erection work in buildings under construction. There are different methods to refuel cranes such as gravity and power fueling.



Tower Crane

II. Definition

CERTIFICATE OF FITNESS (C of F): A written statement issued by the NYC Fire Department certifying that the person to whom it is issued has passed an examination as to his or her qualifications or is otherwise deemed qualified to use or supervise the storage, handling and use of a material, conduct or supervise an operation, or supervise a facility for which such certificate is required by this code or the rules. It is valid for 3 years. It is required to produce the C of F when asked by an FDNY representative or Site Safety Manager or the Site Safety Coordinator.

Clearance from ignition sources - Clearance between ignition sources, such as light fixtures, heaters and open-flame devices, and combustible materials shall be maintained in an approved manner.

COMBUSTIBLE LIQUID - A liquid, other than a compressed gas or cryogenic fluid, having a closed cup flash point at or above 100°F (38°C).

CONSTRUCTION SITE: Any location at which a building, structure, premises or facility is undergoing construction, alteration or demolition.

EXCESS FLOW CONTROL: A fail-safe system or other approved device, equipment or system designed to shut off flow caused by a rupture in a pressurized piping system.

DISPENSING: The pouring or transferring by other means of any material from a container, tank or similar vessel, which would release dusts, fumes, mists, vapors or gases to the atmosphere, unless such release is prevented by a device, equipment or system designed for that purpose.

FLAMMABLE AND COMBUSTIBLE LIQUID STORAGE SYSTEM: A flammable or combustible liquid storage tank and all devices, equipment and systems associated with such tank, including the tank, piping, valves, fill connection, vent lines, pumps and any other ancillary equipment, except liquid motor fuel storage and dispensing systems and flammable and combustible liquid storage systems at a bulk plant or terminal used for bulk transfer operations.

FLAMMABLE LIQUEFIED GAS: A liquefied compressed gas which, under a charged pressure, is partially liquid at a temperature of 68°F (20°C) and which a flammable gas is.

FLAMMABLE LIQUID - A liquid, other than a compressed gas or cryogenic fluid, having a closed cup flash point below 100°F (38°C).

LIQUID: A material having a melting point that is equal to or less than 68°F (20°C) and a boiling point that is greater than 68°F (20°C) at 14.7 psia (101 kpa). When not otherwise identified, the term “liquid” includes both flammable and combustible liquids.

LOWER EXPLOSIVE LIMIT (LEL): See “Lower flammable limit.”

LOWER FLAMMABLE LIMIT (LFL): The minimum concentration of vapor in air at which propagation of flame will occur in the presence of an ignition source. The LFL is sometimes referred to as LEL or lower explosive limit.

PROCESS TRANSFER: The transfer of flammable or combustible liquids between cargo tanks or tank cars and containers, tanks piping and other equipment that is to be used in process operations.

PERMIT ISSUANCE: Every permit shall be valid for a period specified therein, not to exceed one year, and shall expire at the end of such period unless the commissioner approves its renewal. **All FDNY original permits shall be on site and available for inspection at all times.** Permits are not transferable and any change in occupancy, operation, tenancy or ownership shall require that a new permit be issued.

PERSONAL SUPERVISION: A method of supervision by the holder who is required to be personally present on the premises, while performing the duties for which the certificate is required.

POWERED INDUSTRIAL TRUCK: A forklift, tractor, platform lift truck or motorized hand truck powered by an electrical motor or internal combustion engine. Powered industrial trucks do not include farm vehicles or automotive vehicles for highway use.

SMOKING: Smoking shall be prohibited at all construction sites. Signs shall be posted in accordance with FC3 Section 310.

III. Storage, Handling and Use of Combustible liquids

A FDNY permit is required to store, handle and use a combustible liquid (Class I liquids) such as **gasoline** in amounts exceeding **2½** gallons (9.5 L). Class II or III liquids with a flash point of 300°F or less such as **diesel** in amounts exceeding **10** gallons.

Distance between combustible and the tank should be at least **“5 feet”**



The handling and use of flammable and combustible liquids, including the dispensing of such liquids, excluding combustible liquids with a flash point over 300°F (149°C), shall be under the **personal supervision** of certificate of fitness holder for of flammable/combustible liquids and other hazardous chemicals or materials (C-98).



Portable tanks for fueling crane

Portable tank should be designed and installed with the following requirements:

- the capacity of the portable tank for fueling should not exceed 550 gallons.
- the tank should be of approved steel construction and structurally strong to be repeatedly lifted for fueling.
- the lifting assembly is provided with a sufficient number of lugs capable of safely supporting the weight of the tank and the full stored fuel and allowing the tank to be maintained in a level position during lifting and fueling operations.



Lugs

- the connecting hose of the portable tank can not exceed 30 feet. It has to be of braided flexible steel type and with breakaway coupling capable of retaining fuel on both sides of shear section.



Breakaway couplings

- the end of the nozzles has to be threaded and provided with a liquid-tight cap while hoisting.

Storage tanks must be stored away from combustible materials such as lumber and other substances and away from vegetation. It is strongly recommended that a minimum distance of five (5) feet be maintained from the tank and materials which pose safety risks.

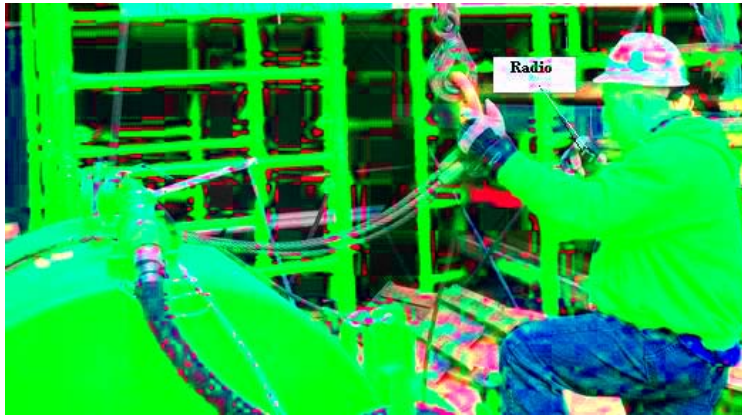
IV. Fueling operation

A Certificate of Fitness (C of F) holder must be present at all time when the fueling operation is in a process. Before starting aerial fueling operation the C of F holder must inspect the following:

- Inspection of Fueling Equipment:** C of F holder must inspect at construction site that:
 - the portable tank, hose valves and all other devices and equipment used for aerial fueling is in a safe condition and ready to be used.
 - Upon inspecting the fueling tank and its components, the c of f holder notices that the discharge hose is frayed and leaking product at its

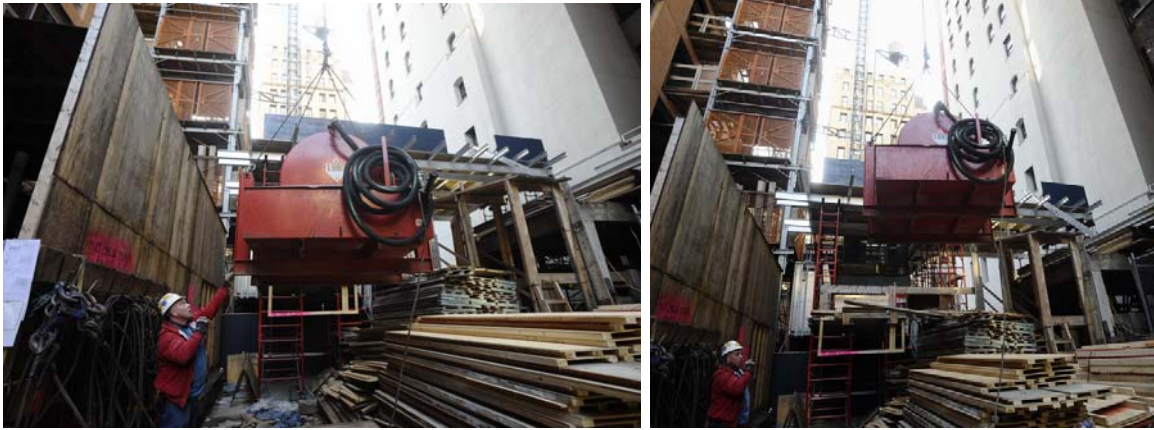
Supervision of Crane Aerial Fueling Operations at Construction Site P-54
connection with the tank should discontinue the fueling operation.

- B. **Weather conditions:** A reliable means should be readily available to monitor weather conditions such as:
- wind speed.
 - approaching storms.
- C. **Communication:** To maintain communication between the crane operator and other personnel involved in the fueling operation there should be: Radio and/or two way wireless communication.



Communication between crane operator in the cabin and other personnel

- D. **Method of discharge:** The aerial fueling has to be done under gravity discharge by hoisting a portable tank to an elevation above the crane's fuel tank.
- E. **Fire Source:** Check for faulty or defective electrical fixtures, open flames or spark producing devices are kept at a safe distance. Make sure there is no body smoking around the fueling operation.
- F. **Fueling of Crane:** After the portable tank is lifted to elevation required before starting the fueling operation:
- stop the construction operation;
 - shut off the engine of the crane;
 - the portable tank should be grounded to the crane structure;
 - the portable tank should be secured to the crane structure with a chain shorter than the hose length that is cable of retraining the tank during the aerial fueling operation;
 - hoist the fuel tank up until it is just above the cabin or higher to attain an appropriate fluid head to allow the fuel to flow;
 - luff in the boom until the fueling hose is close to the machinery deck so that the hose can be reached and obtained by the maintenance personnel;
 - the hose is then inserted into the filler breather opening and the fuel is allowed to flow into tank. Check dipstick for tank level or level gauge if fitted.



Hoisting the fuel portable tank up

Before lowering empty fueling tank to the ground the following procedures should be observed:

- ensure the fuel tank is filled to proper level;
- secure valve and maintained in closed position;
- remove and secure the safety tether;
- remove fill hose and replace fill tank cap;
- if possible, secure the fill hose to the fueling apparatus.

Tower Crane Aerial Fueling Procedure (See picture at end of the booklet)

- Crane operator / oiler will conduct pre-start up checks
- Ground personnel will inspect fuel tank and rigging
- Ground crew will prime (hand pump) the fuel tank on the ground, the ball valve which is located on the fuel hose at the quick disconnect fitting will be in the closed position.
- Ground personnel will attach rigging to fuel tank
- Ground personnel will direct crane operator by radio
- Fuel tank will be lifted
- Crane swing area will be regulated
- No personnel allowed in swing area during lift / fueling
- Oiler will be located on the walk way of the crane with the proper fall protection equipment

- The operator will boom up the fuel tank so it is located above the designated pick area of the crane as depicted on the crane location site plans.
- Oiler will then hook the fuel hose, ground, and tank restraint (chain shorter than the hose length) and place them onto the crane walkway
- Oiler will then attaché the restraint and ground to the crane
- The nozzle will then be removed from the fuel hose at the quick disconnect fitting(the ball valve will still be in the closed position)
- Oiler will then attach the fuel hose to the extension hose

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- Oiler will then re-attach the nozzle to the fuel hose extension and place it into the crane fuel tank
- Fuel hose will be inspected to verify that all quick disconnect fittings have been properly attached
- Once the inspection has been completed only then will the ball valves be open
- Fueling will start at this time
- Once fueling has been completed the ball valves located on the fuel hose and extension will be placed in the closed position
- With the ball valves closed the nozzle will be disconnected from the fuel hose extension
- The fuel hose extension will then be disconnected from the fuel hose which is attached to the fuel tank
- The fuel nozzle will be then attached to the fuel hose which is attached to the fuel tank
- The oiler will then detach the ground and tank restraint
- The fuel hose, ground, and tank restraint will be removed from the crane walk way only after verifying that the nozzle has been connected correctly and the ball valve is still in the closed position
- The fuel tank will then be lowered to the ground
- The ground crew will then secure the fuel tank on the ground

V. Fire Protection Systems

Fire Extinguishers:








At least one portable fire extinguisher having a minimum 10-B: C rating shall be provided either in the cab or in the immediate vicinity of the crane. Additional extinguisher of a minimum 10-B: C rating shall be provided at the construction site not more than 30 feet from where a fueling operation is being conducted. A travel distance of up to 50 feet is allowed if a fire extinguisher having a minimum 40-B: C rating is provided.

Travel Distance is the actual walking distance from any point to the nearest fire extinguisher.

According to the ***National Fire Protection Association and New York City Fire Department Rule***, fire extinguishers are categorized according to their compatibility with the fuel they are expected to extinguish. Fuels include four basic groups: wood, liquids, metals, and animal fats; the hazard is electrical conductivity.

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Further, extinguishes are designated by alphabetical letters and symbols as shown in the table below.

Classes	Symbol	Material
<p>Class A</p> 		<p>Class A fire extinguishers are designed to fight fires caused by common ordinary combustibles, such as wood, paper, some plastics and textiles. To extinguish a Class A fire, these extinguishers utilize either the heat-absorbing effects of water or the coating effects of certain dry chemicals.</p>
<p>Class B</p> 		<p>Class B fire extinguishers are designed to fight fires originating from flammable or combustible liquids and gases such as oil, gasoline, etc. These fire extinguishers work by starving the fire of oxygen and interrupting the fire chain by inhibiting the release of combustible vapors.</p>
<p>Class C</p> 		<p>Class C fire extinguishers are effective on fires that involve live electrical equipment which require the use of electrically nonconductive extinguishing agents. (Once the electrical equipment is deenergized, extinguishers for Class A or B fires may be used.)</p>
<p>Class D</p>		<p>Class D fire extinguishers are designed for use on fires involving combustible metals such as magnesium, titanium, sodium, etc., which require an extinguishing medium that does not react with the burning metal.</p>
<p>Class K</p>	<p>K</p>	<p>Class K fire extinguishers are effective for fighting fires involving cooking fats, grease, oils, etc., in commercial cooking environments. These fire extinguishers work on the principal of saponification. Saponification takes place when alkaline mixtures such as potassium acetate, potassium citrate or potassium carbonate are applied to burning cooking oil or fat. The alkaline mixture combined with the fatty acid creates a soapy foam on the surface which holds in the vapors and steam and extinguishes the fire.</p>

Inspection is a "quick check" that a portable fire extinguisher is available and will operate. It is intended to give reasonable assurance that the portable fire extinguisher is fully charged and operable.

This is done by verifying that:

- Fire extinguishers are in their assigned place;
- Fire extinguishers are not blocked or hidden;
- it has not been actuated or tampered with;
- Fire extinguishers show no visual sign of damage or abuse that prevents its operation;
- Pressure gauge reading or indicator in the operable range or position;
- Ensure that the fire extinguishers tags are current;
- Pin and seals are in place;
- Nozzles are free of blockage.

Basically, inspection means a visual examination of the portable fire extinguisher. In addition fire extinguisher maintenance should be done annually and consists of complete examination of the unit, and involves disassembly and inspection of each part and replacement where necessary. This annual inspection must be performed by a Certificate of fitness holder of full service shop of portable extinguisher (W-96). It involves internal examination and replacement of defective parts.

Signs:

Signs must be constructed of a durable metal and posted indicating that no smoking is permitted on the premises and must include procedures to be followed in case of a fire emergency. Safety regulations must be posted in visible locations in the site. The Certificate of Fitness holder must make sure that this sign is visible at all times. An example of a No Smoking sign is shown below:

Durable warning signs should be noticeably posted.



No Smoking Sign



Unacceptable Warning Sign



An example of a placard:







A numbered placard

The 4- digit ID number identifies the dangerous material involved and 1 digit number identifies the primary hazard class of a material. For example in above placard 1993 ID number means Diesel fuel and 3 means flammable liquids (combustible liquid).

Hazard Identification Signs:

NFPA 704 Diamonds

					
RATING NUMBER	HEALTH HAZARD	FLAMMABILITY HAZARD	INSTABILITY HAZARD	RATING SYMBOL	SPECIAL HAZARD
4	Can be lethal	Will vaporize and readily burn at normal temperatures	May explode at normal temperatures and pressures	ALK	Alkaline
3	Can cause serious or permanent injury	Can be ignited under almost all ambient temperatures	May explode at high temperature or shock	ACID	Acidic
2	Can cause temporary incapacitation or residual injury	Must be heated or high ambient temperature to burn	Violent chemical change at high temperatures or pressures	COR	Corrosive
1	Can cause significant irritation	Must be preheated before ignition can occur	Normally stable. High temperatures make unstable	OX	Oxidizing
0	No hazard	Will not burn	Stable	  	Radioactive Reacts violently or explosively with water Reacts violently or explosively with water and oxidizing

This chart for reference only - For complete specifications consult the NFPA 704 Standard

NFPA-Chart_1 www.ComplianceSigns.com

The *transport* of hazardous materials is accompanied by the use of US DOT compliant placards and labels to assist identification of hazardous materials on the roadway, railway, and waterway in the air. In a similar manner the *storage, handling and use* of hazardous materials is accompanied in the Fire Code by a requirement for the use of consistent signage to alert people, including first responders, to the presence of hazardous materials in a facility. The intent of the signage is to provide an indication of both the *type* of hazardous material present and the relative *degree of harm* that the material may pose. This simplistic system uses symbols, colors and numbers to readily communicate these concerns in a visual manner, and recognizes the fact that a material may pose more than one type of hazard.

The basis of the system is a diamond-shaped sign that is divided into four color-coded quadrants (see Figure 1). The left-most quadrant is colored blue and represents the *health* hazard posed by the material. The upper quadrant is red in color and indicates the relative *fire* hazard. The right-most quadrant is yellow and conveys the relative potential for *reactivity* of the material. The last quadrant, at the bottom, is white in color and serves to convey “*special*” information such as “OX” for oxidizer and “W” for water-reactive material.



Blank NFPA Diamond Sign



Sign with Hazards Indicated (Fig 2)

The diamond-shaped sign is required by the Fire Code to be conspicuously displayed at the entrance to locations where hazardous materials are stored, handled and used, and on stationary containers and aboveground tanks containing hazardous materials. Note that the sign requirement also applies to locations at which a hazardous material is dispensed. The triggering amount for the sign requirement is the **amount required for a permit**.

The numbering system that is used to convey the hazards of a material uses a scale of 0 through 4 for each of the three hazard types (health, fire and reactivity). A number is placed in each box, specific to the material at hand. In each quadrant, a “0” represents the least concern and “4” represents the highest degree of hazard posed by a material. For instance, a “0” in the upper quadrant indicates a material that will not burn, while a “4” in the same quadrant indicates a gaseous material that will burn very readily (see Figure 2). Intermediate numbers represent increasing levels of hazard in all categories, such as the “3” that is present in the “health” quadrant of Figure 2. This is indicative of a material that can cause permanent or serious injury upon exposure.

VI. Emergency Procedures

Fire safety manager: Where a site safety manager or site safety coordinator is required by the Building Code, the owner shall designate a person to be the Fire Safety Manager for the construction site. The Fire Safety Manager may be the site safety manager or site safety coordinator required by the Building Code. The fire safety manager shall be responsible for ensuring compliance with the requirements of this code, including this chapter, and the rules.

The project manager or superintendent should be notified by the person holding the Fire Department C of F for the Supervision of aerial fueling of cranes.

Spill: The Certificate of Fitness holder should pour sand or other absorbing material on a fuel spill. An absorbent material (i.e. like cat litter or sand) is commonly used to contain and soak up fuel spills. The area should then be cleaned. If a spill, more than 1 gallon or leak occurs, the certificate of fitness holder must call 911 or the FDNY borough dispatcher immediately.

The following numbers are the FDNY borough dispatcher:

Manhattan	212-570-4300
Bronx	718-430-0200
Brooklyn	718-965-8300
Queens	718-476-6200
Staten Island	718-494-4296

Inspection:

A person responsible for the supervision of crane aerial fueling operations at a construction site is prohibited to perform any illegal activities and/or create an unsafe condition, such as:

- fuel a crane aerially with a flammable liquid;
- perform aerial fueling of a crane at construction site while construction operation is being conducted;
- perform aerial fueling of a crane when weather conditions such as wind speed or lightning make such operation unsafe;
- portable tanks with out proper label and marking.

Notifications:

The person responsible for the supervision of crane aerial fueling operations at a construction site should notify the site safety manager and the FDNY immediately (Call 911) if fire occurs or if an unsafe condition is created.

Supervision of Crane Aerial Fueling Operations at Construction Site P-54

Business name: _____
Address: _____
City & State: _____
Phone #: _____

**Aerial Fueling Crane
Operations
Company Name
Address
City, ST, Zip Code**

Date: _____
C of F Holder's Name: _____
Signature: _____
C of F #: _____
Exp Date: _____

SECTION A.

General Requirements	Responses	Recommended action
1. Is there a storage and/or use permit for the combustible liquid?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No, discontinue use and remove from site and obtain a permit. (Call District Office at 718-999-2457, 2458)
2. Is there any additional Certificate of Fitness for P-54?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.

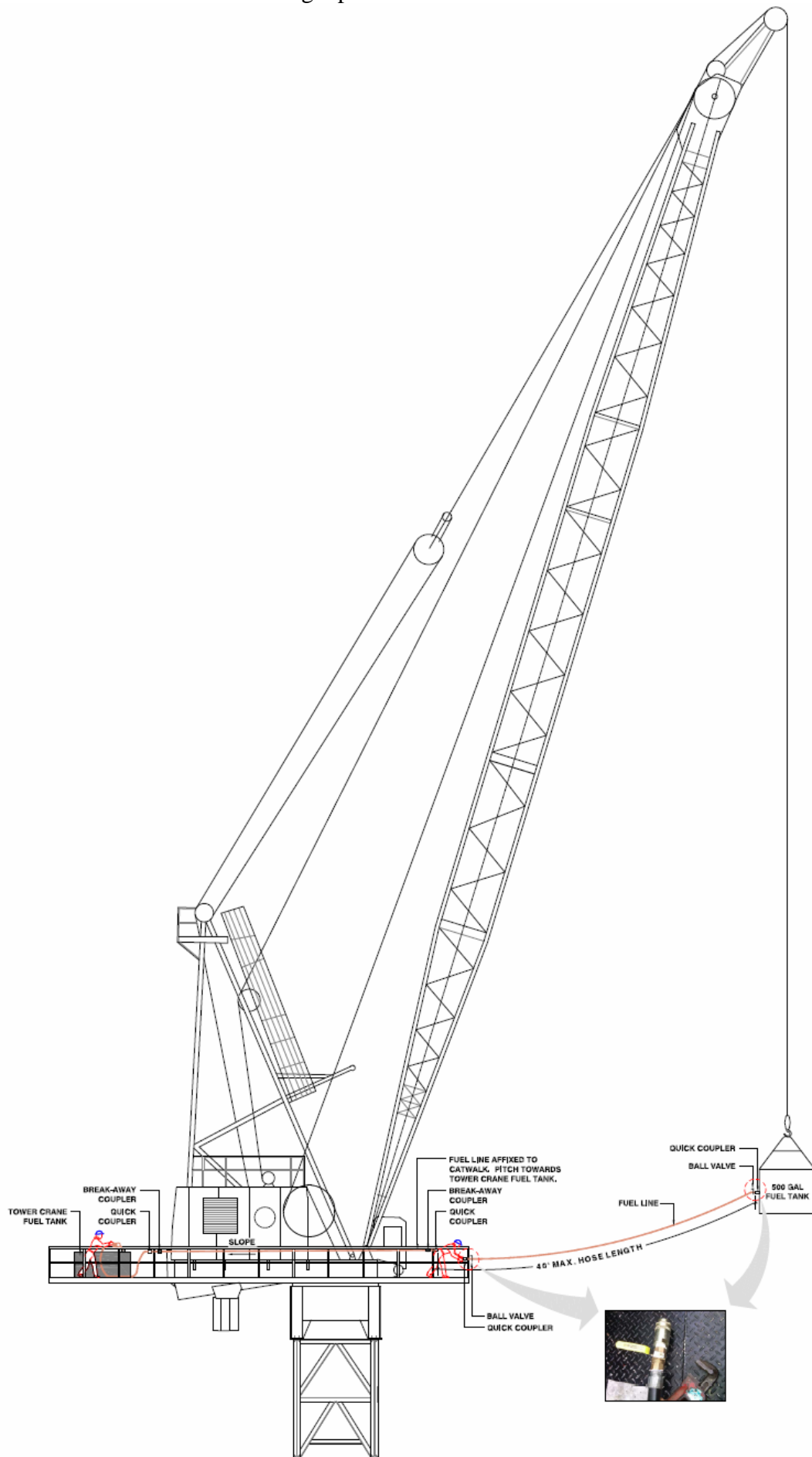
SECTION B.

Pre-Operation check	Responses	Recommended action
1. Have you checked the required extinguisher is available?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
2. Are the extinguishers properly placed and easily accessible?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
3. Are all signs properly posted?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
4. Have you checked the weather condition is safe to operate?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: Discontinue fueling operation.
5. Have you check a fire source at a distance and no body is smoking around the operation?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply
6. Have you checked the portable tank, hose valves, means of communication and all other devices and equipment used for aerial fueling is in a safe condition and ready to be used?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
7. Have you discovered any items that would prevent the starting of fueling operations?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If Yes: Discontinue fueling operation. Describe items _____.

SECTION C.

Fueling Operations	Responses	Recommended action
1. Have you checked the construction site is not operating?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
2. Have you checked the engine of the crane is off?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
3. Is the portable tank grounded to crane structure?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply
4. Is the portable secured to the crane structure with a chain shorter than the hose length?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
5. Is the fuel tank hoisted above the cabin or higher to attain an appropriate fluid head to allow the fuel to flow?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: correct and comply.
6. Is the fueling hose is close to the machinery deck so that the hose can be reached?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No: luff in the boom until the hose can be reached by personnel.
7. Ensure the fuel tank is filled proper level.	<input type="checkbox"/> Yes <input type="checkbox"/> No	If No:

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Supervision of Crane Aerial Fueling Operations at Construction Site P-54

