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Towing Considerations for Safe Operations

VEHICLE LOADINGS: Task Forces should consider the maximum gross vehicle weight rating (GVWR), curb weight, tire-load capacity, maximum payloads, and trailer-towing requirements for fleet equipment while conducting towing operations. These factors have a direct bearing on safety and on the cost of maintaining equipment.

Definitions:

Curb Weight. The curb weight (CW) is the actual weight, in pounds, of a vehicle or trailer, including all permanently attached items and a full tank of fuel. It does not include the cargo, driver, or passengers. Obtain the curb weight by weighing the vehicle on a public scale.

Driver and Passengers. The average weight of the driver and passengers (DP), about 175 pounds per individual.

Gross Axle Weight Rating. The gross axle weight rating (GAWR) is the maximum weight, in pounds, that each axle system (front and rear) is designed to carry. An axle system consists of the axle, springs, wheels and rims, and tires. The lowest rated component of the system determines the GAWR.

Gross Combination Weight Rating. The gross combination weight rating (GCWR) is the combined maximum weight, in pounds, of a vehicle and trailer at which the vehicle is designed to operate. The total weight of the vehicle and trailer shall never exceed the GCWR.

Gross Trailer Weight Rating. The gross trailer weight rating (GTWR) is the maximum loaded weight, in pounds, at which the trailer is designed to operate. The total weight of the loaded trailer shall never exceed the GTWR.

Gross Vehicle Weight Rating. The gross vehicle weight rating (GVWR) is the maximum loaded weight, in pounds, at which the vehicle is designed to operate. The total weight of the loaded vehicle, fuel, cargo, driver, and passengers shall never exceed the GVWR.

Payload. The payload is the weight, in pounds, of the cargo, driver, passengers, and any supplies or tools.

Trailer Weight. The trailer weight (TW) is the actual weight, in pounds, of a loaded trailer. The TW equals the curb weight (CW) plus the payload.

Vehicle Weight. The vehicle weight (VW) is the actual weight, in pounds, of a vehicle that is fully loaded and fueled, including curb weight, cargo, driver, and passengers.

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Vehicle Ratings:

1. Nominal Ratings. Do not use nominal ratings such as 1/2 ton or 3/4 ton when specifying truck size. Use a specific vehicle rating for selecting the proper towing vehicle.
2. Determining Cargo Limitation. Calculate the maximum cargo load (CL) for each vehicle in the fleet using the following formula:

$$CL = RRF (GVWR - CW) - DP$$

Where: CL = Cargo Load
RRF = Rough road factor
GVWR = Gross vehicle weight rating
CW = Curb weight
DP = Driver and passengers

Load Limits and Distribution:

1. Maximum Cargo Loading Limits. Per each vehicle, consider the maximum permissible cargo load that can be hauled.
2. Load Distribution. To prevent the possibility of poor handling characteristics, the center of gravity of all loads should be ahead of the rear axle(s) so that up to 25 percent of the load is carried on the front axle in most truck configurations.
3. Performance. The load, drive train, and terrain affect vehicle performance.

Trailer Towing Requirements:

1. Selecting Trailer Towing Combinations:
 - a. Base the selection of a vehicle and a trailer as a towing combination on the manufacturer's recommendation regarding the acceptable weight rating. An accepted method for testing any vehicle-trailer combinations against the manufacturer's recommendations.
 - b. Do not exceed the gross combination weight rating (GCWR) of the towing vehicle. Gearing for the towing vehicle must be adequate to handle a loaded trailer.
 - c. Do not use sedans and station wagons to tow other equipment.

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2. Brakes and Braking:

- a. Trailers with a gross trailer weight rating (GTWR) of 1,500 pounds or more must have brakes adequate to control the trailer's movement and to stop and hold the trailer. Ensure the trailer brakes are designed so the operator can activate them independently of the foot brakes.
- b. Service brakes on trailers must be designed to operate automatically upon breakaway from a towing vehicle and to remain applied until released.
- c. The towing combination of the vehicle and trailer must meet the braking requirements of State vehicle laws governing stopping distances. In the absence of applicable State laws, any vehicle or vehicle and trailer combination must have service brakes capable of stopping the vehicle when traveling 20 miles per hour within a distance of 40 feet on dry asphalt or concrete pavement on a grade less than 1 percent.
- d. The parking brake on all towing vehicles must be capable of holding a truck and trailer on a 12-percent grade.
- e. Trailers with a GTWR of 20,000 pounds (9,075 kilograms) or more must be equipped with full air brakes that meet Federal Motor Vehicle Safety Standards (FMVSS) 121. Either air, electric, or hydraulic brakes are acceptable on trailers with a GTWR of less than 20,000 pounds (9,075 kilograms).

3. Straight Tongue Trailers. Ensure that the trailer hitches are of a class equal to or higher than the class of trailer being towed. As a rule, where the manufacturer's recommendations are not available, the maximum gross trailer weight that may be towed should not exceed 75 percent of the gross vehicle weight rating (GVWR) of the towing vehicle. The tongue weight at the hitch should be approximately 10 percent of the gross trailer weight (GTW).

- a. Class I systems (bumper) accept up to 200 pounds tongue weight, 2,000 pounds GTW, and require safety chains with a 2,000 pound minimum breaking strength.
- b. Class II systems (frame mounted) accept up to 400 pounds tongue weight, 4,000 pounds GTW, and require safety chains with a 4,000 pound minimum breaking strength.
- c. Class III systems (load distributing) accept up to 600 pounds tongue weight, 6,000 pounds GTW, and require safety chains with a 6,000 pound minimum breaking strength.
- d. Class IV systems (load equalizing) accept up to 1,000 pounds of tongue weight, 10,000 pounds GTW, and require safety chains with a 10,000 pound minimum breaking strength.

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Attach hitches securely to the frame or cross member of the towing vehicle either directly or by mounting on a heavy-duty rear bumper. Reinforce the rear frame and cross member as necessary to provide adequate support. Use ball-type hitches for a 2-inch nominal diameter ball.

4. Fifth wheel trailers. Do not exceed the gross combination weight rating (GCWR) that the manufacturer of the towing vehicle specifies for the gross combined weight of the towing vehicle and trailer. The weight on the fifth wheel (coupler) should be about 25 percent of the trailer weight if the towing vehicle is a light truck (up to 18,500 pounds GVWR) and 33 to 50 percent if a truck tractor with a fifth wheel is used.

The fifth wheel should be located in front of the rear axle. Determine the exact location using prime mover and hitch manufacturer's standards.

5. Other Requirements.

- a. Ensure that all trailers with a tongue weight heavier than 100 pounds have tongue jacks or landing gear designed to support the full GTWR.
- b. Do not park or store trailers equipped with single-pedestal landing gears unless additional supports are provided to eliminate the danger of landing gear collapse.
- c. Ensure that all trailers have taillights, marker lights, backup lights, turn lights, and stoplights in accordance with Department of Transportation regulations.
- d. Equip all trailers with safety chains or cables as required by Society of Automotive Engineers standard SAE J684.