



Designation: D8279 – 23a

Standard Test Method for Determination of Timing-Chain Wear in a Turbocharged, Direct-Injection, Spark-Ignition, Four-Cylinder Engine¹

This standard is issued under the fixed designation D8279; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Portions of this test method are written for use by laboratories that make use of ASTM Test Monitoring Center (TMC)² services (see [Annex A1](#) to [Annex A4](#)).

The TMC provides reference oils, and engineering and statistical services to laboratories that desire to produce test results that are statistically similar to those produced by laboratories previously calibrated by the TMC.

In general, the Test Purchaser decides if a calibrated test stand is to be used. Organizations such as the American Chemistry Council require that a laboratory utilize the TMC services as part of their test registration process. In addition, the American Petroleum Institute and the Gear Lubricant Review Committee of the Lubricant Review Institute (SAE International) require that a laboratory use the TMC services in seeking qualification of oils against their specifications.

The advantage of using the TMC services to calibrate test stands is that the test laboratory (and hence the Test Purchaser) has an assurance that the test stand was operating at the proper level of test severity. It should also be borne in mind that results obtained in a non-calibrated test stand may not be the same as those obtained in a test stand participating in the ASTM TMC services process.

Laboratories that choose not to use the TMC services may simply disregard these portions.

ASTM International policy is to encourage the development of test procedures based on generic equipment. It is recognized that there are occasions where critical/sole-source equipment has been approved by the technical committee (surveillance panel/task force) and is required by the test procedure. The technical committee that oversees the test procedure is encouraged to clearly identify if the part is considered critical in the test procedure. If a part is deemed to be critical, ASTM encourages alternative suppliers to be given the opportunity for consideration of supplying the critical part/component providing they meet the approval process set forth by the technical committee.

An alternative supplier can start the process by initiating contact with the technical committee (current chairs shown on ASTM TMC website). The supplier should advise on the details of the part that is intended to be supplied. The technical committee will review the request and determine feasibility of an alternative supplier for the requested replacement critical part. In the event that a replacement critical part has been identified and proven equivalent, the sole-source supplier footnote shall be removed from the test procedure.

1. Scope*

1.1 Undesirable timing-chain wear has been observed with gasoline, turbocharged, direct-injection (GTDI) engines in field service, and data from correlating laboratory engine tests have shown that chain wear can be affected by appropriately formulated engine lubricating. A laboratory engine test has been developed to provide a means for screening lubricating oils for that specific purpose. The laboratory engine test is 216 h in length, conducted under varying conditions, and the increase in timing-chain length determined at the end of test is

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.B0 on Automotive Lubricants.

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² Until the next revision of this test method, the ASTM Test Monitoring Center will update changes in the test method by means of information letters. Information letters may be obtained from the ASTM Test Monitoring Center, 203 Armstrong Drive, Freeport, PA 16229. Attention: Director. This edition incorporates revisions in all Information Letters through No. 23-2.

***A Summary of Changes section appears at the end of this standard**

the primary result. This test method is commonly known as the Sequence X, Chain Wear (CW) Test.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.2.1 *Exception*—Where there is no direct SI equivalent such as screw threads, national pipe threads/diameters, tubing size, or specified single source equipment.

1.3 Table of Contents:

	Section
Scope	1
Referenced Documents	2
Terminology	3
Summary of Test Method	4
Significance and Use	5
Apparatus	6
Test Engine	6.1
Reagents and Materials	7
Preparation of Apparatus	8
Timing-chain Preparation, Installation, and Measurement	8.20
Test Stand Installation	8.21
Electronic Throttle Controller	8.21.17
Temperature Measurement	8.23
Pressure Measurement	8.24
Flowrate Measurement	8.25
Blowby Flowrate	8.26
Stand Calibration	9
Test Procedure	10
Pre-Test Procedure and Engine Break-In	10.1
Engine Start-up Procedures	10.2
Test Sequence	10.3
Engine Shutdown Procedures	10.4
Blowby Flowrate Measurement	10.5
Parameter Logging	10.6
Oil Consumption Calculation	10.7
General Maintenance	10.8
Special Maintenance Procedures	10.9
Blowby Flowrate Adjustment	10.10
Diagnostic Data Review	11
Test Results	12
Report	13
Precision and Bias	14
Keywords	15
ANNEXES	
ASTM TMC Organization	Annex A1
ASTM TMC: Calibration Procedures	Annex A2
ASTM TMC: Maintenance Activities	Annex A3
ASTM TMC: Related Information	Annex A4
Engine and Stand Parts	Annex A5
Safety Precautions	Annex A6
Engine Rebuild Templates	Annex A7
Engine Build Records	Annex A8
Cylinder Head Build	A8.1
Cylinder Bore Measurement	A8.2
Bearing Journal Measurements	A8.3
Engine Part Photographs, Schematics and Figures	Annex A9
Control and Data Acquisition Requirements	Annex A10
Dipstick Oil Level to Charge Conversions	Annex A11
Sequence X Report Forms and Data Acquisition	Annex A12
APPENDICES	
Sources of Materials and Information	Appendix X1
Suggested Designs for Engine Fixing Brackets	Appendix X2

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:³

- D235** Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
- D445** Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- D664** Test Method for Acid Number of Petroleum Products by Potentiometric Titration
- D4485** Specification for Performance of Active API Service Category Engine Oils
- D4175** Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- D4739** Test Method for Base Number Determination by Potentiometric Hydrochloric Acid Titration
- D5185** Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)
- D5967** Test Method for Evaluation of Diesel Engine Oils in T-8 Diesel Engine
- D6304** Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration
- D6593** Test Method for Evaluation of Automotive Engine Oils for Inhibition of Deposit Formation in a Spark-Ignition Internal Combustion Engine Fueled with Gasoline and Operated Under Low-Temperature, Light-Duty Conditions
- D8047** Test Method for Evaluation of Engine Oil Aeration Resistance in a Caterpillar C13 Direct-Injected Turbocharged Automotive Diesel Engine
- D8291** Test Method for Evaluation of Performance of Automotive Engine Oils in the Mitigation of Low-Speed, Preignition in the Sequence IX Gasoline Turbocharged Direct-Injection, Spark-Ignition Engine

2.2 American National Standards Institute Standard:

- ANSI MC96.1** Temperature Measurement – Thermocouples⁴

2.3 Other Document:

- 2012 Ford Explorer 2.0 L-4V TiVCT GTDi Build Manual⁵**

3. Terminology

3.1 Definitions:

- 3.1.1 *blowby, n*—in internal combustion engines, the combustion products and unburned air-and-fuel mixture that enter the crankcase. **D4175**

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from Helminc, <https://www.helminc.com/helm/homepage.asp>.