U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Towbar and Towbarless Movement of Aircraft

Date: 8/27/09 **AC No:** 00-65

Initiated by: AFS-330 **Change:**

1. PURPOSE. This advisory circular (AC) provides guidance for towbar and towbarless movement of aircraft.

2. APPLICABILITY. The guidance in this AC applies to all Operators under Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 91K, 121, 125, 129, and 135.

3. RELATED CFR REGULATIONS.

- Title 14 CFR part 91, General Operating and Flight Rules;
- Title 14 CFR part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations; and
- Title 14 CFR part 139, Certification of Airports.

4. RELATED MATERIAL (current editions).

- AC 91-73, Part 91 and Part 135 Single-Pilot Procedures During Taxi Operations;
- AC 120-57, Surface Movement Guidance and Control System;
- AC 120-74, Parts 91, 121, 125 and 135, Flightcrew Procedures During Taxi Operations;
- AC 150/5200-37, Introduction to Safety Management Systems (SMS) for Airport Operators;
- AC 150/5210-5, Painting, Marking, and Lighting of Vehicles used on an Airport;
- AC 150/5210-18, Systems for Interactive Training of Airport Personnel;
- AC 150/5210-20, Ground Vehicle Operations on Airports;
- AC 150/5210-21, Announcement of Availability: Airport Surface Safety Training Programs for Mechanics and Ramp Personnel; and
- AC 20-35, Tiedown Sense.

5. HOW TO OBTAIN THIS AC.

(1) Purchase ACs. ACs for which there is a fee may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. A list of all ACs is available at http://www.airweb.faa.gov/rgl. A copy of current CFRs online may also be obtained at http://www.access.gpo.gov/ecfr/.

(2) Request Free ACs. Free ACs may be requested from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785.

(3) Join FAA's Mailing List. You can be placed on FAA's mailing list for free ACs by contacting the U.S. Department of Transportation, Distribution Requirements Section, SVC-121.21, Washington, D.C. 20590.

6. BACKGROUND. There are several reported cases (documented and undocumented) of near incursions and mishaps involving tug operators moving aircraft. Specifically, super tugs have had incidents such as jackknifing, uncontrolled movement, and inability to stop the tug and aircraft quickly. There have been several potential ground incursion instances where super tugs were not seen by the aircraft and ground controllers. There have also been reported cases where pilots are not cognizant to the "right of way passage" of these tugs, even when they are cleared for movement in the active areas. Lastly, ATC specialists have reported that it is very difficult to identify a super tug towing an un-powered aircraft at night, because the aircraft being towed is not illuminated with any lights. For ATC and other pilots in the area, this creates the optical illusion that the low profile super tug is by itself, making the large, dark aircraft being towed nearly invisible.

7. PREVENTING INJURIES TO PERSONNEL AND DAMAGE TO AIRCRAFT DURING GROUND HANDLING. The aviation industry has found through experience that the potential for damage and/or injury if a mishap occurs is high, however firm safety practices deter accidents. This AC contains generally accepted information and safety practices which may help prevent injuries to personnel and damage to aircraft during ground handling and reduce runway incursions.

(1) In anticipation of Safety Management System (SMS) requirements, all managers and supervisors should, identify, eliminate, control, and document hazards within the workplace to minimize risks associated with uncertainty in the decision-making process.

(2) After identifying hazards, assess the risks associated with each hazard, then determine and take action as needed to reduce the risk by:

(a) Engineering the hazard out or imposing procedural actions (operational limits, frequent inspections, protective equipment, or stopping until corrective action is taken); and/or

(b) Educating and training personnel on the hazards and the safety procedures to follow to reduce the chances of a mishap occurring.

(3) Ensure all personnel receive safety and health on-the job training (OJT) upon initial assignment and whenever there is a change in equipment, procedures, processes or safety and health requirements. Well trained and educated personnel are the greatest deterrent to mishaps in the workplace. Supervisors should document safety-related training.

(4) When towing aircraft, use the proper towbar and/or tow vehicle. The wrong type of towbar, or makeshift equipment, can cause damage to the aircraft. Persons performing towing operations should be thoroughly familiar with the procedures that apply to the type of aircraft to be moved and the type of tow vehicle.

8. TRAINING.

a. Procedures and Guidance.

(1) Air carriers must establish guidance per §§ 121.135 and 135.21. Carriers may cover this information in a standard operating procedures (SOP) handbook which should clearly define duties and responsibilities and employ the use of a checklist covering all items pertaining to the safe movement of the type aircraft being towed.

(2) Operators should ensure aircraft ground handling personnel become thoroughly familiar with all published towing procedures pertaining to the type of aircraft being towed along with understanding the restrictions and/or limitations on any vehicle authorized to move an aircraft.

(3) Ensure that the employee's speech and accent, if any, relative to sentence patterns, sentence structure, and in the case of an air traffic control (ATC) clearance, use of standard clearance terminology is satisfactory.

(4) Newly assigned aircraft maintenance specialists/ground movement personnel should pass a proficiency test on the types of aircraft towed, after completing supervised OJT.

(5) Wing and tail walkers may not have to be familiar with all published towing procedures or receive annual proficiency training if their duties are restricted to these positions during towing operations. Additionally, recurrent training should include, but not be limited to, airport signage, limitations or restrictions, and ATC communications procedures, and must be completed before the initial performance of such duties and at least once annually.

(6) A high degree of safety should be the responsibility of all personnel involved in moving an aircraft.

b. Operational Consideration. Operators that use the towbarless tractor should submit appropriate procedures outlining the towing operations to their certificate-holding district office (CHDO). The procedures should include, but not be limited to the following:

- Safety instructions,
- Operating procedures (include the differences between day and night operations),

- Initial and recurring training,
- Radio communication, and
- Towing procedures checklist.

9. TOWBAR AND TOWBARLESS TOWING OF AIRCRAFT.

a. Towbarless Tractor. High speed tugs such as Goldhofer Aircraft System Tractor Models AST-1 and AST-1X, Douglas Equipment, and FMC Expediter family of towbarless tractors, some times referred as "super tugs," usually move aircraft between the terminal gates to maintenance hangars. The weight of an aircraft and its fuel load is a major consideration during towing because handling characteristics of the tow tractor changes proportionally with the change in aircraft weight. Heavier aircraft put more stress on the vehicle. After movement begins, heavy aircraft can "push" the tug with a greater force than lighter aircraft because of weight and momentum. Tow operators must recognize and understand these characteristics. Heavier weights and too much speed create the potential for disaster. Therefore, reduce towing speeds according to the weight of the aircraft. The braking distance required to stop a large aircraft will be greater than the distance required to stop a smaller aircraft.

b. Towing Vehicles. A few of the many tow vehicles used by operators to move aircraft are as follows:

(1) The Lynco Tugger Corporation's 4 KD4 is a patented fully hydra-static tow vehicle with a 48-inch turning radius. Load capacity of 60,000 pounds with a level draw bar pull of 4,000 pounds.

(2) Harlan currently produces more than seven standard model tractors. These vehicles range from 3,000 to 20,000 pound drawbar pull. The A/S32A-37 aircraft towing tractor is an inline, 6-cylinder, diesel-powered, liquid-cooled, 4-wheel drive vehicle used to move heavy aircraft. The A/S32A-42 aircraft mid-range tow vehicle is a 4-cylinder, diesel-powered liquid-cooled, 4-wheel drive vehicle used to move medium aircraft.

(3) Aero Specialties is the exclusive corporate and Fixed-Base Operator distributor of Eagle Tugs. With towing capacity up to 180,000 pounds, Eagle Tugs are the only aircraft tractors in their class with available all wheel drive and limited slip differential.

c. Towing Vehicle Inspections. Tow vehicle operators should ensure all towing equipment is serviceable and functioning properly before starting any towing operation. Before connecting the towbar to the aircraft, the tow vehicle operator should inspect the tow vehicle for defects or extraneous material that may interfere with safe operation. An operator should inspect each tow vehicle at least once each shift to verify that the cab and exterior of the vehicle are clear of all extraneous materials and the vehicle is in safe working condition. Additionally, check all radio communications before dispatching a tow vehicle. Inspect towing connections before each use. When tow vehicle operators find mechanical defects affecting safety on tow vehicles, the carrier should take the equipment out of service and send it to vehicle maintenance for repairs.

d. Towing Operations.

(1) Using qualified personnel, following established procedures, and properly planning for weather, local conditions, such as inclined ramps, emergencies, and other limitations, should prevent mishaps.

(2) For maximum safety, towing personnel will not place themselves in the direct path of aircraft wheels nor ride on any external portion of an aircraft or tow vehicle.

(3) Best practice is to use a checklist.

(4) Ensure placards are serviceable and located inside the tow vehicle cab to identify any restrictions that apply to the tow vehicle.

(5) Observe any other placards that might be of a temporary nature prior to all movements.

(6) When connecting a towbar to any towing vehicle, personnel will stand clear until the backing tow vehicle is in close proximity to the towbar.

(7) When connecting a tow vehicle, personnel should be extremely vigilant to any sudden movement of the tow vehicle or aircraft.

e. Aircraft Lighting. Before movement of any aircraft, § 91.209 states no person may:

(1) During the period from sunset to sunrise (or, in Alaska, during the period a prominent unlighted object cannot be seen from a distance of 3 statute miles or the sun is more than six degrees below the horizon):

(a) Operate an aircraft unless it has lighted position lights;

(b) Park or move an aircraft in, or in dangerous proximity to, a night flight operations area of an airport unless the aircraft:

1. Is *clearly illuminated*,

2. Has lighted position lights, or

3. Is in an area that is marked by obstruction lights.

(c) Anchor an aircraft unless the aircraft:

1. Has lighted anchor lights, or

2. Is in an area where anchor lights are not required on vessels.

(2) Operate an aircraft that is equipped with an anti-collision light system, unless it has lighted anti-collision lights. However, the anti-collision lights need not be lighted when the pilot

in command determines that, because of operating conditions, it would be in the interest of safety to turn the lights off.

> **NOTE: Clearly illuminated means that the aircraft wingtips and tail can be seen by other means of illumination just as clearly as if the aircraft position lights were turned on.**

> **NOTE: The aircraft position lights may be powered by means of the aircraft battery, APU, or an external power source such as a tow vehicle APU/generator.**

f. Flight Deck/Cockpit Observer. A trained person should be in the pilot's seat to operate the aircraft's brakes if needed. If the hydraulic pressure that provides braking drops below safe operating limits, the towing operation should be terminated. Additionally, the observer serves as backup to any communications failures between tow driver and control tower/ramp control.

g. Tow Vehicle Operator. The tow vehicle driver is responsible for operating the vehicle in a safe manner. The vehicle operator will also obey emergency stop instructions given by any team member. A trained vehicle operator will be at the controls of the towing vehicle at all times during aircraft movement. The vehicle operator will stop the vehicle upon losing communication with the cockpit observer, control tower, and/or ramp control.

h. Wing Walker. Station a wing walker at each wingtip to ensure adequate clearance of any obstruction in the path of the aircraft. The wing walker is responsible for properly signaling the tow vehicle operator as soon as it appears the aircraft is in danger of colliding with an obstruction. In such cases, stop towing until the vehicle operator personally checks the clearance. Wing walkers are not required for helicopters being towed with rotor blades in parallel position. Wing walkers do not require annual proficiency testing and need not be fully qualified in all towing procedures. Thorough pre-tow briefings by a tow team lead will satisfy the training requirement.

i. Tail Walker. Use a tail walker during towing operations when you turn the aircraft sharply or back into position. Avoid backing of aircraft as much as possible. Tail walkers do not require annual proficiency testing and need not be fully qualified in all towing procedures as long as this is their only task.

> **NOTE: When towing small aircraft, you can eliminate the tail walker at the discretion of the tow team lead.**

j. Personnel Riding or Walking. Under no circumstances should personnel walk between the nose wheel of an aircraft and its towing vehicle, nor should they ride on the outside of a moving aircraft, on the towbar, or on the outside of the vehicle unless in an authorized seat. No person should attempt to board or leave a moving aircraft or towing vehicle.

k. Night Crew Signals. Operators should issue two luminous wands to towing team members who require wands. Other tow team members should use wands, as required, to warn any aircraft traffic that may approach. Additionally, before moving any aircraft, ensure compliance with § 91.209.

l. Control Tower Clearance. Before towing an aircraft on or across an established taxiway or runway, the tow vehicle operator will obtain clearance from the control tower. At no time will any aircraft be towed on or across runways or taxiways without advance approval of the control tower. The primary means of communication will be the aircraft radio. An alternate method (when conditions restrict aircraft battery operation) is through an escort vehicle in direct radio contact with the control tower. The radio-equipped escort vehicle will accompany the aircraft throughout the towing operation.

m. Towing Speed. Towing speed should not exceed that of walking team members.

n. Brakes. To prevent serious mishaps, charge aircraft brake systems before each towing operation, and stop towing immediately if brake pressure drops below safe operating limits. Do not tow aircraft with faulty brakes, except to repair facilities, and then only with personnel standing by ready with chocks for emergency use.

o. Towbars. Before moving any aircraft, inspect the towing vehicle, towbar, towbar connections, and other associated equipment for defects. Use only authorized equipment in good condition in towing operations.

p. Chocks. Make chocks immediately available in case of emergency throughout towing operations. Place them properly before disconnecting the towing vehicle. When towing or parking aircraft with snow, ice, or frost present anywhere on the parking ramp or towing surface, use sand bags and chocks. Use heavier tow vehicles with chains to improve starting and stopping traction during tow operations on ice or snow-covered towing surfaces. Do not place or hang chocks or other support equipment on any part of the aircraft exterior during towing or repositioning.

q. Starts and Stops. When moving aircraft, tow vehicle operators should not stop and start suddenly. Never apply aircraft brakes when an aircraft is being towed, except in emergencies and upon instructions given by any team member. Before disconnecting the towing vehicle from the aircraft, stow chocks properly in place and set the aircraft's brakes.

r. Equipment, Stands, and Similar Materials. Ensure removal and proper storage of all equipment, work stands, loose aircraft parts, and other materials from the vicinity of an aircraft.

s. Entrance Doors, Ladders, and Down Locks. To avoid possible worker injury and aircraft damage during towing operations, close entrance doors, retract or remove ladders, and install landing gear down locks (if required). The only allowable deviations from these requirements are those allowed by specific aircraft manufacturer instructions.

t. Struts and Tires. Before towing any aircraft, towing team members should check nose and main landing gear struts and tires for proper inflation. Unless the applicable manufacturer instructions require a gauge check, a visual check of tires and struts is adequate for towing purposes.

u. Engine Operation. As a general rule, do not tow aircraft with engines operating. The following exceptions apply to aircraft towing operations with engines running: pushing aircraft

away from terminal gates used by airlines for dispatch. Develop procedures for personnel so that they keep away from rotating propellers and away from the danger zones of jet engines.

10. CONTACT. For additional information, please contact FAA AFS Aircraft Maintenance Division, AFS-300, 800 Independence Ave., SW., Washington, DC 20591.

ORIGINAL SIGNED by

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