



AEROSPACE RECOMMENDED PRACTICE

ARP4853™

REV. D

Issued 1995-06
Revised 2018-09
Reaffirmed 2024-03

Superseding ARP4853C

(R) Design Specification for Towbarless Tow Vehicles

RATIONALE

Electric engines introduction announced, case of aircraft braking introduced and modification criteria adapted.

ARP4853D has been reaffirmed to comply with the SAE Five-Year Review policy.

FOREWORD

This SAE Aerospace Recommended Practice (ARP) describes the dimensions, design, layout, performance, and capability of a towbarless tow vehicle (TLTV).

Overall design of the unit is to allow operations under climatic conditions as stated under 5.1 and safe operations during day and night conditions on airport aprons, runways, taxiways, and in hangars.

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2024 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

Full document details: SAE ARP4853D

For more information on this standard, visit
<https://www.sae.org/standards/content/ARP4853D/>

Documents
Document Sharing Hub

TABLE OF CONTENTS

1.	SCOPE	4
1.1	One-Man Operation	4
1.2	Under-Belly Operation (if required)	4
1.3.1	Push-Back	4
1.3.2	Maintenance Towing	4
1.3.3	Dispatch Towing (or Operational Towing)	4
1.4	Aircraft Nose Gear Load	4
2.	APPLICABLE DOCUMENTS	5
2.1	SAE Publications	5
2.2	Related Publications	5
3.	DIMENSIONS (TYPICAL)	6
3.1	TLTV CAT I and CAT II	6
3.2	TLTV CAT III and CAT IV	6
3.3	General Requirement	7
4.	PERFORMANCE	7
4.2	Speed	7
4.3	Acceleration	7
4.4	Deceleration	7
4.5	Nose Gear Towing Forces	7
5.	DESIGN DETAILS	7
5.1	Diesel Engine	7
5.2	Electric Engine	8
5.4	Power Train	8
5.5	Wheels, Tires, Axles	8
5.6	Brakes	8
5.7	Steering	9
5.7.1	Steering Mode	9
5.7.3	External Turning Radius	9
5.7.5	Nose Gear Oversteer Indication and/or Protection	9
5.8	Electrical System	10
5.10	Tow Coupling (for recovery of tow vehicle)	10
5.11	Cab	10
5.12	Logic Connection of Driver's Seat and Driving Direction	11
5.12.3	Illumination	11
5.16	Monitoring and Alarm Circuits/Lights	12
5.17	Miscellaneous	12
5.18	Coupling System	12
6.	OPTIONS	13
6.2	Automatic Fire Extinguisher System	13
6.3	Airplane Communication	13
6.4	Air Conditioning	13
6.5	Snow Chains	13
6.6	Winterization Kit for Below -40 °C (-40 °F)	13
6.7	Additional Warning Flashers	13
6.8	Tinted Window Screens	13
6.9	Centralized Automatic Greasing System	13
6.10	Safety Belts for Driver and Co-Driver	13
6.11	Steering Angle Indication System	13
7.	SAFETY	14

8.	ENVIRONMENTAL	14
8.1	Weather Conditions.....	14
8.2	Area of Operation, Special Requirements	14
8.3	Noise	14
8.4	Electromagnetic Interference	14
9.	DESIGN AND CONSTRUCTION (ENGINEERING PRACTICE, LIFETIME, ETC.).....	15
10.	MODIFICATIONS.....	15
11.	SPECIAL TOOLS OR JIGS	15
12.	MAINTENANCE AND MAINTAINABILITY	15
13.	CALIBRATION, TESTING, AND CERTIFICATION	16
14.	DOCUMENTATION (MANUAL)	16
14.1	Training	16
15.	NOTES	16
15.1	Revision Indicator.....	16

1. SCOPE

The tow vehicle should be designed for towbarless movement of aircraft on the ground.

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

1.1 One-Man Operation

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

1.2 Under-Belly Operation (if required)

The coupling of the nose landing gear by the towbarless tow vehicle (TLTV) must be possible in all extensions of the nose strut of the aircraft in the vehicle's design category (see 1.4).

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

1.3.1 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.

1.3.2 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 vice versa). The airplane is typically unloaded.

1.3.3 Dispatch Towing (or Operational Towing)

Dispatch towing shall be defined as the towing of a loaded (cargo and/or passenger) revenue airplane from the terminal gate area/remote parking to a location near the runway. This type of towing can involve relatively high speeds and long distances with several starts, stops, and turns. Dispatch towing may not be approved by the airframe manufacturers (refer to airframe manufacturers TLTV assessment criteria and/or service letter).

1.4 Aircraft Nose Gear Load

The TLTV tow tractor should be designed for use with the following aircraft categories:

a. TLTV CAT I:

Aircraft with a maximum nose gear ground reaction load up to 19 metric tons (41900 pounds) static.

Dynamic loads must be calculated by the tow vehicle manufacturer.

b. TLTV CAT II:

Aircraft with a maximum nose gear ground reaction load up to 24 metric tons (52900 pounds) static.

Dynamic loads must be calculated by the tow vehicle manufacturer.

c. TLTV CAT III:

Aircraft with a maximum nose gear ground reaction load up to 36 metric tons (79400 pounds) static.

Dynamic loads must be calculated by the tow vehicle manufacturer.

d. TLTV CAT IV:

Aircraft with a maximum nose gear ground reaction load up to 48 metric tons (105800 pounds) static.

Dynamic loads must be calculated by the tow vehicle manufacturer.

2. 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.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

ARP1247	Aircraft Ground Support Equipment - General Requirements
ARP1328	Aircraft Ground Support Equipment - Wind Stability Determination
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
ARP5283	Nose Gear Towbarless Tow Vehicle Basic 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

2.2 Related Publications

ISO 20683-1, Aircraft ground equipment - Design, test and maintenance requirements for towbarless towing vehicles (TLTV) interfaced with nose landing gear - Part 1: Main line aircraft

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

ISO 11532, Aircraft ground equipment - Graphical symbols

IATA AHM 957, Functional Specification for Nose Gear Towbarless Tractor

Applicable airframe manufacturers service letters referring to towbarless towing

Federal occupational safety and health standards (OSHA), subpart N