



2008 Camry Cooling Fan

Cooling Systems Standards Committee



2008 Camry Cooling Fan:

Lemon-Aid New and Used Cars and Trucks 2007-2018 Phil Edmonston, 2018-02-03 Steers buyers through the the confusion and anxiety of new and used vehicle purchases like no other car and truck book on the market Dr Phil along with George Iny and the Editors of the Automobile Protection Association pull no punches **Popular Science**, 2007-05 Popular Science gives our readers the information and tools to improve their technology and their world The core belief that Popular Science and our readers share The future is going to be better and science and technology are the driving forces that will help make it better Engine Cooling Fan Structural Analysis Cooling Systems Standards Committee, 2012 Three levels of fan structural analysis are included in this practice 1Initial Structural Integrity 2In vehicle Testing 3Durability Test MethodsThe Initial Structural Integrity section describes analytical and test methods used to predict potential resonance and therefore possible fatigue accumulation The In vehicle or machine section enumerates the general procedure used to conduct a fan strain gage test Various considerations that may affect the outcome of strain gage data have been described for the user of this procedure to adapt discard depending on the particular application The Durability Test Methods section describes the detailed test procedures that may be used depending on type of fan equipment availability and end objective Each of the previous levels builds upon information derived from the previous level Engineering judgment is required as to the applicability of each level to a different vehicle environment or a new fan design This SAE Recommended Practice is applicable to medium and heavy duty trucks buses construction equipment industrial and agricultural equipment It does not necessarily include passenger cars and light trucks The usage of nonmetallic construction necessitates areas of evaluation not required by metallic designs Chief among these are temperature extremes moisture content impact resistance chemical attack material purity homogeneity and aging weathering Areas of evaluation affecting both metallic and nonmetallic fans but requiring somewhat different approaches with nonmetallic parts include natural frequency determination and durability testing The technical content of J1474 Heavy Duty Nonmetallic Engine Cooling Fans Material Manufacturing and Test Considerations has been incorporated so both metallic and nonmetallic fans are covered by this document Various spelling grammar and punctuation mistakes have been corrected *Test Method for Measuring Performance of Engine Cooling Fans* Cooling Systems Standards Committee, 2019 This SAE Recommended Practice is intended for use in testing and evaluating the approximate performance of engine driven cooling fans This performance would include flow pressure and power This flow and pressure information is used to estimate the engine cooling performance This power consumption is used to estimate net engine power per SAE J1349 The procedure also provides a general description of equipment necessary to measure the approximate fan performance The test conditions in the procedure generally will not match those of the installation for which cooling and fuel consumption information is desired The performance of a given fan depends on the geometric details of the installation including the shroud and its clearance These details should be duplicated in the test

setup if accurate performance measurement is expected The performance at a given air density and speed also depends on the volumetric flow rate or the pressure rise across the fan since these two parameters are mutually dependent These parameters depend on the pressure drop across the radiator core and the ram pressure due to vehicle motion For these reasons the test procedure should be recognized as providing only an approximate measure of installed fan performance Although the test procedure is based on running the fan with a motoring dynamometer the actual installation can be used as a test fixture if an accurate torque meter is available In this case the same qualifications discussed apply For the effect of a fan clutch in reducing fan use and power consumption which is not a part of this procedure refer to SAE J1342 Performance testing of electric cooling fan assemblies is covered in SAE J2867 This document has been updated to improve readability and clarity and Figure 1 moved to its appropriate section Heavy-Duty Nonmetallic Engine Cooling Fans--Material, Manufacturing, and Test Considerations Cooling Systems Standards Committee,2012 The following topics are included in this report Section 2 References Section 3 DefinitionsSection 4 Material SelectionSection 5 Production ConsiderationsSection 6 Initial Structural IntegritySection 7 In Vehicle TestingSection 8 Laboratory Testing The Material Selection section lists environmental factors and material properties which should be considered when determining appropriate fan material s for a given application The Production Considerations section covers various aspects of machine selection mold design and process control The Initial Structural Integrity section lists factors which should be considered in addition to those covered by Section 3 of SAE J1390 The In Vehicle Testing section lists factors which should be considered in addition to those covered by Section 4 of SAE J1390 The Laboratory Testing section addresses some test considerations and methods for nonmetallic fans which differ from those used with metallic fans or which were not included in Section 5 of SAE J1390 This document is cancelled because its technical content has been merged with that of SAE J1390 Engine Cooling Fan Structural Analysis **The Automotive Cooling-fan** A. D. Gardner,1932 *Cooling Fan Protection Circuit* Linda A. Grunden,1987 NOMENCLATURE - ENGINE COOLING FAN E-25 General Standards for Aerospace and Propulsion Systems,1945 *Engine Cooling Fan Installation* D. V. Mascall, *Laboratory Testing of Light Duty Vehicle Electric Cooling Fan Assemblies for Airflow Performance* Cooling Systems Standards Committee,2014 This SAE Recommended Practice is intended for use in testing and evaluating the performance of Light Duty automotive electric engine cooling fans These Electric Cooling Fan ECF Assemblies are purchased by Light Duty Truck and Passenger Car OEM s from suppliers They are purchased as complete assemblies consisting of the fan s motor s and shroud see Figure 1 this Recommended Practice will only consider such complete assemblies Some purchased assemblies using brush type motors may also include control devices such as power resistors or pulse width modulation PWM electronics for speed control In the case of brushless motor technology the controller is an integral part of the motor where it also performs the commutation process electronically The performance measurement would include fan output in terms of airflow and pressure and fan input electric

power in terms of voltage and current This information could then be used to calculate the efficiency of the assembly including aerodynamic efficiency of the fan and shroud and electrical efficiency of the motor The electric power consumption could be used to estimate vehicle energy as it relates to electrical charging system sizing and fuel economy The test conditions in the procedure generally will not always match those of the installation for which cooling electric energy consumption and fuel consumption information is desired The performance of a given fan depends on the installation details of the application including the effects of system resistance and geometry of the grille heat exchangers and underhood geometry of the engine and other underhood components These details should be duplicated in the test setup to the greatest extent possible if accurate performance measurement is expected Vehicle level airflow performance will also be affected by the bumper profile and any other shape that would influence how the airflow enters the grille Includes Fan Motor Shroud Stators Electrical Connector and Pressure Relief Flaps for High Vehicle Speed Applications This Recommended Practice is intended to describe a Standard method for measuring the performance characteristics of electric cooling fans ECF also known as electric motor fans or electric motor driven fans Today there is a wide range of conditions under which OEM s request and or ECF Suppliers measure and report performance This current condition results in unnecessary variation in the data and its interpretation making it difficult to use the data for vehicle performance prediction and even to accurately compare the performance of fans from different suppliers or even from the same supplier The major ECF suppliers support the concept of having an Industry Standard for Performance Measurement Electric Drive Cooling Fan Motor Mounting Society of Automotive Engineers,2010 **Engine Cooling Fan Structural Analysis** Society of Automotive Engineers,2012

Test Method for Determining Power Consumption of Engine Cooling Fan Drive Systems Cooling Systems Standards Committee,2017 The techniques outlined in this SAE Recommended Practice were developed as part of an overall program for determining and evaluating fuel consumption of heavy duty trucks and buses but it is applicable to off highway vehicles as well It is recommended that the specific operating conditions be carefully reviewed on the basis of actual installation data Cooling requirements are affected by all heat exchangers that are cooled by the fan drive system These may include radiators condensers charge air coolers oil coolers and others Because of the variation in size shape configuration and mountings available in cooling fans and fan drive systems specific test devices have not been included Using known power speed relationships for a given fan this procedure can be used to calculate the fan drive system s power consumption for engine cooling systems using fixed ratio viscous or speed modulating and mechanical on off fan drives including electronically activated fan drives This power consumption may then be used in determining engine net power per SAE J1349 For fan power speed relationships refer to SAE J1339 This document has been revised to show an additional method for determining power consumption of engine driven fan drive systems by looking at an alternative method for measuring in vehicle fan power Advanced Electrical Cooling Fan Control System T Fukusen, Motor Industry Research Association

(MIRA), Nuneaton (GB), 1989 *METHOD FOR DETERMINING POWER CONSUMPTION OF ENGINE COOLING FAN-DRIVE SYSTEMS* Cooling Systems Standards Committee, 1989 The technique outlined in this SAE Recommended Practice was developed as part of an overall program for determining and evaluating fuel consumption of heavy duty trucks and buses It is recommended that the specific operating conditions be carefully reviewed on the basis of actual installation data Cooling requirements are affected by all heat exchangers that are cooled by the fan drive system These may include radiators condensers charge air coolers or oil coolers Because of the variation in size shape configuration and mountings available in cooling fans and fan drive systems specific test devices have not been included Using known power speed relationships for a given fan this procedure can be used to calculate the fan drive systems power consumption for engine cooling systems using fixed ratio speed modulating and on off fan drives This power consumption may then be used in determining engine net power per SAE J1349 For fan power speed relationships refer to SAE J1339 TEST METHOD FOR MEASURING POWER CONSUMPTION OF ENGINE COOLING FANS Cooling Systems Standards Committee, 1989 This SAE Recommended Practice is intended for use in testing and evaluating the approximate power consumption of engine cooling fans This power consumption would then be used to estimate net engine power per SAE J1349 The procedure also provides a general description of equipment necessary to measure the approximate fan power consumption in a vehicle installation The test conditions in the procedure generally will not match those of the installation for which fuel consumption information is desired The power required by a given fan depends on the geometric details of the installation including the shroud and its clearance These details should be duplicated in the test setup if accurate power measurement is expected Required power at a given air density and speed also depend on the volumetric flow rate or else the pressure rise across the fan since these two parameters are mutually dependent These parameters depend on the pressure drop across the radiator core and the ram pressure due to vehicle motion Core drop and ram pressure tend to offset each other but can be expected to cancel one another at only one vehicle speed at most Tests run in the absence of the radiator core will not impose the proper pressure rise requirement on the fan Tests run with the radiator core in place will impose a greater pressure rise requirement on the fan than it will likely experience at high vehicle speeds when part of the rise will be provided by ram air For these reasons the test procedure should be recognized as providing only an approximate measure of installed fan power Although the test procedure is based on running the fan with a motoring dynamometer the actual installation can be used as a test fixture if an accurate torque meter is available In this case the same qualifications discussed apply Finally for the effect of a fan clutch in reducing fan use and power consumption which is not a part of this procedure refer to SAE J1342 **Experimental Stress Analysis of a Nylon Engine Cooling Fan** Society of Automotive Engineers, Inc., J. Pouder, 1985 **Electric Drive Cooling Fan Motor Mounting** Cooling Systems Standards Committee, 2016 This SAE Recommended Practice is applicable to Electric Drive Cooling Fan Assemblies used in Light Duty vehicle cooling systems typically passenger cars and light duty

trucks This document outlines the Electric Drive Cooling Fan Motor Mounting interface characteristics such that a common standard is possible Industry finds this recommended practice to be unnecessary and limiting to innovation

Model-based diagnosis of electronic cooling fan drive systems Michael Pagel, 2018 Kurzzusammenfassung Model based diagnosis of electric cooling fan drive systems is a contribution to the field of fault detection and diagnosis for electrically driven engine cooling fans Its main focus is on the online gathering and determination of important parameters and internal states The developed methods for fault detection and diagnosis are characterized by resource and computing efficient design and by a low application effort drastically reducing the costs for transferring them to other applications Novel algorithms are presented for determination of the winding resistance the flux linkage over angle and the equivalent series resistance Based on these algorithms a new and innovative approach for determination of the magnet temperature is proposed utilizing the winding temperature which is derived without requiring an additional temperature sensor Furthermore methods are presented for detection of a demagnetization event detection of an aged DC link capacitor and

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