



AEROSPACE RECOMMENDED PRACTICE

ARP5916™

REV. A

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Superseding ARP5916

(R) Design Specification for Regional Aircraft Towbarless Tow Vehicle
for Pushback and/or Maintenance Towing Operations

RATIONALE

ARP5916A has been reaffirmed to comply with the SAE Five-Year Review policy.

FOREWORD

This SAE Aerospace Recommended Practice (ARP) describes the design requirements, performance, and capability of a towbarless tow vehicle (TLTV), used for push-back and/or maintenance towing operations on the nose gear of regional type aircraft.

Throughout this document, the minimum essential criteria are identified by the use of the key-word "shall". Other recommended criteria are identified by the use of the key-word "should" and, while not mandatory, are considered to be of primary importance in providing safe and serviceable towbarless tractors. Alternative solutions may be adopted only after thorough consideration and in-service evaluation have shown them to be equivalent.

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1. SCOPE

The tow vehicle should be designed for towbarless push-back and/or maintenance towing of regional type aircraft as specified in 1.3.

The design will ensure that the unit will safely secure the aircraft nose landing gear within the coupling system for any operational mode.

The purpose of this towing procedure is to achieve a safer and faster operation than is possible with conventional towing equipment.

1.1 One-Man Operation

A one-man towbarless tow vehicle operation is required with all functions to be performed by the operator. Good visibility is required for controlled and safe operations, during day and night conditions.

1.2 The TLTV has to be designed to carry out the following tasks:

1.2.1 Push-Back

Push-back shall be defined as the moving of a loaded airplane in a backward direction from a parking position to the taxiway. Movement typically includes push-back with a turn, stop and short tow forward to align the airplane. Aircraft engines may or may not be running.

And/Or

1.2.2 Maintenance Towing

Maintenance towing shall be defined as the movement of an airplane for maintenance/remote parking purposes (i.e., from the gate to a maintenance hangar or remote parking stand or vice versa). Airplane is typically unloaded.

1.3 Range of Aircraft:

The TLTV should be designed for use with regional type aircraft with maximum ramp weights ranging between 8600 kg (19 000 lb) and 50 000 kg (110 000 lb), as covered by FAR 25 and EASA CS-25.

Including but not limited to the following types of aircraft:

ATR 42/72
BAe 146 RJ 85/RJ 100
Canadair CRJ 200/700/900/1000
De Havilland Dash 8
Dornier 328
Embraer 120/135/140/145/145XR/170/175/190/195
Fokker 50/70/100
Saab 340/2000
Shorts 340/360

This type of towbarless tractor may also be capable of handling larger civil transport aircraft, in which case it should also comply with the applicable requirements of ARP4852 Revision C and ARP4853 Revision C.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained. The TLTV must fully comply with the most recent issue to the following documents, standards, specifications, and practices as applicable to airport ramp operations.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

ARP1247	Aircraft Ground Support Equipment - General Requirements
ARP1330	Welding of Structures for Ground Support Equipment
AIR1375	Minimum Safety Requirements for Special Purpose Airline Ground Support Equipment
ARP1801	Measurement of Exterior Sound Level of Specialized Aircraft Ground Support Equipment
ARP5911	Regional Aircraft Towbarless Tow Vehicle - Test Requirements
ARP5284	TLTV - Aircraft NLG Steering and Tractive Force Protection Systems or Alerting Devices - Inspection, Maintenance and Calibration Requirements
ARP5285	Towbarless Towing Vehicle Operating Procedure

2.1.2 Applicable References

Applicable airframe manufacturers service letters referring to towbarless towing

Federal Occupational Safety and Health Standards (OSHA), subpart N

California Occupational Safety and Health Standards (CAL-OSHA)

EU Directive 2006/42/EC on machinery. The Machinery Directive requirements are legally mandatory for operation in Europe (EU and EFTA). They can be met by complying with the EN standards listed hereafter: CEN Standards (EN1915-1, EN1915-2, EN1915-3, EN 1915-4 and EN12312-7)

ISO 20683-2, Aircraft ground equipment - Design, test and maintenance for towbarless towing vehicles (TLTV) interfaced with nose-landing gear - Part 2: regional aircraft

IATA AHM 957, Functional Specification for Nose Gear Towbarless Tractor

National traffic codes and regulations

Applicable mechanical engineering standards, recommended practices, and Health and Safety Rules

Application aviation regulatory agency rulings or interpretations (FAA, EASA or Country)

Standards and safety rules especially applicable to electrical installations

Local Airport Regulations

If local regulations add requirements, they have to be made known to seller and adhered to.

2.2 Terms and Definitions

TLTV: Towbarless Towing Vehicle

NLG: Nose Landing Gear

3. GENERAL REQUIREMENTS

This tow vehicle will basically be used for handling Regional type aircraft including (but not limited to) the aircraft listed in 1.3.

Overall design of the unit is to allow operations under climatic conditions as stated under 5.1.1 and 8.1.1 and safe operations during day and night conditions on airport aprons, runways, taxiways, and in hangars.

4. DIMENSIONS

The overall dimensions of the TLTV should be as compact as possible taking into account the dimensions and clearance requirements of the aircraft to be handled.

TLTVs must not preclude airplane emergency evacuation procedures.

5. PERFORMANCE

5.1 Tractive force shall be variable depending on the aircraft type according to 4.4. The tractive forces must be sufficient to move A/C from standstill even under bad surface conditions and aircraft engines on idle speed on ramp gradients typically up to 2%.

The fore-aft load limiting device should be set as a function of the airplane to be towed. This value must not be exceeded during normal towing (including acceleration/braking).

Tractive and braking forces applied to the aircraft shall be limited by fail safe load limiting devices/systems. The load limiting device or system must be designed such that when the/a component in the system fails, or deteriorates over time, the TLTV will revert to a state where it cannot impart damaging loads into the aircrafts landing gear. This can be accomplished by some form of built in test monitoring function, or by some periodic maintenance activity targeting dormant failure modes.

The load limiting system should be subject to a failure modes and effects analysis to identify components whose failure requires some form of continuous or periodic monitoring to maintain the integrity of the system.

To ensure that the tow vehicle does not negatively impact the certified safe life of the airplane nose landing gear, the tow vehicle must be qualified according to the requirements specified by the airframe manufacturer.

5.2 Speed

- a. An empty tow vehicle (without aircraft) should be capable of a minimum operational speed of at least 10 km/h (6 mph) or to meet customer's operational requirement.
- b. A loaded tow vehicle (with airplane) should be capable of a speed of at least 5 km/h (3 mph) for push-back operations and at least 12 km/h (8 mph) for maintenance towing operations or to meet customer's operational requirements but should not exceed airframe manufacturers' recommendation.