AMERICAN CHEMISTRY COUNCIL
PETROLEUM ADDITIVES
PRODUCT APPROVAL
CODE OF PRACTICE

January 2018

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American Chemistry Council Petroleum Additives Product Approval Code of Practice

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American Chemistry Council

Petroleum Additives

Product Approval Code of Practice[1]

Purpose

This Code of Practice will help ensure that a particular engine lubricant meets its performance specifications. This will be accomplished through the use of specified engine tests, procedures, and record-keeping.

Implementation of this Code in engine testing will provide more accurate performance results, thereby yielding more cost-effective engine testing - a mutual benefit both to lubricant formulators and their customers. In addition, communications between sponsors and customers will be improved because standard practices are described in detail.

This Code represents the best efforts of the American Chemistry Council (ACC) Petroleum Additives Panel to develop a Code of Practice for Product Approval. It is intended that adherence to this Code will result in continuous improvement in accuracy and precision of all engine tests covered by the Code. The Code will be updated on an ongoing basis.

Compliance with the Code is voluntary and is not restricted to ACC member companies. For a company to achieve and maintain compliance, that company must conduct ***all*** candidate oil engine tests and programs on a worldwide basis in accordance with practices specified by the Code, for tests listed within the Code (see Appendix A).

Definition of Terms

Key terms are defined in the Glossary, which should be consulted for assistance in interpreting provisions of this Code.

Practices

1. All engine testing for product approval must be conducted using only equipment and facilities in compliance with monitoring and calibration requirements of the ASTM Test Monitoring Center (TMC) and meeting the requirements for engine test stand/laboratory calibration in Appendix A.

2. Testing of a candidate in a particular test type can only commence following proper scheduling and registration (see Appendix B) of that test with the ACC Monitoring Agency (see Appendix C).

3. Test laboratory is at the choice of the sponsor. However, no pre-selection of test

[1] This Code of Practice was not developed as a Code under the American Chemistry Council RESPONSIBLE CARE® initiative, and is separate and distinct from that initiative.

stands is allowed and all calibrated test stands within a laboratory, meeting Appendix A requirements,are to be made available for all candidate submissions. Test stand assignment is as defined in Appendix D.

4. Final test results of a candidate will utilize current - time test severity adjustments (±) in accordance with Appendix A. Severity adjustments are to be included in the test report.

5. The test laboratory will supply the results of all tests initiated by registration simultaneously: i) to the ACC Monitoring Agency for inclusion in the data base, and ii) to the sponsor for inclusion in the Candidate Data Package as specified in Appendix E. All test results must be supplied for any program run under the Code. The data will be entered into the ACC Monitoring Agency data base.

6. All chemical & physical tests are to be conducted in laboratories current in participation in the ASTM D.02 Interlaboratory Crosscheck Program for the particular tests.

7. Conformance to passing limits in a specific engine test will be determined using Multiple Test Evaluation Procedures (MTEP) in Appendix F. Only engine tests meeting ASTM test guidelines and ACC guidelines for operational validity in Appendix G are to be considered. All valid tests are to be considered for MTEP, except as specified in Appendix E.

8. If questions arise as to the validity of a specific test or test result, the test laboratory or test sponsor may seek an opinion and/or industry test severity and precision information from the ACC Monitoring Agency (see Appendix E). Such opinions and/or information shall be included in the Candidate Data Package.

9. Minor formulation modifications are permissible during development of the Core Data Set (see Appendix H). All such modifications and support data will be disclosed to the customer and included in the Candidate Data Package.

10. Programs will be conducted in accord with Program Guidelines (see Appendix I). These guidelines and those for minor formulation modifications may be combined with applicable API guidelines within API Publication 1509. Use of the Program Guidelines will be disclosed to the customer and support data will be included in the Candidate Data Package.

11. Compliance with the Code will be determined by annual review by an independent auditor (see Appendix J). A Self-Evaluation Checklist prepared by the company and endorsed by the auditor will be submitted to ACC annually as part of complying with the Code.

12. A decision to accept tests into the Code will be made following joint efforts by the test developer, the ACC Technical Advisory Group and any third parties, as appropriate, which target bringing the test into compliance with the Template for Acceptance of New Tests (see Appendix K). If the engine test is to be used as part of a category, a demonstration oil is necessary to establish the performance limits of the tests comprising the category. Such an oil must meet the performance limits of each of the tests within the category.

Process Evaluation

Implementation of the Code is a quality process. Evaluation of implementation of the Code will proceed via annual review. As indicated in the Purpose, the Code will be updated on an ongoing basis. Recommended enhancements should be forwarded to the Manager, Petroleum Additives Product Approval Protocol Task Group (PAPTG), American Chemistry Council, 700 Second Street, NE, Washington, DC 20002.

AMERICAN CHEMISTRY COUNCIL
PRODUCT APPROVAL
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APPENDIX A

Requirements for Engine Test Stand/Laboratory Calibration

APPENDIX A

REQUIREMENTS FOR ENGINE TEST STAND/ LABORATORY CALIBRATION

Introduction

The engine test stand/laboratory calibration requirements, which are monitored and benchmarked by American Chemistry Council (ACC), consist of state-of-the-art calibration methodologies to manage test precision and severity. The ACC requirements are supplementary to ASTM Test Monitoring Center (TMC) test stand and test laboratory requirements, i.e., TMC calibration is a prerequisite for Code practice.

Purpose

This Appendix provides the minimum calibration requirements for engine test stands and laboratories that must be met in order for candidate testing to commence under the Code.

Discussion

Details on the calibration requirements are provided in the ASTM Lubricant Test Monitoring System (LTMS) Manual defined in ASTM Test Monitoring Center Technical Memorandum 94-200. This manual *must* be adhered to for the purposes of ACC calibration. The manual may be obtained from the ASTM TMC at the following address:

ASTM Test Monitoring Center, 6555 Penn Avenue, Pittsburgh, PA 15206-4489 (phone) 412/365-1000, (fax) 412/365-1047

When the use of the LTMS is called for, there is a potential need for the application of engineering judgment. The process for acceptance of such engineering judgment is included as Addendum A1, in this Appendix.

The requirements for the engine test types currently covered by the Code are defined by test type as:

Sequences IIIF, IIIFHD, IIIFVS, IIIG, IIIGA, IIIGB, IIIGVS, IIIH, IIIHA, IIIHB, IIIH60, IIIH70, IVA, IVB, VG, VH, VID, VIE, VIF, VIII, IX, X; Caterpillar 1K, 1M-PC, 1N, 1P, 1R, C13, Caterpillar engine Oil Aeration Test (COAT); Mack T-8, T-8E, T-11, T-12; RFWT; Cummins ISB, ISM and Volvo T-13.

In the event that there are any questions relating to this Appendix, or the fulfillment of the requirements for engine test stand and laboratory calibration for candidate testing under the Code, please contact the American Chemistry Council Monitoring Agency (ACC MA). ACC MA contact information is located on the cover page of Appendix C of the ACC Code of Practice.

ADDENDUM A1

PROCESS FOR ACCEPTANCE OF ENGINEERING JUDGMENT

Engineering Judgment of Control Chart Process

The Lubricant Test Monitoring System (LTMS) control charts should be viewed as a tool used to monitor and interpret the stand/lab/industry calibration process. Failure of a calibration test on a reference oil to meet control chart limits can sometimes be indicative of a false alarm or may wrongly attribute the cause. In other cases, a real problem can exist and LTMS charts do not trigger alarms.

When this occurs, engineering judgment is exercised to determine whether actions other than those specified by the LTMS should be taken. Alarms may likely be triggered by required changes in hardware, fuels or procedures; or by the resolution of laboratory or industry problems.

Review of Engineering Judgment of Control Chart Process

The TMC notifies the ACC Monitoring Agency when it determines that the application of engineering judgment in the interpretation of control charts is appropriate, and reaches a preliminary decision on such application. The program manager of the ACC Monitoring Agency will determine if the application of specific engineering judgment falls within the intent of the Code. The ACC Monitoring Agency program manager may elect to use resources from a mix of individuals with an in-depth knowledge of the Code, the ASTM test methodology and a full understanding of the development and application of the LTMS charts, if applicable.

The program manager will target to close the review and express an opinion to the TMC within one week of notification.

Disseminating Information

The program manager of the ACC Monitoring Agency will maintain a file of engineering judgment actions and report these actions to the ACC Monitoring Agency Advisory Group (MAAG) on a yearly basis. The program manager will also advise MAAG of any disagreement on the application of engineering judgment. MAAG is responsible for communicating this discrepancy to the Product Approval Protocol Task Group (PAPTG).

AMERICAN CHEMISTRY COUNCIL
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APPENDIX B

Candidate Scheduling,
Registration and Tracking Procedure

APPENDIX B

CANDIDATE SCHEDULING, REGISTRATION AND TRACKING PROCEDURE

Introduction and Purpose

Central to the Code is the requirement for a complete and independent record of engine testing for every candidate engine oil formulation[2]. Such a record provides verification of candidate testing relative to customer or industry standards, enables and ensures entry of all candidate test results into the industry candidate data base and serves as a basis for the sponsor's annual external audit as required by the Code.

The Candidate Test Scheduling, Registration and Tracking Procedure described in this Appendix, defines the steps in establishing the testing record for a candidate oil with respect to a single engine test[3]. It is a procedure that involves coordination among several parties- the test sponsor, the test laboratory, and the American Chemistry Council (ACC) Monitoring Agency. Many of the Code practices defined in other Appendices are critically dependent on successful execution of this procedure.

Scheduling and Registration Procedure

Scheduling, registering and test cancellation is done via the ACC-MA website: acc-ma.org. To use the scheduling and registering features of the website users must create a user id and password. This can be done by selecting either Lab or Sponsor Tools → User Account. The ACC-MA will then contact you when you have been assigned a Sponsor ID.

1. The Test Sponsor completes Part A of the Registration Form via the website (Sponsor Tools → Schedule) and submits it to the Test Laboratory and the ACC Monitoring Agency.

2. The Test Laboratory completes Part B of the Form via the website (Laboratory Tools → View Requests) and submits it to the ACC Monitoring Agency. The test stand assignment must be in accordance with Appendix D. Each test is registered with a separate registration form.

3. The test may be started at any time after registration, which is established by a-two verifiable application dates in Part C of the Form. The start of an engine test is defined as when the oil is poured into the crankcase of a calibrated engine.

4. If a test is cancelled, either after scheduling and prior to registration, or after registration and prior to start, an ACC Product Approval Code of Practice Cancellation Form is submitted from the website via (Sponsor Tools → View Schedulings). The Test Laboratory is then automatically notified via email of the cancellation and the laboratory test record is displayed on the ACC Monitoring Agency website. A test is considered cancelled only when a scheduled oil misses its spot in a test queue or is removed from a test queue.

[2] This requirement applies only to engine tests included in the Code.

[3] Only those tests included in the Code may be scheduled and registered. Specific exceptions to this policy are covered in Tab 5, Procedural Information, II. Scheduling and Registration of Demonstration Oils and New Engine Tests.

5. At the completion of the test, results and the Test Laboratory Conformance Statement are submitted to the Test Sponsor and to the ACC Monitoring Agency. The test results and conformance statement make up the standardized report packet available from the ASTM Test Monitoring Center website: www.astmtmc.cmu.edu

6. Registration Code information and Test Data are available only through the Test Sponsor.

Test Registration Form Instructions

The Test Registration Form is designed to facilitate the registration and reporting process. It is intended to take advantage of current communications technology by allowing each participant in the process to make required entries via the ACC-MA website. There is one form (Registration Form) consisting of three parts (Part A, B and C):

Registration Form

This form provides the specific information required by the Code scheduling and registration procedure of the Test Sponsor and Test Laboratory.

Part A: Test Sponsor Information

1. **SPONSOR**: The name of the Test Sponsor.

2. **CONTACT**: The name, address, phone, e-mail address and fax number of the appropriate Point of Contact at the Test Sponsor.

3. **DATE**: The date the test request is transmitted to the laboratory.

4. **FORMULATION CODE**: The code used to identify the candidate formulation, following the standard industry practice shown below and detailed later in this Appendix:

   Sponsor ID - Sponsor Code - Mod. - Blend - Test - Count - Lab

   The Formulation Code is used to schedule and register all tests, modifications and blends. The Sponsor ID, Sponsor Code, Modification, and Blend Number portion of this formulation number are used to identify the candidate oils at the Test Laboratory.

   a) ***VISCOSITY***: SAE J300 Engine Oil Viscosity Classification.

   b) ***SPONSOR IN-HOUSE NUMBER***: Space for the Test Sponsor to insert desired in- house code. Entry is optional.

   c) ***Expected NOACK Volatility*** **>** 15: To be check by the Test Sponsor for Sequence IIIF tests only.

5. **TEST**: The engine test desired on the candidate.

6. **TEST LABORATORY**: The name of the test laboratory.

Part B: Test Laboratory Information

1. **LAB CONTACT**: The name, address, e-mail address, phone and fax number of the appropriate point of contact at the laboratory.

2. **FORMULATION/STAND CODE**: The Formulation Code in Part A, Item 4 with the assigned stand code added.

   Sponsor ID - Sponsor Code - Mod. - Blend - Test - Count - Lab - Stand

   The Test Laboratory will include the entire Formulation/Stand Code on all test reports.

3. **FORMULATION (CODING)**
   Sponsor ID - Sponsor Code - Modification - Blend - Test - Count - Lab - Stand

   a) **ID**: A two letter permanent code chosen by the Test Sponsor and registered with the ACC Monitoring Agency.

   b) **Sponsor Code**: An up-to-ten character alphanumeric field assigned by the Test Sponsor to facilitate tracking and auditing. Dashes, slashes and special characters, etc. are not permitted. The Test Sponsor inserts this code.

   c) **Modification**: A one or two letter code used to designate minor modification of a formulation. Available coding would encompass modifications A through ZZ. The Test Sponsor inserts this code.

   d) **Blend**: A one or two digit number code used to designate the blend batch of the candidate. 1 = first batch, 2 = second batch, 10= tenth batch, etc., and would encompass blends 1 through 99. The Test Sponsor inserts this code.

   e) **Test**: An up-to-eight character code used to designate the type of test run.

PC		HD	
Test	**Code**	**Test**	**Code**
Sequence IIIF	IIIF	Caterpillar 1N	1N
Sequence IIIFVS	IIIFVS	Caterpillar 1M-	1MPC
Sequence IIIG	IIIG	PC Caterpillar	1K
Sequence IIIGVS	IIIGVS	1K Caterpillar	1P
Sequence IIIGA	IIIGA	1P Caterpillar	1R
Sequence IIIGB	IIIGB	1R Caterpillar	C13
Sequence IIIH	IIIH	C13 Mack T-8	T8
Sequence IIIHA	IIIHA	Mack T-8E	T8E
Sequence IIIHB	IIIHB	Mack T-11	T11
Sequence IIIH60	IIIH60	Mack T-12	T12
Sequence IIIH70	IIIH70	Cummins ISB	ISB
Sequence IVA	IVA	Cummins ISM	ISM
Sequence IVB	IVB	RFWT	65L
Sequence VG	VG	Sequence IIIFHD	IIIFHD
Sequence VH	VH	CAT Oil Aeration	COAT
Sequence VID	VID	Volvo T-13	T13
Sequence VIE	VIE		
Sequence VIF	VIF		
Sequence VIII	VIII		
Sequence IX	IX		
Sequence X	X		

This code is permanent for each test type and is assigned by the ACC Monitoring Agency. The Test Sponsor inserts this code.

f) **Count**: An up-to-two digit number code used to designate the number of times Part A of the Registration Form for the candidate, as identified by "Sponsor ID", "Sponsor Code" and "Mod", has been submitted to a test laboratory within a designated "test type". 1 = the first test submitted to any test laboratory for a given Sponsor ID and Sponsor Code, 2 = the second test submitted to any test laboratory for the same Sponsor ID and Sponsor Code, etc. The count number shall be reset with each minor formulation modification. The Test Sponsor inserts this code.

g) **Lab**: A two letter code used to identify the test laboratory at which the test is conducted. This code is unique and permanent for each test laboratory and is the same as the code used by the ASTM TMC for the test laboratory. The Test Sponsor inserts this code.

h) **Stand**: An up-to-five alphanumeric code which identifies the test stand in which the candidate will be tested. The stand is selected by the test laboratory in accordance with Appendix D. The laboratory provides this code in Part B of the Registration Form.

Use of the Code is encouraged. Any party interested in sponsoring tests under the Code may do so by requesting a Test Sponsor ID from the ACC Monitoring Agency by telephone or letter.

(Coding) Clarifications: Modifications are noted in accordance with the Guidelines for Minor Formulation Modifications defined in Appendix H. When a modification is made in accordance with Appendix H, the modification letter in this space is changed to another letter (see Example B-1).

Example B-1*
The following table is an example in which the Test Sponsor chooses to run the Sequence IIIF test first, demonstrates these principles:

Step	Activity	Mod.	Blend	Test	Count
1	Testing starts	A	1	IIIF	1
2	Repeat test, same blend as Steps 1 and 2	A	1	IIIF	2
3	Minor Mod. on oil from Steps 1 and 2	B	1	IIIF	1
4	Repeat test, same blend as Step 3	B	1	IIIF	2
5	Reblend oil from Steps 3 and 4, repeat test	B	2	IIIF	3
6	New test type on same blend as Step 5	B	2	VG	1
7	Reblend oil from Steps 5 and 6, repeat test	B	3	VG	2

*Examples and Illustrations in the ACC Code of Practice are designed to assist in the interpretation of various elements and guidelines in the Code of Practice. They are not meant to be comprehensive in that they do not define the guidelines and exist to clarify the elements or guidelines not to limit them to the circumstances shown in the example or illustration.

Test Sponsor ID: The following codes have been requested by and permanently assigned for exclusive use by the test sponsors in the ACC Code of Practice registration process:

AA - American Automobile Manufacturers Association
AD - BP Chemicals (Additives) Ltd-ADIBIS
AP - American Petroleum Institute
AQ - Amaco Petroleum Additives Company
BL - BestLine International Research, Inc.
CA - Lubricants UK Ltd.
CG - BASF Corporation
CI - Lubricants UK Ltd.
CL - Conoco, Inc.
DB - E.I. Dupont De Nemours& Company
EC - Paramins, Exxon Chemical Company
EL - Shell Oil Products Company
EM - ExxonMobil Research& Engineering
ER - Exxon Company International
ES - Elevance Renewable Sciences
EU - Eni S,p.A.
FG - FUCHS Petrolub AG
FM - Ford Motor Company
FR - Fina Research S.A.
GE - Green EarthTechnologies, Inc.
GW - Sinopec Lubricant Co., LTD
GR - Worldwide Petromoly Corporation
HR - Honda R&D Americas, Inc.
IK - Idemitsu Kosan CO., LTD
IM - Infineum
IN - Intevep, S.A.
JL - Jimioil Ltd.
KP - Kuwait Petroleum Research and Technology B.V.
LE - Elf Lubrifiants
LB - Afton Chemical Corporation
LU - LUKOIL Lubricants Company
LX - Petro-Canada Products Lubricants Department
MC - Mobil Chemical Company
MI - Material Innovations, Inc.
ML - MOL-LUB Ltd.
NC - Nippon Cooper Company- Japan
NM - Natoil GmbH & Co. KG
NO - Nippon Oil (U.S.A.) Ltd.
OR - Chevron Oronite Company LLC
PA - RohMax USA
PC - Lanzhou Lube Oil R&D Institute of Petrochina
PD - PetroChina Dalian Lube Oil R&D Institute
PP - Peaks and Praires LLC
PX - Permatex, Inc.
PZ - Pennzoil Products Company
QM - Quantum Marketing, Inc.
RM - The Lubrizol Corporation
SA - Shell International Chemical Company, Additives
SC - Shell Chemical Company
SR - Shell Global Solutions
TC - Tiahne Chemicals Additive Division

TE - Test Engineering, Inc.
TO - Total Lubrifiants
TS - ChevronTexaco Technology Ghent
VL - The Valvoline Company
VP - RohMax GmbH

Laboratory Sponsor ID: The following codes have been requested by and permanently assigned for exclusive use by the test sponsors in the ACC Code of Practice registration process:

EV - Afton Chemical Corporation
AS - Ashland Petroleum Company
MB - ExxonMobil Research & Engineering
EG - Intertek Automotive Research
IJ - I.S.P. France
LZ - The Lubrizol Corporation - Wickliffe Laboratory
OT - Chevron Oronite Technology b.v.
SR - Southwest Research Institute

4. **TEST NUMBER**: The test report number assigned by the test laboratory.

5. **ESTIMATED STARTING DATE**: The date the laboratory plans to start the test.

Part C: Monitoring Agency Information

1. **DATE AND TIME RECEIVED**: The date and time the form is received by the ACC Monitoring Agency through the web, or alternatively by a fax machine.

AMERICAN CHEMISTRY COUNCIL (ACC)
PRODUCT APPROVAL CODE OF PRACTICE
Engine Test Registration Form

Registration Key:

Part A – Test Sponsor			
Test Sponsor:	Contact:		
Address:			
City:	State/Province:		
Country:	Postal Code:		
Phone Number:	Fax Number:		
Email:	Date:	Time*:	
Test Laboratory:	Test Type:		
Formulation Stand Code:			
SAE Viscosity Grade:	Sponsor In-House Number:		
Expected NOACK Volatility > 15%: (Only for Sequence IIIF)			

Part B – Laboratory Information			
Test Lab:	Contact:		
Address:			
City:	State/Province:		
Country:	Postal Code:		
Phone Number:	Fax Number:		
Email:	Date:	Time*:	
Test Number:	Stand Number:		
Test Type:	Estimated Start Date:		
Formulation Stand Code:			
Prepared By:			

Part C – ACC Monitoring Agency	
Part A Date Received:	Time Received*:
Part B Date Received:	Time Received*:

Print this page and retain for your records – If anything is in error please notify the ACC MA immediately.
This test lab and ACC MA will notify you via email upon successful scheduling of request.

** All times listed are US Eastern Time Zone.*

AMERICAN CHEMISTRY COUNCIL (ACC)
PRODUCT APPROVAL CODE OF PRACTICE
Sponsor Cancellation Form

Registration Key:

Test Sponsor Information		
Test Sponsor:	Contact:	
Address:		
City:	State/Province:	
Country:	Postal Code:	
Phone Number:	Fax Number:	
Email:	Part A Date:	Part A Time*:
Formulation Stand Code:		
Reason For Cancellation:		

Laboratory Information		
Test Lab:	Contact:	
Address:		
City:	State/Province:	
Country:	Postal Code:	
Phone Number:	Fax Number:	
Email:	Part B Date:	Part B Time*:
Test Number:	Stand Number:	
Test Type:	Estimated Start Date:	
Formulation Stand Code:		

ACC Monitoring Agency	
Cancellation Date Received:	Time Received*:

Print this page and retain for your records – If anything is in error please notify the ACC-MA immediately.
The ACC-MA will notify you via email upon receiving the request.
** All times listed are US Eastern Time Zone.*

SAMPLE
AMERICAN CHEMISTRY COUNCIL (ACC)
PRODUCT APPROVAL CODE OF PRACTICE
Correction of Error Form

Registration Key:

Current Schedule/Registration Information as of :	
Sponsor:	Sponsor Contact:
Sponsor Phone Number:	Sponsor Email:
Lab:	Lab Contact:
Lab Phone Number:	Lab Fax Number:
Test Current Status:	Test Type:
Test Number:	Stand:
Estimated Start Date:	Lab Email:
Formulation Stand Code:	

Part B Corrected Information: **This form is not to be used for formulation cancellations or substitutions**	
Item	Parameter/Corrected Value

Revised Formulation Stand Code:	
Correction Company:	
Correction Contact:	
Correction Date:	**Correction Time*:**
Correction Reason:	

** All times listed are US Eastern Time Zone.*

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APPENDIX C

American Chemistry Council
Monitoring Agency

ASTM TMC
6555 Penn Avenue
Pittsburgh, PA
(412) 365-1000 Phone
(412) 365-1027 Fax
EDT Address: https://acc-ma.org

APPENDIX C

AMERICAN CHEMISTRY COUNCIL MONITORING AGENCY

Introduction

The mission of the American Chemistry Council (ACC) Monitoring Agency is to act as an impartial organization providing to the industry oversight, administrative and advisory services related to candidate engine testing in accordance with the Code.

Purpose

The ACC Monitoring Agency was created to perform many of the administrative functions specified in the Code. The scheduling and registration of engine tests and the recording of engine test results by the ACC Monitoring Agency help ensure that sponsors are aware of all engine test results on their formulations while protecting the proprietary nature of the data. In addition, the ACC Monitoring Agency utilizes the candidate data base to inform the industry of engine test severity and precision trends. Procedures for information requests are detailed in Tab 5.

Responsibilities and Functions

Responsibilities and functions of the ACC Monitoring Agency are listed below. Detailed procedures and underlying concepts, both of which are the intended focus of the Agency's activities, are included throughout the Code and its appendices.

Specific ACC Monitoring Agency responsibilities and functions shall include, but not be limited to, the following:

1. Establish and maintain communications and data management systems for scheduling, registration and cataloguing of candidate tests;

2. Register all candidate engine tests;

3. Establish and maintain a secure data management system to contain results of engine tests on candidates;

4. Receive and record results for all candidate engine tests;

5. Use the data base systems to generate reports confirming all tests scheduled, their disposition and test results (Such reports are to be provided upon request to the test sponsor or his designee in accordance with Appendices E and J);

6. Use the data base systems to:
   a) Proactively monitor candidate test data for all engine tests covered by the Code;
   b) Provide, upon request, appropriate candidate data analyses for identification and resolution of test precision and severity problems (See Tab 5, Section I. Requesting ACC Monitoring Agency Analyses and Opinions, Item 3); and
   c) Provide, upon request, industry test severity and precision information data base analyses relative to the validity and interpretability of specific test results (Ibid, Item 2).

7. Provide, upon request, impartial expert advice and guidance on interpretations of the Code related to test stand selection procedures, test scheduling and registration, and reporting;

8. Provide impartial expert opinions on operational validity of engine tests when requested by the test laboratory, test sponsor or his designee (Ibid, Item 1); and

9. Maintain appropriate communications with:

   a) The ASTM TMC to remain current with regard to the calibration oil system, the calibration process and the application of engineering judgment; and

   b) The ASTM Surveillance Panels to remain knowledgeable with regard to current issues.

AMERICAN CHEMISTRY COUNCIL
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APPENDIX D

Engine Test Stand Selection

APPENDIX D

ENGINE TEST STAND SELECTION

Introduction

The engine test stand shall be selected by testing laboratory personnel on a next-available-stand basis, in accordance with the requirements described herein. The engine test shall be registered with the American Chemistry Council (ACC) Monitoring Agency before the test sponsor is notified of the test stand selection.

Purpose

The criteria employed for engine stand selection are designed to maximize the distribution of a sponsor's tests across all available calibrated engine test stands in a laboratory while creating a minimum of test scheduling efficiency loss. Furthermore, since all test stands in a laboratory will be used more or less equally, there is incentive to assure that all test stands are operating at the same severity level.

Candidate Tests

A candidate is to be tested in the next available calibrated engine test stand that meets the criteria outlined in this appendix following the decision below.

- For the first engine test on a candidate in a given laboratory, the candidate is assigned to the next available test stand in which the number of the sponsor's runs in the last 180 days, including the test to be scheduled, does not exceed the number determined in the Table on page D5 of this appendix. For numbers not given in the Table, the equation given in the footnote of the Table should be used.

- For repeat tests on a candidate in a given laboratory, the candidate is assigned to the next available test stand in which the candidate has not been previously tested or has been tested the fewest number of times, and in which the number of the test sponsor's tests in the last 180 days, including the test to be scheduled, does not exceed the number determined in the Table on page D5.

- For repeat tests on a candidate in a given laboratory, if, as determined above, the next available test stand has tested the candidate oil more times than another referenced stand, the candidate test must wait for the first available stand in which the candidate has been tested fewer times (without application of the criterion in the Table on page D5), unless the wait for that stand will exceed the lesser of 4 calendar days (96 hours) or 75 % of the standard test length.

Any specific questions or problems regarding engine test stand selection should be referred to the ACC Monitoring Agency.

The test sponsor has the option of substituting for or canceling test candidates up to the start of the test. The laboratory will report all such changes to the ACC Monitoring Agency, along with the reason for the change, before testing is started. Operationally invalid tests, whether terminated prior to completion or completed, are not counted as candidate tests for engine test stand selection criteria, and are not included in the MTEP calculations. However, they must be reported to the ACC Monitoring Agency with documentation for declaring them operationally invalid.

Matrix or Research Tests

Matrix or research tests can be conducted in calibrated engine test stands without registering with the ACC Monitoring Agency, but such tests cannot be considered candidate runs. A single research or matrix program can be conducted in one or more designated engine test stands, but subsequent unrelated programs must be conducted in a different stand or set of engine test stands. This ensures that all engine test stands will be used for candidate testing. When matrix or research testing is conducted in calibrated engine test stands, the time-weighted average of the calibrated engine test stands available for candidate testing for use in the Table can be reduced to reflect the unavailability of the engine test stands involved in matrix or research testing.

A worksheet is provided on pages D3 and D4 of this appendix to lead the test scheduler through the calculations necessary to adhere to the requirements of engine test stand scheduling.

WORKSHEET FOR CALCULATING THE MAXIMUM NUMBER OF A SPONSOR'S CANDIDATE RUNS THAT CAN BE MADE IN A SINGLE TEST STAND

CALCULATION OF THE TIME-WEIGHTED AVERAGE NUMBER OF TEST STANDS AVAILABLE FOR THE 180 DAY PERIOD:

Number of test stands calibrated for entire previous 180 day period = ( )

Time average number of test stands calibrated for less than the entire previous 180 day period: = ( )

		Number of Days Stand Was Calibrated	
1st Std.	1x	( )	/180 =( )
2nd Std.	1x	( )	/180 =( )
3rd Std.	1x	( )	/180 =( )
4th Std.	1x	( )	/180 =( )
5th Std.	1x	( )	/180 =( )
6th Std.	1x	( )	/180 =( )

Total = ( ) = ( ) Add

Total time-weighted number of calibrated engine test stands used for research matrix work during the previous 180 day period:

		Number of Days Stand Was Used for Matrix	
1st Std.	1x	( )	/180 = ( )
2nd Std.	1x	( )	/180 = ( )
3rd Std.	1x	( )	/180 = ( )
4th Std.	1x	( )	/180 = ( )
5th Std.	1x	( )	/180 = ( )
6th Std.	1x	( )	/180 =( )

Total = ( ) = ( ) Subtract

Total Time-Weighted Average Number of Test Stands Available = ( )*

ACTUAL NUMBER OF ASTM TEST MONITORING CENTER-CALIBRATED TEST STANDS IN THE LAB AT THIS POINT IN TIME: = ( )*

AVAILABLE STANDS NUMBER:

AVAILABLE STANDS NUMBER is equal to the smaller of the TOTAL TIME- WEIGHTED AVERAGE NUMBER OF TEST STANDS AVAILABLE or the ACTUAL NUMBER OF ASTM TMC-CALIBRATED TEST STANDS AVAILABLE AT THIS POINT (The numbers marked with an asterisk on Page D-3).

= ( )**

NUMBER OF ENGINE TESTS CONDUCTED IN THE LABORATORY FOR THE SPONSOR IN THE PREVIOUS 180 DAYS, INCLUDING THE TEST TO BE SCHEDULED. = ( )***

TO DETERMINE THE MAXIMUM NUMBER OF A SPONSOR'S CANDIDATE TESTS THAT CAN BE MADE IN A SINGLE ENGINE TEST STAND:

Using the Table

Take the AVAILABLE STANDS NUMBER (Number above marked with two asterisks) and determine the proper column in the Table.

Take the number of tests conducted for the sponsor in the last 180 days, including the test to be scheduled (Number above marked with three asterisks) and determine the proper row in the Table.

Read the value in the Table shown under the proper column in the proper row; this is the maximum number of runs that can be made in that stand for the sponsor.

Using the Equation Shown at the Bottom of the Table

Calculate as follows:

$$1.5 \times \frac{(\quad)^{***}\ \text{No. of sponsor's tests in the lab in the prior 180 days, including the run to be scheduled}}{(\quad)^{**}\ \text{Available stands number}}$$

MAXIMUM NUMBER OF SPONSOR CANDIDATE RUNS THAT CAN BE MADE IN A SINGLE ENGINE TEST STAND

Available Stands Number	2	3	4	5	6	7	8	9	10	20	30
No. of Sponsor's Tests in last 180 Days											
2	2	2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2	2	2
4	3	2	2	2	2	2	2	2	2	2	2
5	4	3	2	2	2	2	2	2	2	2	2
6	5	3	2	2	2	2	2	2	2	2	2
7	5	4	2	2	2	2	2	2	2	2	2
8	6	4	3	2	2	2	2	2	2	2	2
9	7	5	3	3	2	2	2	2	2	2	2
10	8	5	4	3	3	2	2	2	2	2	2
11	8	6	4	3	3	2	2	2	2	2	2
12	9	6	5	4	3	3	2	2	2	2	2
13	10	7	5	4	3	3	2	2	2	2	2
14	11	7	5	4	4	3	3	2	2	2	2
15	11	8	6	5	4	3	3	3	2	2	2
16	12	8	6	5	4	3	3	3	2	2	2
17	13	9	6	5	4	4	3	3	3	2	2
18	14	9	7	5	5	4	3	3	3	2	2
19	14	10	7	6	5	4	4	3	3	2	2
20	15	10	8	6	5	4	4	3	3	2	2
25	19	13	9	8	6	5	5	4	4	2	2
30	23	15	11	9	8	6	6	5	5	2	2
40	30	20	15	12	10	9	8	7	6	3	2
50	38	25	19	15	13	11	9	8	8	4	3
60	45	30	23	18	15	13	11	10	9	5	3
70	53	35	26	21	18	15	13	12	11	5	4
80	60	40	30	24	20	17	15	13	12	6	4
90	68	45	34	27	23	19	17	15	14	7	5
100	75	50	38	30	25	21	19	17	15	8	5

NOTE: This table is calculated on the basis of the following equation, and any combinations of test runs and calibrated stands should be calculated using this equation:

Max. No. of Sponsor's Runs In Any One Stand =
1.5 x (the Number of Sponsor's Tests In Last 180 Days, including the planned run) ÷
(the Time-Weighted Avg. Number of Calibrated Test Stands in the Laboratory during the Last 180 Days, or the total number of ASTM TMC calibrated test stands in the lab at this point, whichever is smaller).

ALL FRACTIONAL ANSWERS ARE ROUNDED TO THE NEAREST NUMBER EXCEPT THAT ALL NUMBERS LESS THAN TWO ARE ROUNDED UP TO TWO.

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APPENDIX E

Candidate Data Package

APPENDIX E

CANDIDATE DATA PACKAGE

Introduction

All sponsors have the responsibility of maintaining a complete record of each program conducted under the Code. The Candidate Data Package serves as this record.

Purpose

The Candidate Data Package provides a record of information on the formulation and testing of candidate oils. This record, compiled by the test sponsor, may be used by the auditor as part of the compliance process and shall be used by the test sponsor to report engine test programs to a customer.

Candidate Data Package Minimum Requirements

1. **A summary, generated by the American Chemistry Council (ACC) Monitoring Agency, of all engine tests registered as part of the test program shall be included in the Candidate Data Package.** The summary should include all tests registered under the same Sponsor ID and Sponsor Code as defined in Appendix B, and shall include the entire Formulation Code as defined in the registration for Part B (see Appendix B). The summary also shall include**:**
   a) A tabulation showing the Formulation Code and the fate of each registered test, completed, pending, or cancelled prior to the start of the test or terminated prior to completion of the test.
   b) A tabulation showing the summary test results for all completed tests identified above.

2. **Documentation showing all formulations used to support the final formulation to assure that the customer can reproduce the intended formulation.** If multiple viscosity grades are being supported, descriptions of each viscosity grade's final formulation shall be included. This documentation shall include:
   a) Complete formulation recipes in either mass or volume percent, totaling 100%, listing base oils; viscosity modifier (VM), if any; detergent/dispersant/inhibitor (DI) package; pour point depressant, if any; and any other additive component. If a VM is used, dispersant or non- dispersant designations shall be included. If a DI package is not used, individual components shall be listed. All formulation components must be clearly identified by trade name, stock or code number or any other definitive designation.
   b) The following physical and chemical characterization of all formulations, including those developed for Level 1 shall be included:

	All Formulations (Level 1)	Final Formulation	ASTM Test Methods
Viscosity at 100°C	X	X	D445
Viscosity at 40°C		X	D445
HTHS at 150°C	X	X	D4683 or D4624 or D4741
CCS (if W grade)	X	X	D5293
MRV (if W grade)		X	D4684

Elements*	X	X	
TBN	X	X	D2896
IR		X	
* known to be present, for example, Na, Mg, Ca, Cu, Zn, N, P, Mo, B, S Note: All Tests above are to be conducted in laboratories current in participation in the ASTM D.02 Interlaboratory Crosscheck Program for the particular test			

c) Base stocks – appropriate analysis (saturates, sulfur and viscosity index; see API 1509), not typical values, to determine base stock group categories shall be included.

3. **Supporting performance test data for any minor formulation modifications requiring Level 2 support (see Appendix H).** Supporting data are not required for minor formulation modifications which do not become part of the final formulation.

4. **Documentation of Performance**
Documentation of performance may include documentation for each registered performance test, OEM waivers and use of Single Technology Matrix (STM).

a) Documentation for each registered performance test identified in 1 above to include:

Test disposition →	Operationally valid	Operationally invalid	Uninterpretable	Terminated	Cancelled
Completed ACC Registration Form	X	X	X	X	X
ACC Lab Conformance Statement	X	X	X	X	
Validity page	X	X	X		
ACC Cancellation Form					X
Test operating details	X**				
Test measurements / ratings	X**				
Photographs*	X**				
*Only if required by ASTM test procedure. ** Only for completed engine tests which support the final formulation					

- For any engine test that was terminated prior to completion, a specific, clear description of the reason(s) for stopping the test must be included.
- Cancellation Forms must include an explanation as to why the test was cancelled.
- Full test reports from the test laboratory for all completed engine tests which support the final formulations are required. Copies of the original engine test reports are acceptable for Candidate Data Packages.
- A clear explanation of exclusion must be provided for any engine test result reported in the summary generated by the ACC Monitoring Agency but not required to support the final formulation.

b) Documentation for Single Technology Matrix
Where a Single Technology Matrix (STM), as defined by the American Petroleum Institute (API), is used to cover an engine test, then it should be stated in the Candidate Data Package that a STM was used and an explanation of how the formulation meets STM must be included in the Candidate Data Package (See Exhibit 1B).

c) Documentation for use of OEM approvals or review in lieu of required testing
Where an engine test on a final formulation is waived due to formal OEM approval or by formal OEM review, as allowed by the American Petroleum Institute (API), then the waiver should be stated in the Program Engine Test Report table and a copy of the approval or review must be included in the Candidate Data Package. OEM waivers used in lieu of engine testing are only valid for the test(s) which the OEM sponsors (See Exhibit 2).

d) Documentation of API Base Oil Interchange and Viscosity Read Across Guidelines
For engine and bench tests that are covered and satisfied by API 1509 Appendix E Base Oil Interchange Guidelines or Appendix F Viscosity Read Across Guidelines, an explanation showing clearly how the API 1509 Base Oil Interchange Viscosity Read Across and Guidelines are applied shall be included.

5. **Any other statements related to engine test operational validity:** Should the test sponsor or test laboratory have questions about test operational validity, either may ask the ACC Monitoring Agency to review the data and render an independent opinion regarding operational validity according to Tab 5, Section 1, Item 1. The test sponsor request and the ACC Monitoring Agency response shall be included in the Candidate Data Package. If the ACC Monitoring Agency and the test laboratory agree on operational validity, the decision is binding. In the event of a disagreement, the test sponsor may seek the opinion of one or more third parties, including their own engineers or outside experts. A composite of these third-party opinions shall be included in the Candidate Data Package, and shall also be reported to the ACC Monitoring Agency in a timely fashion.

6. **Engine test result validity opinions:** Should the test sponsor believe that results from an engine test are invalid, even though the test has been judged to be operationally valid; the sponsor may exclude the suspect test result from MTEP (Multiple Test Evaluation Procedures) calculations. The test from which the results are discarded as non-representative shall not be counted toward the total number of times the candidate has been tested (see Appendix F). If suspect test results are excluded from MTEP calculations, the following shall be included in the Candidate Data Package:
   a) Results from operationally valid, registered engine tests on oils containing performance additive package(s) representative of the chemistry in the suspect test, which support the conclusion that the suspect results are not representative of the true performance of the oil.
   b) All pertinent information related to any of the following:
      i. Industry test severity and precision information obtained per Tab 5, Section I, Item 2.
      ii. External (knowledgeable) opinions / interpretations developed by the test sponsor.
      iii. ASTM statistical data related to the test in question
   c) A statement summarizing the information supporting the exclusion of the suspect test results from MTEP calculations.

7. **If multiple tests of any Code procedure were required, a work sheet showing clearly how the Multiple Test Evaluation Procedures (MTEP) were applied shall be included.** This shall delineate what data have been discarded and what data have been used in the average, following all the transformation calculations where appropriate.

8. **A summary table (Program Engine Test Report) showing a description of the formulations of the Core Data Set (see Exhibit 1) or the Matrix Core Data Set (see Exhibit 2).** The table will show which performance tests were conducted on each formulation (designated by X) and the reasons for waivers of any tests not conducted (designated by PG, BOI, VGRA, STM, OEM; see Exhibits). The table must include all performance tests covered by the Code.

9. **Retroactive Registration:** Valid engine test results may have been generated prior to availability of registration for these tests. Examples include the Caterpillar 1M-PC, Caterpillar 1N, Mack T-8, Mack T-8E, RFWT, IIIGA, and IIIFHD, etc. These data are on file with the ACC Monitoring Agency. All the above relevant information which applies to these tests shall be included in the Candidate Data Package.

10. **Additional information:** The Candidate Data Package may contain additional information which the test sponsor deems appropriate.

EXHIBIT 1A

PROGRAM ENGINE TEST REPORT SUMMARY EXAMPLE*

	Core	Base Oil Interchange
Base Oil	**A**	**B**
Base Oil Group	I	II
SAE Viscosity Grade	5W-40	5W-40
Performance Level	API SM	API SM
Base Oil Saturates, %m	75.5	92.2
Base Oil Sulfur, %m	0.37	0.0005
Base Oil Viscosity at100°C, cSt	5.0	7.40
Engine Tests		
Sequence IIIF	X	X
Sequence IVA	X	BOI
Sequence VG	X	BOI
Sequence VIII	X	BOI

Notes:

The Core Data Set is surrounded with double lines.

X = Test run; formulation details and test report included in Candidate Data Package.

PG = Test waived per ACC Code of Practice Program Guidelines.

BOI = Test waived per API Base Oil Interchangeability Guidelines for Passenger Car Motor Oils and Diesel Engine Oils.

VGRA = Test waived per API Guidelines for SAE Viscosity-Grade Read Across Engine Testing.

OEM = Test waived per formal OEM approval or review per API 1509.

STM = Single Technology Matrix defined per API 1509.

*Examples and Illustrations in the ACC Code of Practice are designed to assist in the interpretation of various elements and guidelines in the Code of Practice. They are not meant to be comprehensive in that they do not define the guidelines and exist to clarify the elements or guidelines not to limit them to the circumstances shown in the example or illustration.

EXHIBIT 1B

PROGRAM ENGINE TEST REPORT SUMMARY EXAMPLE*

	Core
Base Oil	**A**
Base Oil Group	I
SAE Viscosity Grade	15W-40
Performance Level	API SM
Base Oil Saturates, %m	75.5
Base Oil Sulfur, %m	0.37
Base Oil Viscosity at100°C, cSt	5.0
Engine Tests	
Sequence IIIF	STM
Sequence IVA	X
Sequence VG	X
Sequence VIII	X

Notes:

The Core Data Set is surrounded with double lines.

X = Test run; formulation details and test report included in Candidate Data Package.

PG = Test waived per ACC Code of Practice Program Guidelines.

BOI = Test waived per API Base Oil Interchangeability Guidelines for Passenger Car Motor Oils and Diesel Engine Oils.

VGRA = Test waived per API Guidelines for SAE Viscosity-Grade Read Across Engine Testing.

OEM = Test waived per formal OEM approval or review per API 1509.

STM = Single Technology Matrix defined per API 1509

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EXHIBIT 2 SUMMARY EXAMPLE*
PROGRAM ENGINE TEST REPORT

	Matrix Core	Matrix Core	Matrix Core	Matrix Core	Matrix Core	Matrix Core	Base Oil Interchange
Base Oil	**A**	**A**	**A**	**B**	**C**	**D**	
Base Oil Group	I	I	I	I	I	II	
SAE Viscosity Grade	10W-30	10W-40	15W-40	10W-40	15W-40	15W-40	
Performance Level	API CI-4	API CI-4	API CI-4	API CI-4+	API CI-4	CI-4+	
Base Oil Saturates, %m	75.5	75.5	74.6	69.2	63.8	95.5	
Base Oil Sulfur, %m	0.37	0.37	0.36	0.81	0.35	0.00	
Base Oil Viscosity at 100°C, cSt	5.0	5.0	6.1	4.6	5.1	7.2	
Engine Tests							
Caterpillar 1R	VGRA	X	VGRA	BOI	BOI/VGRA	BOI/VGRA	
Caterpillar 1N	BOI/VGRA	-	X	-	BOI	BOI	
Caterpillar 1K	BOI/VGRA	-	BOI/VGRA	X	BOI/VGRA	BOI/VGRA	
Mack T-10	X	VGRA	VGRA	BOI/VGRA	BOI/VGRA	BOI/VGRA	
Cummins M11 EGR	X	VGRA	VGRA	BOI/VGRA	BOI/VGRA	BOI/VGRA	
Mack T-8E	BOI/VGRA	BOI/VGRA	BOI	BOI/VGRA	X	BOI	
RFWT	X	VGRA	VGRA	BOI/VGRA	BOI/VGRA	BOI/VGRA	
Navistar Aeration (EOAT)	X	BOI	VGRA	X	BOI/VGRA	BOI/VGRA	
Sequence IIIF	-	-	-	-	-	X	
Mack T-11				OEM		OEM	

Notes:

The Core Data Set is surrounded with double lines.

X = Test run; formulation details and test report included in Candidate Data Package.
PG = Test waived per ACC Code of Practice Program Guidelines.
BOI = Test waived per API Base Oil Interchangeability Guidelines for Passenger Car Motor Oils and Diesel Engine Oils.
VGRA = Test waived per API Guidelines for SAE Viscosity-Grade Read Across Engine Testing.
OEM = Test waived per formal OEM approval or review per API 1509.
STM = Single Technology Matrix defined per API 1509.

*Examples and Illustrations in the ACC Code of Practice are designed to assist in the interpretation of various elements and guidelines in the Code of Practice. They are not meant to be comprehensive in that they do not define the guidelines and exist to clarify the elements or guidelines not to limit them to the circumstances shown in the example or illustration.

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APPENDIX F

Multiple Test Evaluation Procedures

APPENDIX F

MULTIPLE TEST EVALUATION PROCEDURES

Introduction

Multiple Test Evaluation Procedures (MTEP) is any data-based approach for evaluation of the quality and performance of a candidate formulation where one or more tests have been conducted.

Purpose

The use of American Chemistry Council accepted MTEP ensures that all test sponsors base the performance representation of engine oils on a uniform treatment of data. This appendix provides detailed instructions on how to perform calculations using all of the relevant Multiple Test Evaluation Procedures and guidelines to use for specifications that do not indicate how to handle test data.

MTEP Guidelines

Passing limits in performance specifications may take a variety of forms, the two most common of which are a) a flat limit and b) a statistically-derived, tiered-set of limits. Many performance specifications also designate an MTEP method to be used in evaluating conformance of candidate test data with the passing limits. When this is the case, the MTEP technique designated in the specification shall be used. For specifications that do not include a designated MTEP, the method defined in this appendix shall be used.

All operationally valid and interpretable engine test results for a particular minor formulation modification must be included in the MTEP calculations, except as specified in Appendix E. All engine test data, test results, operational validity statements and other vital details, including the MTEP calculations, must be included in the Candidate Data Package.

Performance Specification Passing Limits

Flat Limit – The passing limit is expressed as a single value. The normal form would be as follows:

	Passing Limit
Rated Parameter	*a*

or, less often,

	1-Test Limit	2-Test Limit	3-Test Limit
Rated Parameter	*a*	*a*	*A*

where *a* is the required performance level irrespective of how many tests are run.

Tiered Limits – Passing limits are specified by a series of values, expressed as a function of the number of tests run. Typically, the limit would take the following form:

	1-Test Limit	2-Test Limit	3-Test Limit
Rated Parameter	*x*	*y*	*z*

Where, x to y to z increases or decreases depending on whether the test limit is a maximum or a minimum. The limits change as the number of tests increase because the confidence in the true performance of the oil increases as more tests are run. The differences between x and y and between y and z are derived statistically taking into account the precision of the test and the desired confidence level.

MTEP Calculations

There are many types of MTEP, but only three are described in this appendix. These are referred to as Multiple Test Acceptance Criteria (MTAC), Tiered Limit Method (TLM) and Merit Rating System (MRS). Care must be taken to understand each of these terms since they are sometimes used in other contexts where they may have different meanings.

MTAC – While MTAC is sometimes used broadly to refer to any technique for handling multiple test data, the term has been widely used in ASTM D4485 to refer to one specific technique, and that definition, as described below, is used in this appendix.

TLM – The term tiered limits is sometimes applied to both the method of deriving passing limits and to the method of handling data for comparison to tiered limits. In order to distinguish the two, tiered limits is used in this appendix as it applies to passing limits and TLM is used to refer to Tiered Limit Method.

MRS –A methodology which rewards test parameter performance better than the anchor point and penalizes test parameter performance poorer than the anchor point.

The following guidelines apply to all MTEP calculations:

1. Some rated parameters must be transformed during calculations. These are identified in the table in the next section. The specific form of the transformation may be found at the end of this appendix. Additional details may be found in the ASTM TMC Manual for LTMS (Technical Memorandum 94- 200).
2. The final adjusted test results as reported by the test laboratory are used in the MTEP calculations. These are the results that have been, if applicable, Outlier Screened, Industry adjusted, and severity adjusted.
3. Rounding in all calculations is to be carried out according to ASTM E29.
4. Two of the MTEP methods have provision for discarding a test result. In all cases, if at least one rated parameter of a test is discarded, the data for all rated parameters of that test are to be discarded. It should be noted that all data, including any discarded from MTEP calculations, must be included in the Candidate Data Package, per Appendix E.

Multiple Test Acceptance Criteria (MTAC)

One Test

1. Obtain the test result for the test parameter being evaluated.
2. Compare the result in step 1 to the passing limit in the specification. If limits in the specification are expressed as tiered limits, compare the result in step 1 to the one-test passing limit.

Two Tests

1. Obtain the test results in both tests for the test parameter being evaluated.
2. Transform data, if appropriate, for each test. Round transformed data to seven decimal places.
3. Total the values for the tests in step 2 [step 1 if there is no transform] and divide by two.
4. Transform the result in step 3 back to the original units, if applicable.
5. Round the value in step 4 [step 3 if there is no transform] to the same number of decimal places used for that parameter in the specification.
6. Compare the result in step 5 to the passing limit in the specification. If limits in the

specification are expressed as tiered limits, compare the result in step 5 to the two-test passing limit.

Three or More Tests

1. Obtain the test results in all valid and interpretable tests for the test parameter being evaluated.
2. (Optional) Discard the results from any one test. Revert to the previous calculation procedure for two tests, or run a fourth test and repeat the three-test calculation deleting the outlier result.
3. Transform data, if appropriate, for the retained tests. Round transformed data to seven decimal places.
4. Total the values for all tests in step 3 [data remaining after step 2 if there is no transform] and divide by the total number of test results retained.
5. Transform the result in step 4 back to the original units, if applicable.
6. Round the value in step 5 [step 4 if there is no transform] to the same number of decimal places used for that parameter in the specification.
7. Compare the result in step 6 to the passing limit in the specification. If limits in the specification are expressed as tiered limits, compare the result in step 6 to the three-test passing limit.

Tiered Limit Method (TLM)

One Test

1. Obtain the test result for the test parameter being evaluated.
2. Compare the result in step 1 to the one-test passing limit in the specification. If limits in the specification are expressed as flat limits, compare the result in step 1 to the passing limit.

Two Tests

1. Obtain the test results in both tests for the test parameter being evaluated.
2. Transform data, if appropriate, for each test. Round transformed data to seven decimal places.
3. Total the values for the tests in step 2 [step 1 if there is no transform] and divide by two.
4. Transform the result in step 3 back to the original units, if applicable.
5. Round the value in step 4 [step 3 if there is no transform] to the same number of decimal places used for that parameter in the specification.
6. Compare the result in step 5 to the two-test passing limit in the specification. If limits in the specification are expressed as flat limits, compare the result in step 5 to the passing limit.

Three Tests

1. Obtain the test results in all (three) valid tests for the test parameter being evaluated.
2. Transform data, if appropriate, for each test. Round transformed data to seven decimal places.
3. Total the values for all tests in step 2 [step 1 if there is no transform] and divide by three.
4. (Optional) One test may be discarded if it meets certain outlier criteria. Compare the suspect test result with the result of step 3 using ASTM E178 and the outlier test determination values listed in ASTM D4485. If the suspect test result may be discarded, revert to the previous calculation procedure for two tests, or run a fourth test and repeat the three-test calculation deleting the outlier result.
5. Transform the result in step 3 back to original units, if applicable.
6. Round the value in step 5 [step 3 if there is no transform] to the same number of decimal places used for that parameter in the specification.
7. Compare the result in step 6 to the three-test passing limit in the specification. If limits in the specification are expressed as flat limits, compare the result in step 6 to

the passing limit.

Merit Rating System (MRS)

Each parameter is assigned a Weight, an Anchor (or target), a Minimum and a Maximum (or cap). The method for calculating Merits is generally as follows:

- Performance for any parameter at the Anchor value, results in Merits equal to the parameter Weight.
- Test results for any parameter at, or better than the Minimum results in Merits equal to twice the parameter Weight.
- Test results for any parameter at the Maximum results in zero Merits
- Test results for any parameter worse than the Maximum is an automatic test failure no matter the performance on all other parameters.
- Merits between the Minimum and Anchor are proportionally awarded based upon the test result's proximity to the Anchor and the range between the Minimum and the Anchor.
- Similarly, Merits between the Maximum and Anchor are proportionally awarded based upon the test result's proximity to the Anchor and the range between the Anchor and the Maximum.
- Some specifications may use Secondary Maximums (or Secondary Caps). These more restrictive limits result in a mandatory fail if the test result is worse than the Secondary Maximum just like the primary Maximum. The Merits are still calculated based upon the primary Maximum as defined in ASTM D4485.

Multiple test evaluation consists of averaging the test results for each test parameter across multiple tests and then putting that result into the Merit calculation system. Specifics of each Merit Calculation are referenced in ASTM D4485.

MTEP Methods for Rated Parameters

As indicated in the "MTEP Guidelines" section above, when a specification includes requirements for handling data from multiple tests, the specified MTEP method shall be used for that specification. However, for any specification that does not specify an MTEP method (e.g., an ACEA specification); the technique specified in the following table shall be used.

Test	Type of MTEP	Parameter (Units) (note 1)
Sequence IIIF	MTAC MTAC MTAC MTAC (note 2)	*Kinematic Viscosity (% increase at 40°C*) Avg. piston skirt varnish (merits) Weighted piston deposit (merits) Screened avg. cam plus lifter wear (µm) Hot stuck rings
Sequence IIIFHD	MTAC	*Kinematic Viscosity @ 60 h* (% increase)
Sequence IIIG	MTAC MTAC MTAC (note 2)	*Kinematic Viscosity (% increase at 40°C*) Weighted piston deposit (merits) *Avg. cam plus lifter wear (µm)* Hot stuck rings
Sequence IIIGA	None	No MTEP, No MTAC
Sequence IIIGB	MTAC	Phosphorus retention (%)

Test	Type of MTEP	Parameter (Units) (note 1)
Sequence IIIH	MTAC MTAC	*Kinematic Viscosity (% increase at 40° C)* Weighted piston deposit (merits)
Sequence IIIHA	MTAC	*MRV Viscosity (%)*
Sequence IIIHB	MTAC	Phosphorus retention (%)
Sequence IIIH60	MTAC	*Kinematic Viscosity (% increase at 40° C)*
Sequence IIIH70	MTAC MTAC MTAC	*Kinematic Viscosity (% increase at 40° C)* *Weighted piston deposit (merits)* *Average piston skirt varnish (merits)*
Sequence IVA	MTAC	Avg. cam wear (µm)
Sequence VG	MTAC MTAC MTAC MTAC MTAC (note 3)	Avg. engine sludge (merits) Rocker arm cover sludge (merits) Avg. piston skirt varnish (merits) Avg. engine varnish (merits) *Oil screen clogging (%)* Hot stuck compression rings
Sequence VH	MTAC MTAC MTAC MTAC (note 3)	Avg. engine sludge (merits) *Rocker arm cover sludge (merits)* Avg. piston skirt varnish (merits) Avg. engine varnish (merits) Hot stuck compression rings
Sequence VID	MTAC MTAC	FEI 2 (%) FEI SUM (%)
Sequence VIE	MTAC MTAC	FEI 2 (%) FEI SUM (%)
Sequence VIF	MTAC MTAC	FEI 2 (%) FEI SUM (%)
Sequence VIII	MTAC	Bearing weight loss (mg)
Sequence IX	MTAC	*Average Number of Preignitions*
Sequence X	MTAC	*Chain Wear Stretch (%)*
Caterpillar 1K	TLM TLM TLM TLM (note 4) (note 5)	WDK (demerits) Top Groove Fill (%) *Top Land Heavy Carbon (%)* Avg. Oil Consumption (g/kW·h) Piston Ring Sticking (yes or no) Piston, Ring and Liner Scuffing (yes or no)
Caterpill ar 1MPC (note 5)	MTAC (note 6) MTAC (note 4) (note 7)	WTD (demerits) Top Groove Fill (%) Piston Ring Sticking (yes or no) Piston, Ring and Liner Scuffing (yes or no)
Caterpillar 1N	TLM TLM TLM TLM(note 4) (note 5)	WDN (demerits) Top Groove Fill (%) *Top Land Heavy Carbon (%)* Oil Consumption (g/kWh) Piston Ring Sticking (yes or no) Piston, Ring and Liner Scuffing (yes or no)

Test	Type of MTEP	Parameter (Units) (note 1)
Caterpillar 1P	TLM TLM TLM TLM TLM(note 5)	WDP (demerits) Top Groove Carbon (demerits) Top Land Carbon (demerits) *Avg. Oil Consumption (0-360h) (g/h)* *Final Oil Consumption (312-360h) (g/h)* Piston, Ring and Liner Scuffing (yes or no)
Caterpillar 1R	TLM TLM TLM TLM TLM(note 5)	WDR (demerits) Top Groove Carbon (demerits) Top Land Carbon (demerits) Avg. Initial (0-252 h) Oil Consumption (g/h) Avg. Final (432-504 h) Oil Consumption (g/h) Piston, Ring and Liner Scuffing (yes or no)
Caterpillar C13	MRS (note 4) (note 8)	Caterpillar C13 Merits *Delta Oil Consumption (g/*h) Average Top Land Carbon (Demerits) Average Top Groove Carbon (Demerits) *Second Ring Top Carbon (Demerits)*
Cummins ISM	MRS (note 8) TLM	Cummins ISM Merits Crosshead Weight Loss (mg) Injector Screw Wear (mg) *Oil Filter Pressure Delta (kPa)* Sludge (merits) Top Ring Weight Loss (mg)
Cummins ISB	TLM TLM	Average Camshaft Wear (µm) Average Tappet Weight Loss (mg)
Mack T-8	TLM TLM TLM	Viscosity Increase at 3.8% soot (cSt) Filter Plugging, Differential Pressure (kPa) Oil Consumption (g/kWh)
Mack T-8E	TLM TLM	Viscosity Increase at 3.8% soot (cSt) Relative Viscosity at 4.8% soot (unitless number)
Mack T-11	TLM	TGA % Soot @ 4.0 cSt increase @ 100° C TGA % Soot @ 12.0 cSt increase @ 100° C TGA % Soot @ 15.0 cSt increase @ 100° C
Mack T-12 (note 9)	TLM	Liner Wear, µm Top Ring Mass Loss, mg Lead Content at EOT, mg/kg
Mack T-12 (note 10)	MRS	Cylinder Liner Wear, µm Top Ring Mass Loss, mg *Delta Pb @ EOT, mg/kg* *Delta Pb 250 to 300 hours, mg/kh* *Oil Consumption, g/hr*
Mack T-12 (note 11)	MTAC (note 12)	Top Ring Mass Loss, mg Cylinder Liner Wear, µm

Test	Type of MTEP	Parameter (Units) (note 1)
Volvo T-13	TLM	IR Peak at EOT, Abs., cm^{-1} Kinematic Viscosity Increase at 40°C, %
COAT	MTAC (note 12)	Average Aeration, 40h to 50h, %

Notes:

1. Units for parameters in italics are transformed. See next section for specific transformations.
2. The majority of retained tests must not have ring sticking (hot stuck).
3. The majority of retained tests must not have compression ring sticking (hot stuck).
4. None of the retained tests may have piston ring sticking.
5. If three or more operationally valid tests have been run, the majority of these tests must not have scuffing. Any scuffed tests are considered non-interpretable, and no data from these tests are to be used in MTEP calculations.
6. Two methods of calculating WTD are used, one for API Category CF and a different one for API Category CF-2. Both methods use MTAC for handling test results.
7. None of the retained tests may have piston, ring or liner scuffing.
8. The parameters used in calculating the Merit Rating value are shown.
9. This TLM applies to Mack T-12 used in API Category CH-4.
10. This MRS applies to Mack T-12 used in API Category CI-4 and CJ-4.
11. This MTAC applies to Mack T-12 used in API Category CK-4 and FA-4.
12. The MTAC provision to discard any valid test result is not applicable (See Appendix F, pg. F-3, Three or More Tests, Number 2).

List of Transformations of Rated Parameters

Test	Parameter	Transformation
Sequence IIIF	Viscosity, % Increase	1/square root of the % increase at 80 hours
Sequence IIIFHD	Viscosity, % Increase	LN (PVISH060)
Sequence IIIG	Viscosity, % Increase Avg. cam plus lifter wear	LN (PVISH100) LN (ACLW)
Sequence IIIH	Kinematic Viscosity (% increase at 40°C)	LN (PVIS)
Sequence IIIHA	MRV Viscosity (%)	LN (MRV)
Sequence IIIH60	Kinematic Viscosity (% increase at 40°C)	LN (PVISH060)
Sequence IIIH70	Kinematic Viscosity (% increase at 40°C)	LN (PVISH070)
Sequence VG	Oil Screen Clogging	LN (oil screen clogging +1)
Sequence VH	Rocker Arm Cover Sludge	LN(10 – RCS)
Sequence IX	Average Number of Preignitions	Square root (AVPIE + 0.5)
Sequence X	Chain Wear Stretch (%)	LN (Chain Wear Stretch)
Caterpillar 1K	Top Land Heavy Carbon	LN (TLHC + 1)
Caterpillar 1N	Top Land Heavy Carbon	LN (TLHC + 1)
Caterpillar 1P	Average Oil Consumption Final Oil Consumption	LN (AOC) LN (FOC)
Caterpillar C13	Delta Oil Consumption (g/h) Second Ring Top Carbon	Square root (Delta OC) LN(R2TC)
Mack T-12	Delta Pb @ EOT Delta Pb 250 to 300 hours Oil Consumption	LN (DPbEOT) LN (DPb250300) LN (OC)
Cummins ISM	Oil Filter Pressure Delta	LN (OFDP)
Volvo T-13	Kinematic Viscosity Increase at 40°C	Square root (KV40)

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PRODUCT APPROVAL
CODE OF PRACTICE

APPENDIX G

Engine Test
Operational Validity Criteria

APPENDIX G

ENGINE TEST OPERATIONAL VALIDITY CRITERIA

Introduction

Only operationally valid and interpretable tests are to be used to support the approval of candidate formulations. This section outlines the criteria to be used by the test laboratories in evaluating engine test operational validity.

Purpose

These guidelines are intended to improve integrity of engine test results and to ensure test laboratory uniformity to appropriate ASTM and American Chemistry Council (ACC) guidelines for operational validity.

While the Code permits the test sponsor to terminate a test early (hence invalidating the test) without further explanation to the test laboratory, it is the intent of the Code that this be done to provide appropriate flexibility to the test sponsor. It is not intended to provide a means for a test sponsor to discard a predicted poor result from MTAC calculations.

Operational Validity Criteria – General

The test laboratory is responsible for determining and documenting the operational validity of every engine test and the conformance of every test with those aspects of the Code that are controllable by the test laboratory. The test laboratory shall determine and document the operational validity of engine tests in accordance with the latest version of the appropriate test procedure, including all updates issued by the organization responsible for the test.

The test laboratory shall document the decision regarding the operational validity and conformance of every test to the Code of Practice using the Test Laboratory Conformance Statement given on Page G4 of this Appendix. This form is to be forwarded to the ACC Monitoring Agency along with test results and must be inserted in the front of the final test report for the engine test.

In responding to the Declarations in the ACC Code of Practice Test Laboratory Conformance Statement, the test engineer shall, as a minimum, consider each of the checklist questions shown below:

No. 1 All requirements of the Code for which the test laboratory is responsible were met in the conduct of this test. Yes__No_*

Checklist Criteria

Checklist Criteria	Yes	No
Was the stand calibrated per the Code?		
Was the test stand assigned per the Code?		
Was the test registered with the ACC Monitoring Agency prior to start of testing?		
Were test results reported to the ACC Monitoring Agency per the Code?		

Were test severity adjustments properly applied per the Code?		
Were all chemical & physical test measurements required by the engine test procedure run in a laboratory current in participation in the ASTM D.02 Interlaboratory Crosscheck Program for that test? (only applies to chemical & physical test methods included in the Crosscheck Program.)		

No. 2 The laboratory ran this test for the full duration following all procedural requirements; and all operational validity requirements of the latest version of the applicable test procedure (ASTM or other), including all updates issued by the organization responsible for the test, were met.
Yes_____No_____*

Checklist Criteria

Checklist Criteria	Yes	No
Was the test run for the full duration specified in the test procedure?		
Was the appropriate combination of test power selection and/or test stands calibrated in accordance with the applicable test procedure (ASTM or other), including all updates issued by the organization responsible for the test?		
Were test engine build records in accordance with the test procedure?		
Was stand instrumentation calibrated in accordance with the test procedure requirements?		
Do test operational performance data conform with the test procedure requirements?		
Were all after-test engine part ratings and measurements reviewed and all calculations and/or transcription errors corrected?		
Were all new and used test oil analytical data reviewed and all transcriptional errors corrected?		

NOTE: *If the response to Declaration No. 2 is "No", the Test Engineer must indicate whether the deviation(s) that occurred was considered to be beyond the control of the test laboratory by answering the appropriate question on the Test Laboratory Conformance Statement. Beyond the control of the test laboratory normally will mean that the test was terminated at the direction of the test sponsor or due to test operational control problems that appeared to be related to the test oil performance.*

No. 3 A deviation occurred in one of the test parameters identified by the organization responsible for the test as being a special case. Yes___* No__*(This currently applies only to specific deviations identified in the ASTM Information Letter System.)*

Operational Validity Criteria - Extended Length Tests

Where the test sponsor requests an extended length test for which there is no ASTM test procedure, the standard portion of the test may be determined operationally valid only if carried out in complete accord with the ASTM test procedure including full engine inspection at the normal conclusion of the test. Upon reassembling the engine, the extended length portion of the test is formally declared operationally invalid.

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TEST LABORATORY CONFORMANCE STATEMENT

Test Laboratory:
Test Sponsor:
Formulation/Stand
Code: Test Number:
Test Start Date and Time (Include time zone):

DECLARATIONS

No. 1 All requirements of the ACC Code of Practice for which the test laboratory is responsible were met in the conduct of this test. Yes__No___*

No. 2 The laboratory ran this test for the full duration following all procedural requirements; and all operational validity requirements of the latest version of the applicable test procedure (ASTM or other), including all updates issued by the organization responsible for the test, were met. Yes____No____*

If the response to this Declaration is "No", does the test engineer consider the deviations from operational validity requirements that occurred to be beyond the control of the laboratory? Yes___* No___

No. 3 A deviation occurred for one of the test parameters identified by the organization responsible for the test as being a special case. Yes__*No___*(This currently applies only to specific deviations identified in the ASTM Information Letter System.)*

CHECK THE APPROPRIATE CONCLUSION

( ) Operational review of this test indicates that the results should be included in Multiple Test Acceptance Criteria calculations.

( ) *Operational review of this test indicates that the results should not be included in Multiple Test Acceptance Criteria calculations.

NOTE: *Supporting comments are required for all responses identified with an asterisk.*

Comments:

(Signature) *(Date)*

(Typed Name) *(Title)*

AMERICAN CHEMISTRY COUNCIL
PRODUCT APPROVAL
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APPENDIX H

GUIDELINES FOR MINOR FORMULATION MODIFICATIONS

APPENDIX H

GUIDELINES FOR MINOR FORMULATION MODIFICATIONS

Introduction

Minor formulation modifications are part of the American Chemistry Council Code for testing engine oils. These guidelines were developed based on criteria set by a work group of industry formulators. The guidelines are based on fundamental knowledge of the performance of engine oils in each test type. They relate to industry need and have been verified by industry data. No guideline is driven by individual company need.

Purpose

For all engine tests accepted into the Code of Practice, minor formulation modifications can be applied. This appendix outlines the allowable modifications which can be made during the development of a Core Data Set (Tab 1).

During the development of the Core Data Set, Minor Formulation Modification Guidelines and API Guidelines for SAE Viscosity-Grade Engine Testing (API 1509 Appendix F) may be used. Additionally, for a matrix approach, API Base Oil Interchangeability Guidelines (API 1509 Appendix E) may also be used.

General Guidelines

Guidelines for minor formulation modifications allow the formulator to make small adjustments in the candidate formulation during the conduct of a test program so that a failed test(s) does not force discarding passing results for previously run test types. Such minor modifications are made with the intent that they result in a discernible improvement in performance. Minor formulation modifications made during the conduct of a Program are based on fundamental formulation knowledge and can include but are not limited to those modifications described in “Guidelines for Specific Engine tests.”

If minor formulation modifications are used during the conduct of an engine test program, such minor modifications are permitted with the expectation that the final formulation contain all modifications and will pass all the engine and chemical & physical tests required by the performance claim. Supporting data will be required to ensure that minor modifications will not deteriorate performance in tests previously passed.

All minor modifications and support data will be disclosed to and agreed to by the customer and included in the Candidate Data Package (Appendix E).

The General Guidelines for minor modifications apply to all of the tests accepted into the ACC Code of Practice. Specific guidelines are provided for the following engine test Sequences IIIF, IIIG, IIIH, IIIH60, IIIH70, IVA, IVB, VG, VH, VID, VIE, VIF, VIII, IX, and X and are listed in the section titled “Guidelines for Specific Engine Tests”.

Guidelines for Specific Engine Tests

The numbered guidelines listed here are applicable only to Sequence IIIF, IIIG, IIIH, IIIH60, IIIH70, IVA, IVB, VG, VH, VID, VIE, VIF, VIII, and IX engine tests. Guideline 11 must be consulted when applying these guidelines to the Sequence IX test as indicated by footnote 1 in this section. Specific tests have been included in these guidelines based on a thorough

review by the Minor Formulation Modification Working Group and acceptance by the Petroleum Additives Product Approval Protocol Task Group. These tests have been judged to respond either beneficially or without harm to formulation changes allowed by the numbered guidelines. This judgment is based on collective internal company data, previous generation tests and on basic formulation knowledge.

No guideline is driven by individual company data.

New tests may be considered for inclusion in these Specific Guidelines if:

- The test has been added to a new or revised API Category
- The engine test has been accepted into the Code of

Practice Engine tests may be considered for removal from these

Specific guidelines if:

- The test becomes obsolete or is removed from the COP
- Changes in test hardware or procedures indicate that the engine test no longer responds to changes in additive chemistry

Common industry terminology is used to describe ingredients in the candidate formulation impacted by the numbered guidelines.

Additive treatment levels in the following guidelines are in percent mass. Major components are those included as part of the performance additive package at a treatment level of >1.0% in the formulation to be tested. Decrease in the treatment level of components of the performance additive package other than for rebalances (Guidelines 5 and 6), is not allowed. All modifications are relative except those that are noted as absolute. Definitions for Level 1 and Level 2 support are found in Tab 1.

1. An increase in the treatment level of the performance additive package, exclusive of viscosity modifier and pour point depressant, is acceptable.
   a) ≤ 20% with Level 1 support[4].
   b) > 20% to ≤ 30% with Level 2 support.

2. An increase in the treatment level of a single component of the performance additive package present at greater than 1.0% (major component) in the formulation to be tested is acceptable:
   a) ≤ 20% with Level 1 support[4].
   b) > 20% to ≤30% with Level 2 support.

3. An increase in the treatment level of a single component of the performance additive package present at 1.0% or less in the formulation to be tested is acceptable:
   a) ≤0.3% ≤100% with Level 1 support[4]; >100% to 200% (maximum 0.6% in formulation to be tested) with Level 2 support.
   b) >0.3% to ≤0.6% ≤50% with Level 1 support[4];>50% to 100% with Level 2 support.
   c) >0.6% to ≤1% ≤30% with Level 1 support[4]; >30% to 100% (maximum 1.3% in formulation to be tested) with Level 2 support).

4. With Level 2 support, one new component not present in the original formulation may be added. The new component may not exceed 10% of the total performance additive package (original package plus added component).

[4] *See guideline 11 for the* Sequence IX *test*

5. Variations in zinc dithiophosphate (ZDP) type and treatment level are acceptable changes with appropriate Level 1 or Level 2 support.

   a) Rebalance among zinc dithiophosphate (ZDP) is allowed while maintaining a constant formulation phosphorus level with Level 2 Support. This may include introduction of a new ZDP; only one new ZDP introduction is allowed. Such a rebalance counts as one minor modification. Only one ZDP rebalance is allowed.

   b) An increase in treatment level of zinc dithiophosphate (ZDP), in a formulation where the phosphorus level from ZDP is greater than 0.04%, up to a maximum of 0.12% phosphorus from ZDP is acceptable with Level 2 support for the Sequence VID, VIE and/or VIF and Level 1 support for all other engine tests. For increases above 0.12% P from ZDP, Level 2 support is required for all engine tests. Alternatively, Guideline H2 or H3 could be used if applicable.

6. A rebalance of metallic detergents is acceptable with Level 2 support provided that the sulfated ash remains constant and the metallic detergent soap is not decreased. For any individual detergent soap type, the increase in soap level is limited to 30% maximum. Only one detergent rebalance is allowed.

   The detergent rebalance may be effected simultaneously with the addition of a new metallic detergent component in line with the requirements of Guideline 4. In the specific instance where the soap and metal type of the new component are already present in the formulation, the rebalance counts as one modification. In other cases, the simultaneous rebalance/addition counts as two minor modifications.

7. There is a limit to the number of minor modifications allowed during the conduct of a Core Program (see below). This limit applies to Guidelines 1 through 6 only. For Guidelines 1 through 4, if the same minor modification guideline is applied more than once and the sum falls within the guideline parameters, this is considered to be only one minor modification. The sum of all modifications shall not result in an increase in treatment level of any major component of the performance additive package of greater than 30%.

   a) When using a non-matrix approach, no more than three minor modifications, made either individually or simultaneously, may be incorporated in the core data set.
   b) When using a matrix approach, a maximum of four minor modifications may be used.

8. Base stock ratio and viscosity modifier treatment level (not type) are acceptable changes with Level 1 support.
   a) A 15% absolute change in base stock ratio within the same base stock slate (+ or - 15% compared to the wt. % of the base oil blend) is allowed with Level 1 support. This change can include the addition of a new base stock cut that is part of the original base stock slate.
   b) If a new base stock is added and is in a different base stock slate and that slate is either API Group I, Group II, Group III or Group IV the change is limited to a maximum of 10% of the formulation (the finished blend of base stocks and additives).
   c) Viscosity modifier (either dispersant or non-dispersant type) treatment level may change no more than 15% relative to its treat rate.
      ["Type" means a specific molecular structure with a specific shear stability characterized by a specific trade name, stock or code number.]
   d) Base stock ratio and/or viscosity modifier level changes greater than those cited

above in 8a, 8b or 8c are allowed with Level 1 support as permitted by the API BOI/VGRA guidelines as defined in API 1509 for a given test.

9. Variations in pour point depressant and/or foam inhibitor type or treatment level are acceptable changes with Level 1 support. When changing foam inhibitor type or treatment level in the Caterpillar engine Oil Aeration Test (COAT), Level 1 support alone is not adequate; fundamental formulation knowledge support must exist to ensure performance is not deteriorated in this test.

10. The performance additive package commercialized for sale must include all permitted minor modifications in accord with Guideline 7. The package plus any other minor modifications made under Guidelines 8 and 9 define the final formulation.

11. Guidelines 1 through 6 can be used with the Sequence IX test, however, all modifications which involve a metallic detergent (e.g. performance additive package treat rate increase, metallic detergent increase, metallic detergent rebalance, or new metallic detergent introduction) requires Level 2 support for the Sequence IX.

ILLUSTRATIONS OF GUIDELINE USAGE

Introduction

The following illustrations are only examples, and do not preclude other ways, of application of minor formulation modification guidelines. Where multiple illustrations are used for a single guideline they are represented by a hyphenated number, the first part of which refers to the specific guideline number.

Illustration 0 Matrix Core Data Set

As an alternative to the use of a single base stock slate for the generation of the Core Data Set to support an ACC Program, a matrix approach may be used. A Matrix Core Data Set uses the API interchange guidelines in that a test (or tests) may be run in any applicable base oil combination. Not all base stock slates or base oil combinations used in a Matrix Core may be qualified to carry the final API category claim.

For example, an API SM matrix to cover base stock slate D might look like this*:

Base Oil (Group)	A(II)	B (II)	C (III)	D (II)
Viscosity Grade	10W-40	10W-40	5W-30	10W-40
Base Oil Saturates	91	98	99	99
Base Oil Sulfur	0.005	0.000	0.000	0.000
Base Oil Vis @ 100C, cSt	5.8	6.0	5.6	6.2
Sequence IIIG	-	-	-	Run
Sequence IVA	-	Run	-	BOI
Sequence VG	Run	-	-	BOI
Sequence VIII	-	-	Run	VGRA/BOI

API SM is allowed in base stock slate D. In order to qualify the other base stock slates, a Sequence IIIG, as well as possibly other engine tests, would be required in that base stock slate or base oil combination per the API Base Oil Interchangeability Guidelines, the API Guidelines for SAE Viscosity- Grade Engine Testing and the API Guidelines for Use of a Single Technology Matrix.

For example, an API SM/EC matrix to cover base stock slate H might look like this*:

Base Oil (Group)	E (II)	F (II)	G (III)	H (II)
Viscosity Grade	5W-30	5W-30	5W-20	5W-30
Base Oil Saturates	96	98	99	99
Base Oil Sulfur	0.001	0.000	0.000	0.000
Base Oil Vis @ 100C, cSt	4.2	4.1	4.2	4.3
Finished Oil CCS, cP	6100	5900	5780	5800
Finished Oil HTHS, cP	3.0	2.9	2.6	2.9
Sequence IIIG	-	-	-	Run
Sequence IIIGA	-	-	-	Run
Sequence IVA	-	Run	-	BOI
Sequence VG	Run	-	-	BOI
Sequence VIII	-	-	Run	VGRA/BOI

API SM/ Energy Conserving is allowed for Base stock slate H.

* Examples and Illustrations in the ACC Code of Practice are designed to assist in the interpretation of various elements and guidelines in the Code of Practice. They are not meant to be comprehensive in that they do not define the guidelines and exist to clarify the elements or guidelines not to limit them to the circumstances shown in the example or illustration.

For example, an API CJ-4/SM 15W-40 matrix might look like this*:

Base Oil (Group)	I (I)	J (I)	K (II)	L (II)
Base Oil Saturates	78	85	90	97
Base Oil Sulfur	0.3	0.1	0.001	0.000
Base Oil Vis @ 100C, cSt	5.2	5.3	5.3	5.5
Base Oil Viscosity Index	100	101	106	110
Sequence IIIG	Run	Run	Run	Run
Sequence IVA	Run	BOI	BOI	BOI
Sequence VG	Run	BOI	BOI	BOI
Sequence VIII	BOI	Run	BOI	BOI
Caterpillar 1N	BOI	BOI	BOI	Run
Caterpillar C13	Run	BOI	BOI	Run
RFWT	BOI	Run	BOI	BOI
Cummings ISM & ISB	Run	BOI	BOI	BOI
Mack T-11	Run	BOI	BOI	BOI
Mack T-12	Run	BOI	BOI	BOI

API CJ-4 / SM is allowed for all four base stock slates above.

Since API BOI and VGRA Guidelines are subject to change, it is prudent to review the most current version of API Publication 1509, Appendix E and F, before initiating a Matrix Approach Core Data Set Test Program.

*Examples and Illustrations in the ACC Code of Practice are designed to assist in the interpretation of various elements and guidelines in the Code of Practice. They are not meant to be comprehensive in that they do not define the guidelines and exist to clarify the elements or guidelines not to limit them to the circumstances shown in the example or illustration.

Illustration 1(a) For Guideline 1(a)

A performance additive package is used in the candidate at 10.0% mass. During the development of the Core Data Set, the candidate passes one or more of the required tests; however, it is necessary to increase the treatment level of the performance additive package to 12.0% mass to pass the remaining tests. This minor modification requires Level 1 support.

Illustration 1(b) For Guideline 1(b)

Conditions exist as outlined in Illustration 1(a) but during the development of the Core Data Set, the treatment level of the performance additive package is increased to 13.0% mass to pass the remaining tests. This minor modification requires Level 2 support demonstrating no harm at the 13.0% mass treatment level in the test(s) run at 10.0% mass.

Illustration 2(a) For Guideline 2(a)

A component is present in the formulation to be tested at 2.0% mass. During the development of the Core Data Set, it is necessary to increase the component to 2.4% mass in the formulation to be tested to pass the remaining tests. This minor modification requires Level 1 support.

Illustration 2(b) For Guideline 2(b)

A component is present in the formulation to be tested at 2.0% mass. During the development of the Core Data Set, it is necessary to increase the component to 2.5% mass in the formulation to be tested to pass the remaining tests. This minor modification requires Level 2 support demonstrating no harm for the 2.5% mass treatment level of the component in the tests run with 2.0% mass treatment.

Illustration 3(a) For Guideline 3(a)

A component is present in the formulation to be tested at 0.2% mass. During the development of the Core Data Set, it is necessary to increase the component to 0.5% mass in the formulation to be tested to pass the remaining tests. This minor modification requires Level 2 support demonstrating no harm for the 0.5% mass treatment level of the component in the tests run with 0.2% mass treatment.

Illustration 3(b) For Guideline 3(b)

A component is present in the formulation to be tested at 0.4% mass. During the development of the Core Data Set, it is necessary to increase the component to 0.6% mass in the formulation to be tested to pass the remaining tests. This minor modification requires Level 1 support.

Illustration 3(c) For Guideline 3(c)

A component is present in the formulation to be tested at 0.7% mass. During the development of the Core Data Set, it is necessary to increase the component to pass the remaining tests. A 100% increase in the treatment level of the component is desired. However, the guideline limits the formulation to a maximum of 1.3% mass of the component in the formulation to be tested. The minor modification requires Level 2 support demonstrating no harm for the 1.3% mass treatment level of the component in the tests run with 0.7% mass treatment.

Illustration 4 For Guideline 4

A performance additive package is used in the candidate at 10% mass. During the development of the Core Data Set, it is necessary to add a new component not present in the original candidate to pass the remaining tests. Addition of this component is limited to 10% of the performance additive package (original package plus added component). This minor modification requires Level 2 support demonstrating no harm for the new component in the tests run prior to its addition.

Illustration 5-1 For Guideline 5a

The performance additive package contains a 50/50 mixture of ZDP A and ZDP B. During the development of the Core Data set, it is necessary to increase the treatment level of ZDP B by 25% (25% ZDP A/75% ZDP B) to pass the remaining tests. This maintains a constant formulation phosphorous level. This minor modification requires Level 2 support.

Illustration 5-2 For Guideline 5a

The performance additive package contains 100% of ZDP A. During the development of the Core Data Set, it is necessary to add ZDP B up to 25% to pass the remaining tests. This minor modification (75% ZDP A/25% ZDP B) maintains a constant formulation phosphorous level. This requires Level 2 support demonstrating no harm in those tests run with 100% ZDP A.

Illustration 6-1 For Guideline 6

The performance package contains a mixture of calcium sulfonate detergents. During the development of the Core Data Set, it is found necessary to increase the sulfonate detergent soap level by 30%. This is achieved by adjusting the ratio of the two calcium sulfonate detergent components to attain the required increase in detergent soap while maintaining a constant sulfated ash level. This minor modification requires Level 2 support demonstrating no harm for the performance package containing the adjusted concentrations of the metallic detergents in those tests run with the metallic detergents in the original concentrations.

Illustration 6-2 For Guideline 6

The performance package contains a mixture of magnesium and calcium sulfonate detergents. During the development of the Core Data Set, it is found necessary to increase the concentration of the magnesium sulfonate detergent component by 30%, e.g., Mg content increased from 0.05% mass to 0.065% mass in the finished oil, without simultaneously increasing the sulfonate detergent soap level. The concentrations are adjusted so that overall there is no change in the sulfated ash and sulfonate soap levels in the finished oil. This minor modification requires Level 2 support demonstrating no harm for the performance package containing the adjusted concentrations of the metallic detergents in those tests run with the metallic detergents in the original concentrations.

Illustration 6-3 For Guideline 6

The performance package contains a mixture of calcium sulfonate and calcium phenate detergents. During the development of the Core Data Set, it is found necessary to increase the sulfonate detergent soap level by 30%. However, only one calcium sulfonate detergent component (A) is present in the formulation. To maintain a constant sulfated ash content it is necessary to adjust the concentration of the calcium sulfonate (A) and introduce a new lower TBN calcium sulfonate component (B). Since detergent component B is of the same soap and metal type as a detergent already in the formulation, i.e., detergent component A, then the change counts as one minor formulation change and requires Level 2 support demonstrating no harm for the performance package containing the adjusted concentrations of the metallic detergents in those tests run with the metallic detergents in the original concentrations.

Illustration 7-1 For Guideline 7

During the development of the Core Data Set, it is necessary to increase the total performance additive package by 25% (Guideline 1(b)), rebalance the ZDP (Guideline 5), and add a new component not present in the original candidate (Guideline 4). These minor modifications require Level 2 support in accord with the individual guidelines.

Illustration 7-2 For Guideline 7

Conditions exist as outlined in Illustration 7-1 but during the development of the Core Data Set it is determined that a rebalance of metallic detergents is necessary (Guideline 6). Such a minor modification exceeds the three that are allowed. Some of the tests previously run must be repeated to assure that only three minor modifications are used from the start to completion of the Core Data Set. These minor modifications require Level 2 support in accord with the individual guidelines.

Illustration 7-3 For Guideline 7

During the development of the Core Data Set, it is necessary to increase the treatment level of a single component present in the formulation to be tested at 0.4% mass by 50% (Guideline 3(b)) and increase the treatment level of a second component present in the formulation to be tested at 0.8% by 30% (Guideline 3(c)). It is also necessary to increase the treatment level of the total performance additive package by 15%. While each of these minor modifications require Level 1 support, the aggregate of the modifications results in increases in the individual components exceeding Level 1 limitations. Under such conditions, Level 2 support is required.

Illustration 7-4 For Guideline 7

During the development of the Core Data Set it is necessary to increase the treatment level of the total performance additive package by 15% (Guideline 1(a)), then increase the treatment level of the performance additive package again by 15% relative to the original level. The total increase in the treatment level of the additive package is now 30% (15% + 15%), done in two steps (Guideline 1(b)). Overall, there is only one minor modification. While each individual increase in treatment level of the performance additive package requires Level 1 support, the overall increase requires Level 2 support.

Illustration 7-5 For Guideline 7

During the development of the Core Data Set it is necessary to increase the treat level of a single component present at 2.0% mass by 10% (Guideline 2(a)), resulting in a treat level of 2.2% mass. The treat level of this component is then increased a second time by 15% (Guideline 2(a)), resulting in treat level of 2.53% mass and then a third time by 5% mass (Guideline 2(a)), resulting in a treat level of 2.66% mass. These increases in the treat level of the same component are considered only one minor modification. While each of these increases requires level 1 support, the sum of the first two increases exceeds Level 1 limitations and Level 2 support is required. The aggregate of the three increases totaling a 33% increase, results in the individual component exceeding Level 2 limitations of 30% maximum, therefore additional engine testing would be required.

Illustration 8-1 For Guideline 8

The formulation contains two base stocks A and B. During the development of the Core Data Set, it is determined that it is necessary to change concentration of base stock A in the base stock combination by 15% absolute to maintain the same viscosity characteristics. Base stock B is correspondingly adjusted.

Absolute percentages are calculated by first normalizing the base stock portion of the formulation to 100%. For example, a formulation containing 60% base stock A and 20% base stock B, together with 20% of other components, such as additives and viscosity modifier, has absolute percentages of base stocks A and B of 75% and 25% respectively. A maximum

allowable reduction of 15% absolute in base stock A utilizing Guideline 8 would produce absolute percentages of 60% and 40% for A and B respectively, corresponding to final formulation (relative) percentages of 48% A, 32% B, and 20% of other components.

Illustration 8-2 For Guideline 8

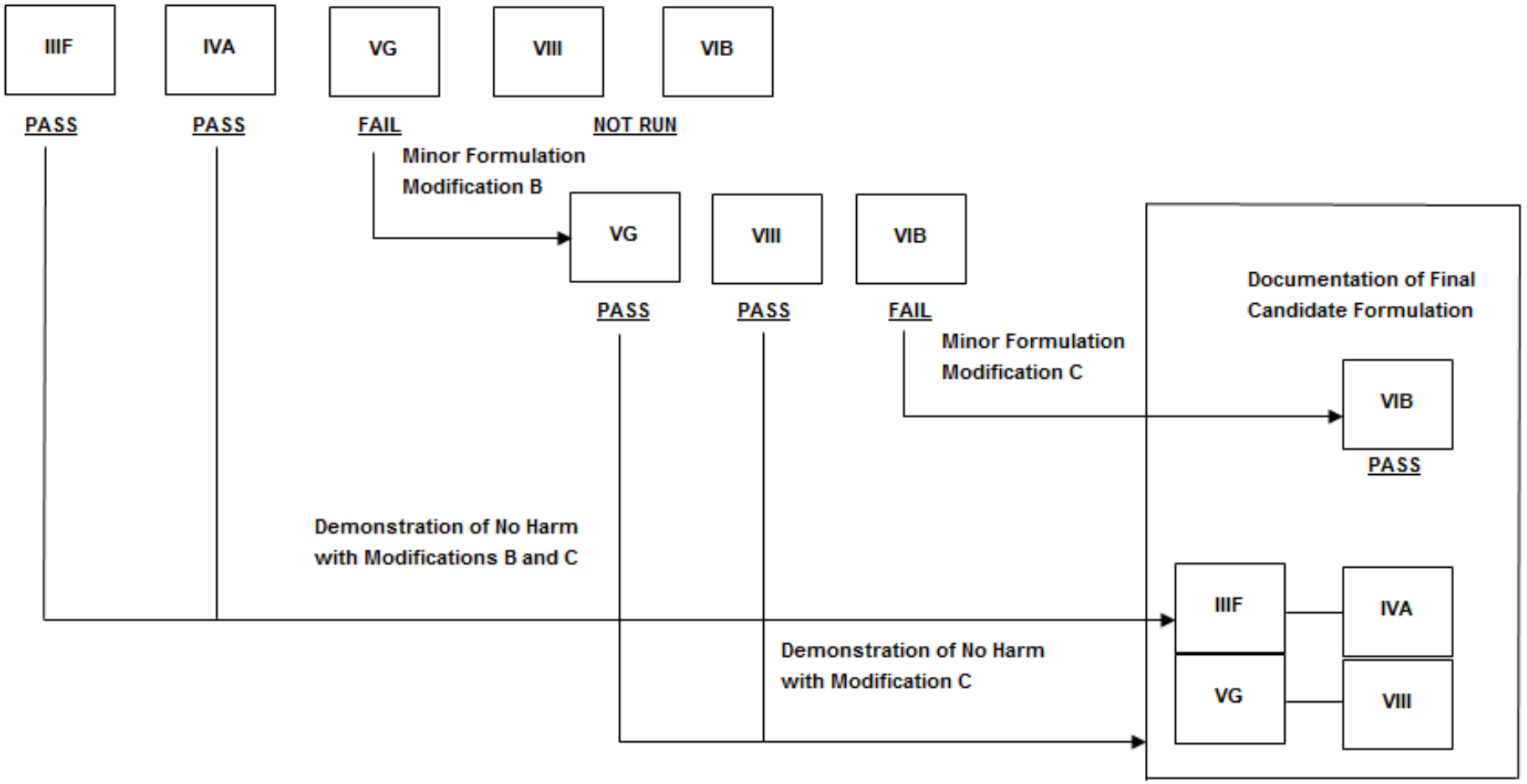
The formulation contains a single base stock A. During the development of the Core Data Set, it is determined that to maintain the same viscosity characteristics it is necessary to change 15% absolute of the base stock by replacing base stock A with base stock B from the same slate. The treatment level of viscosity modifier remains unchanged. This minor modification requires Level 1 support.

Illustration 9 For Guideline 9

During the development of the Core Data Set, it is determined that use of a different foam inhibitor is required. This minor modification requires Level 1 support.

ILLUSTRATION OF APPLICATION OF MINOR FORMULATION MODIFICATIONS

Original Formulation (Coded as Modification A; See Appendix B, Page 4)



Examples and Illustrations in the ACC Code of Practice are designed to assist in the interpretation of various elements and guidelines in the Code of Practice. They are not meant to be comprehensive in that they do not define the guidelines and exist to clarify the elements or guidelines not to limit them to the circumstances shown in the example or illustration.

AMERICAN CHEMISTRY COUNCIL
PRODUCT APPROVAL
CODE OF PRACTICE

APPENDIX I

Program Guidelines

APPENDIX I

PROGRAM GUIDELINES

Introduction

Program Guidelines are part of the American Chemistry Council (ACC) Code for testing engine oils. These guidelines were developed based on criteria set by a work group of industry formulators. The guidelines are based on fundamental knowledge of the performance of engine oils in each test type. They relate to industry need and have been verified by industry data. No guideline is driven by individual company need or data.

Purpose

Program Guidelines are provided to promote cost effective testing when developing programs built on existing Core Data Sets developed under the ACC Code. Supporting data are required to ensure that any modifications made to the formulation will not deteriorate performance in tests previously passed. Engine test data are required to support any booster attributes, and Level 2 support, where applicable, (see Tab 1) must exist for all other test types. In the absence of Level 2 support, the actual engine tests must be run. Information should be included in the candidate data package specifying those guidelines utilized and the performance represented for each oil grade.

1. a) An increase in treatment level of the total performance additive package, exclusive of viscosity modifier and pour point depressant, of <20% is acceptable with Level 1 support, except for the Sequence IX which requires Level 2 support.

   b) Additives already present or additives which were not present in the original tested formulation may be used as boosters to the system such as for TBN, performance, fuel economy, etc. The amount of the resultant up treat is not restricted. Engine test data are required to support any booster attributes, and Level 2 support must exist for all other test types. In the absence of Level 2 support, the actual engine tests must be run.

2. When conducting base oil interchange, the final commercial formulation must contain all minor formulation modifications. For the Sequences IIIF, IIIG, IIIH, IIIH60, IIIH70, IVA, IVB, VG, VH, VID, VIE, VIF, VIII and IX engine tests in the Code, the total number of changes from the tested formulations may not exceed four, including all changes made for base oil interchange. When using a matrix core data set based on the engine tests listed above, the number of changes may not exceed four. Support data, as defined in Tab 1, must be provided.

   A base oil interchange program may be built from the following data, for the same API Service Category, provided the performance package is the same in all data sets except as allowed in Appendix H:

   1. A single Core Data Set
   2. More than one Core Data Set
   3. One or more Core Data Sets and other base oil interchange programs.

3. Where a change in viscosity modifier shear stability is required by the customer, it is acceptable to make this change within the same chemical type and manufacturer with

corresponding Level 2 support. "Chemical type" means chemical family such as, but not limited to, styrene ester, polymethacrylate, styrene butadiene, styrene isoprene, polyisoprene, olefin copolymer and poly- isobutylene.

4. Where dispersant viscosity modifiers are used in a multigrade program, the additional dispersant requirement for any subsequent rationalization to a monograde or other grade with a lower viscosity modifier treatment level will be defined by the Sequence VG test alone provided Level 2 support (Tab 1) exists in the other test types.

5. Following completion of a program according to the ACC Code of Practice, substitution of Group III or Group IV base stock for Group I, Group II and/or Group III base stock is allowed with Level 2 support.

6. Substitution of API Group V base stock for up to 10% of the base stock is allowed for PCMOs and diesel engine oils with Level 2 support.

AMERICAN CHEMISTRY COUNCIL
PRODUCT APPROVAL
CODE OF PRACTICE

APPENDIX J

Compliance

APPENDIX J

COMPLIANCE

Introduction

This section establishes requirements for those organizations desiring to assess compliance with the Code. A Letter of Intent from each company's management establishes its commitment to compliance with the Code. The audit provides an independent evaluation of an organization's compliance.

Purpose

This section provides uniform guidelines for assessment of compliance with the Code. Compliance with the Code is voluntary and is not restricted to American Chemistry Council (ACC) member companies or their laboratories.

I. TEST SPONSOR (COMPANY) COMPLIANCE

A test sponsor (company) may achieve and maintain compliance by adhering to the following requirements.

a) A company must conduct all candidate oil engine tests and programs on a worldwide basis for tests listed within the Code according to the applicable Practices of the Code.

b) A company must submit a **Test Sponsor Letter of Intent** to comply with the Code, signed by an executive officer. This letter must be submitted to the ACC PAPTG Manager when a company begins practice of the Code and must be renewed before March 30 of each year thereafter.

c) A company must complete an annual external audit according to the **Test Sponsor Audit Process**. An approved auditor, chosen from a list of ACC-trained auditors, must conduct this audit using the **Test Sponsor Audit Guide**.

d) A company must submit to the ACC PAPTG Manager by July 1 of each year the **Test Sponsor Self-Evaluation Checklist of Compliance Stages (Checklist)**, endorsed by the auditor, based on the results of the external audit and meeting the **Criteria for Assessing Compliance** (or, see "f" below if no tests were registered). In the first audited year of Code practice, a company with areas of non-compliance is permitted to remain in compliance by rectifying these deficiencies, repeating the audit, and submitting another **Checklist**, endorsed by the auditor, by January 1 of the year following the first audited compliance period.

e) If a company wishing to be in compliance with the Code enters the system after March 30 of a given year, it must:

   i) file a **Test Sponsor Letter of Intent** covering the period of time from entry through the following March 30, which is considered the "first year";
   ii) conduct an audit for that period before July 1 of the following year, as in (c) and (d) above; and,

iii) file a **Test Sponsor Letter of Intent** before March 30 of each year thereafter.

This process will bring a company into the established cycle of compliance and audit.

f) A company that has not conducted candidate oil engine tests during the compliance period will be considered to be in compliance by following these steps:

i) have on file at ACC a **Test Sponsor Letter of Intent**;
ii) have verification from the ACC Monitoring Agency that no tests were scheduled or registered; and,
iii) submit that verification and a letter, signed by an executive officer, attesting to the fact that no candidate oil engine tests were conducted.

Test Sponsor Letter of Intent

_____ is committed to the continuous
(Test Sponsor Name)

improvement of engine oil testing and approval procedures as defined by the American Chemistry Council (ACC) Product Approval Code of Practice. Accordingly, effective March 30, 201x (or other date of implementation) _____ intends to conduct on a
(Test Sponsor Name)

worldwide basis all candidate oil engine tests and programs in accordance with the Practices specified in the Code. This provision applies to all engine tests listed in the Code.

_____ understands that compliance with the Code will be
(Test Sponsor Name)

monitored by a yearly external audit. The results of the audit will be made available to the ACC annually.

_____
Signed by Executive Officer of Company

Test Sponsor Audit Process

1. Test Sponsor chooses auditor from list of approved auditors.

2. Test Sponsor notifies the ACC PAPTG Manager that auditor has been selected.

3. The test sponsor authorizes the ACC Monitoring Agency to release to the auditor a listing of all tests scheduled by that sponsor during that auditing period. Alternatively, the test sponsor obtains from the ACC Monitoring Agency web site, a list of all tests scheduled by that sponsor during the auditing period. This list should be made available to the auditor at the beginning of the audit.

4. Audit is conducted according to **Test Sponsor Audit Guide**. The auditor can request, and the company must authorize release of, the ACC Monitoring Agency's "Summary of Engine Test Data for Completed Tests" for on-site review during the audit process.

5. Test Sponsor receives confidential audit report after completion of audit.

6. Test Sponsor notifies the ACC PAPTG Manager when audit is completed.

7. Test Sponsor completes **Test Sponsor Self-Evaluation Checklist of Compliance Stages (Checklist)**.

8. Auditor reviews and if agrees, endorses **Checklist**.

9. Test Sponsor submits **Checklist** to the ACC PAPTG Manager.

10. When an audit has been completed, if the auditor and the test sponsor cannot agree on the Checklist:
    i) The test sponsor submits the unendorsed **Checklist** to the ACC PAPTG Manager, indicating the reason why it is not endorsed;
    ii) The test sponsor must contract with another auditor, making the contents of the first audit available to him/her; and,
    iii) The test sponsor must submit an endorsed **Checklist** to the ACC PAPTG Manager within 60 days of the first submission to maintain compliance.

11. During the first audit of a test sponsor, the **Checklist** may contain areas of non-compliance, as noted in the **Criteria for Assessing Test Sponsor Compliance**. When this occurs:
    i) The test sponsor submits the endorsed Checklist to the ACC PAPTG Manager;
    ii) The test sponsor must rectify all areas of non-compliance;
    iii) The test sponsor contracts the auditor to repeat the audit; and,
    iv) The test sponsor submits the endorsed Checklist subsequent to the repeat audit by January 1 of the year following the first audited compliance period.

12. ACC publishes list of test sponsors in compliance. This will occur after July 1.

Test Sponsor Audit Guide

Practice #1. Testing in Calibrated Stands

Check the Test Laboratory Conformance Statement in each test report for completeness and correctness.

Practice #2. Test Scheduling and Registration

- Verify test scheduling and registration documentation.
- Confirm that test registration date preceded start of test.
- Verify Sponsor Code for Core Data Set.
- Verify correct use of **Cancellation Form**, if used (Appendix B-8).
- Check for listing of reasons for canceled tests.
- **Correction of Error Form**, if used, was correctly applied (Appendix B-9).
- Correction indicated and explanation given.

Practice #3. Test Stand Selection

- Check the Test Laboratory Conformance Statement in each test report for completeness and correctness.

Practice #4. Severity Adjustments

- Check engine test reports to confirm that laboratory severity adjustments were properly applied.
- Check engine test reports to confirm that industry severity adjustments (or correction factors) were properly applied.

Practice #5. Treatment of Data

- Confirm agreement between Candidate Data Package and ACC Monitoring Agency file regarding scheduled tests.
- Verify fate of each scheduled test.
- Check that all "count" numbers are accounted for.

Practice #6. Chemical & Physical Tests

- Verify participation statement from Director of ASTM International D.02 Interlaboratory Crosscheck Program on file for current audit year for each laboratory where physical and chemical tests are run.

- Verify statement from Laboratory Director on file for current audit year that their laboratory participates in the ASTM International D.02 Interlaboratory Crosscheck Program for the physical and chemical tests listed in Appendix 2b (Appendix E-2).

Practice #7. Multiple Test Evaluation Procedures (MTEP)

- Verify all results reported and included in MTEP.
- Check MTEP applied where multiple runs have occurred.
- Verify MTEP calculation done correctly, as per Appendix F, if applicable.
- Verify presentation of MTEP results in the Candidate Data Package.

Practice #8. Validity Questions

- Check the Test Laboratory Conformance Statement in each test report for completeness and correctness.
- Verify inclusion in the Candidate Data Package of any opinions, if sought, regarding the operational validity of a test.
- Verify inclusion in the Candidate Data Package of any statements summarizing the information supporting the exclusion of suspect test results from MTEP calculations.

Practice #9. Minor Formulation Modifications

- Verify that when using a non-matrix approach, no more than three modifications, and when using a matrix approach, no more than four modifications, as indicated by a change in the "mod" number, were incorporated into the final formulation. This only applies to the engine test types listed in Appendix H-3 (Item 7).
- Confirm Level 1 support on those modifications leading to the final formulation.
- Verify presence of Level 2 support, if required.
- Verify that the Minor Formulation Modifications leading to the final formulation are included in the Candidate Data Package.
- Check Candidate Data Package for the presence of a complete description of Core Data Set formulation.

Practice #10. Program Guidelines

- Verify existence of oil grades outside the Core Data Set.
- Verify that Program Guidelines, if required, were properly applied and included in the Candidate Data Package.
- Confirm the proper application of API Guidelines for SAE Viscosity-Grade Engine Testing, if used.
- Confirm the proper application of API Base Oil Interchangeability Guidelines, if used.

- Confirm Level I support on all modifications incorporated into the final formulation.
- Verify presence of Level 2 support, if required.
- Check Candidate Data Package for the presence of a complete description of the final formulation of each oil grade.

General

- Verify existence of current Test Sponsor Letter of Intent.
- The most current copy of SAE J300 and API EOLCS Publication 1509 were available.
- The most current copy of Code Bulletins and Monitoring Agency Bulletins were available.

Test Sponsor Self-Evaluation Checklist of Compliance Stages

Stages of Compliance

Stage I:	Non-Compliance
Stage II:	Partial Compliance (Material Issue*)
Stage III:	Partial Compliance (Non-Material Issue*)
Stage IV:	Full Compliance

* "Material" refers to those issues that would have real importance to, or substantial consequences on, the implementation of the Code. "Non-material" refers to those issues that would not have that effect. If issue is not applicable, please respond by marking "N/A".

	Stage				
	I	II	III	IV	N/A
Practice #1. Testing in Calibrated Stand					
Conformance Statement in each test report was complete and correct.					
Practice #2. Test Scheduling and Registration					
Test scheduling and registration documentation was complete.					
Test registration date preceded start of test.					
Sponsor Code was used for Core Data Set.					
Cancellation Form, if used, was correctly applied.					
Reasons for canceling test were given.					
Correction of Error form, if used, was correctly applied.					
Correction indicated and explanation given.					
Practice #3. Test Stand Selection					
Conformance Statement in each test report was complete and correct.					
Practice #4. Severity Adjustments					
Laboratory severity adjustments were properly applied.					
Industry severity adjustments (or correction factors) were properly applied.					

	Stage				
	I	II	III	IV	N/A
Practice #5. Treatment of Data					
There was agreement between the Candidate Data Package and the Monitoring Agency file regarding scheduled tests.					
The fate of each scheduled test was indicated.					
All “count” numbers were accounted for.					
Practice #6. Chemical & Physical Tests					
Verify participation statement from Director of ASTM International D.02 Interlaboratory Crosscheck Program on file for current audit year for each laboratory where physical and chemical tests are run.					
Verify statement from Laboratory Director on file for current audit year that their laboratory participates in the ASTM International D.02 Interlaboratory Crosscheck Program for the physical and chemical tests listed in Appendix 2b (Appendix E-2).					
Practice #7. Multiple Test Evaluation Procedures					
All results were reported and included in MTEP.					
MTEP were applied where multiple runs occurred.					
MTEP calculations were done according to Appendix F, if applicable.					
MTEP results were properly presented in the Candidate Data Package.					

	Stage				
	I	II	III	IV	N/A
Practice #8. Validity Questions					
Conformance Statement in each test report was complete and correct.					
Any opinions, if sought, regarding the operational validity of a test, were included in the Candidate Data Package.					
Statements supporting exclusion of suspect test results from MTEP calculations were included in the Candidate Data Package.					
Practice #9. Minor Formulation Modifications					
Verify that when using a non-matrix approach, no more than three modifications, and when using a matrix approach, no more than four modifications, as indicated by a change in the "mod" number, were incorporated into the final formulation. This only applies to the engine test types listed in Appendix H-3 (Item 7).					
Level 1 support was shown on those modifications incorporated into the final formulation.					
Level 2 support, if required, was presented.					
The Minor Formulation Modifications leading to the final formulation are included in the Candidate Data Package.					
The Candidate Data Package contained a complete description of Core Data Set formulation.					
Practice #10. Program Guidelines					
A Program was indicated by the presence of oil grades outside the Core Data Set.					
The Program Guidelines were properly applied					
The API Guidelines for SAE Viscosity-Grade Engine Testing, when used, were properly applied.					
The API Guideline for SAE Viscosity-Grade Engine Testing, when used, were properly applied					

		Stage				
		I	II	III	IV	N/A
	The API Base Oil Interchangeability Guidelines, when used, were properly applied					
	Level 1 support was shown on all modifications incorporated into the final formulation.					
	Level 2 support, if required, was presented.					
	Data relating to the use of Program Guidelines were included in the Candidate Data Package.					
	The Candidate Data Package contained a complete description of the final formulation of each oil grade.					
General						
	The current Test Sponsor Letter of Intent had been signed and submitted to ACC.					
	The most current copy of J300 and API EOLCS Publication 1509 were available.					
	The most current copy of Code Bulletins and Monitoring Agency Bulletins were available.					

Certified by:

Company Chief Executive Officer (or delegated authority)	Auditor
Company	Company
Date	Date

Criteria for Assessing Test Sponsor Compliance

During the first year of Code implementation, being "in compliance" means that a test sponsor (company) has no Stage I checkmarks on the Test Sponsor Self-Evaluation Checklist of Compliance Stages.

During the second year, being "in compliance" means that a test sponsor has no Stage I checkmarks and no Stage II checkmarks in Practices 1, 2, 3, 5, 6, and 8.

During the third year and all subsequent years, being "in compliance" means that a test sponsor has no Stage I or II checkmarks.

II. TEST LABORATORY COMPLIANCE

A test laboratory may achieve and maintain compliance by adhering to the following requirements.

a) A laboratory must conduct all ACC-scheduled engine tests according to the Practices of the Code.

b) A laboratory must submit a **Test Laboratory Letter of Intent** to comply with the Code, signed by an executive officer. This letter must be submitted to the ACC PAPTG Manager when a laboratory begins practice of the Code and must be renewed before March 30 of each year thereafter.

c) A laboratory must complete an annual external audit according to the **Test Laboratory Audit Process**. An approved auditor, chosen from a list of ACC-trained auditors, must conduct this audit using the **Test Laboratory Audit Guide**.

d) A laboratory must submit to the ACC PAPTG Manager by July 1 of each year the **Test Laboratory Self-Evaluation Checklist of Compliance Stages**, endorsed by the auditor, based on the results of the external audit and meeting the **Criteria for Assessing Compliance**. In the event a laboratory does not register any tests, written verification from the ACC Monitoring Agency must be submitted to the ACC PAPTG Manager.

e) In the first audited period of Code practice, a laboratory with areas of non-compliance is permitted to remain in compliance by rectifying these deficiencies, repeating the audit, and submitting another **Checklist**, endorsed by the auditor, by January 1 of the year following the first audited compliance period.

f) If a laboratory wishing to be in compliance with the Code enters the system after March 30 of a given year, it must:

   i) file a **Test Laboratory Letter of Intent** covering the period of time from entry through the following March 30, which is considered the "first year";
   ii) conduct an audit for that period before July 1 of the following year, as in (c) and (d) above; and,
   iii) file a **Test Laboratory Letter of Intent** before March 30 of each year thereafter.

   This process will bring a laboratory into the established cycle of compliance and audit.

Test Laboratory Letter of Intent

_____ is committed to the continuous improvement of
(Laboratory)
engine oil testing as defined by the American Chemistry Council (ACC)

Product Approval Code of Practice. Accordingly, effective March 30, 201X (or other

date of implementation) _____ intends to
(Laboratory)

conduct all ACC-scheduled candidate engine oil tests listed in the Code in accordance

with those practices controllable by the laboratory as specified in the Code.

_____ understands that compliance with the Code will be
(Laboratory)
monitored by a yearly external audit. The results of the audit will be made available to

ACC annually.

Signed by:

_____
Signature

_____
Title

Test Laboratory Audit Process

1. Laboratory chooses auditor from list of approved auditors.

2. Laboratory notifies the ACC PAPTG Manager that auditor has been selected.

3. The laboratory makes available to the auditor TMC-generated individual test summaries of all reference oil tests, results, and validity codes for the audit period. The laboratory authorizes the ACC Monitoring Agency to release the total number, by test type, of scheduled tests, and the fate of each test (Appendix E1) for that laboratory.

4. Audit is conducted according to the **Test Laboratory Audit Guide**.

5. Laboratory receives confidential audit report after completion of audit.

6. Laboratory notifies the ACC PAPTG Manager when audit is completed.

7. Laboratory completes Test Laboratory **Self-Evaluation Checklist of Compliance Stages (Checklist)**.

8. Auditor reviews and if agrees, endorses **Checklist**.

9. Laboratory submits **Checklist** to the ACC PAPTG Manager.

10. When an audit has been completed, if the auditor and the laboratory cannot agree on the Checklist:
    i) The laboratory submits the unendorsed **Checklist** to the ACC PAPTG Manager, indicating the reason why it is not endorsed;
    ii) The laboratory must contract with another auditor, making the contents of the first audit available to him/her; and,
    iii) The laboratory must submit an endorsed **Checklist** to the ACC PAPTG Manager within 60 days of the first submission to maintain compliance.

11. During the first audit of a Laboratory, the **Checklist** may contain areas of non-compliance, as noted in the **Criteria for Assessing Test Laboratory Compliance**. When this occurs:
    i) The laboratory submits the endorsed **Checklist** to the ACC PAPTG Manager;
    ii) The laboratory must rectify all areas of non-compliance;
    iii) The laboratory contracts the auditor to repeat the audit; and,
    iv) The laboratory submits the endorsed **Checklist** subsequent to the repeat audit by January 1 of the year following the first audited compliance period.

12. ACC publishes list of test laboratories in compliance. This will occur after July 1.

Test Laboratory Audit Guide For Compliance

Practice #1. Test Stand Calibration

The test stand is a TMC-calibrated stand and meets the requirements of Appendix A.

- Verify test stand/test calibration status.
- Review and verify stand/laboratory LTMS charts.

Practice #2. Test Stand Assignment

The stand was assigned per Appendix D. We assume that the stand selection algorithm has assigned the test to the proper stand.

- Verify use of test stand selection algorithm.
- Verify algorithm consistent with Engine Test Stand Selection (Appendix D).

Practice #3. Test Registration

Part B of the test registration form was completed and sent to ACC Monitoring Agency prior to the beginning of the test.

- Verify test registration prior to test start.

Practice #4. Test Results Reporting

The intent is to send the appropriate information to ACC Monitoring Agency as per RSI Bulletin #92-003 and #92-007.

- Verify simultaneous notification of final results to test sponsor and ACC Monitoring Agency.
- Verify that all tests scheduled are accounted for.
- Verify that a process is in place for submission of corrected test report pages to the ACC Monitoring Agency and test sponsor.

Practice #5. Test Severity Adjustments

The application and calculation of laboratory severity adjustments were done in accordance with Appendix A.

- Verify severity adjustment process in place.
- Verify proper application of laboratory severity adjustments.
- Verify proper application of industry severity adjustments (or correction factors).

Practice #6. Test Sponsor Instructions

Instructions from the sponsor do not conflict with the spirit and letter of the Code and ASTM test procedure.

- Verify that a process is in place to ensure that test sponsor requests are in compliance with the Code.

Practice #7. Engine Build Records

The engine build records were reviewed to ensure that, to the best of the test engineer's knowledge, the proper test hardware and techniques were used and the specified build parameters were met.

- Verify that a process is in place for reviewing records.
- Verify application of process.

Practice #8. Stand Calibration Records

The test stand is a TMC-calibrated stand and meets the requirements of Appendix A.

- Verify that a process is in place for reviewing records.
- Verify application of process.

Practice #9. Instrument Calibration Records

The calibration records are reviewed following the periodic instrument calibration (reviewing records of every test is not necessary). The stand is verified to meet the calibration requirements in accordance with the appropriate ASTM test procedure.

- Verify that a process is in place for reviewing records.
- Verify application of process.

Practice #10. Operational Data

At a minimum, the operational data is compared against the appropriate validity criteria.

- Verify that a process is in place for reviewing data.
- Verify application of process.

Practice #11. Post-Test Inspection

The reported ratings and measurements that are not related to pass/fail criteria were reviewed, e.g., rater's remarks.

- Verify that a process is in place for inspection.

- Verify application of process.

Practice #12. Engine Test Result Data

Applicable reported ratings and measurement data related to pass/fail criteria were reviewed.

- Verify that a process is in place for reviewing data.
- Verify application of process.

Practice #13. Oil Analytical Data

The reported oil analytical and physical data were reviewed.

- Verify that a process is in place for reviewing data.
- Verify application of process.
- Verify that a quality process is in place to assure that test procedures are followed.
- Verify that a quality process is in place to assure that test precision is within that considered typical for the test method.

General

- Verify existence of current Test Laboratory Letter of Intent.
- The most current copy of Code Bulletins and Monitoring Agency Bulletins were available.
- The most current copies of documents referenced in the Code were available (ASTM Lubricant Test Monitoring System (LTMS); ASTM D445, D2896, D5293, D4684, D5481, D4683, D4741; ASTM E29; ASTM Information Letters Re: Severity Adjustment Calculations; Test procedures for all tests included in the Code.)

Test Laboratory Self-Evaluation Checklist of Compliance Stages

Stages of Compliance

Stage I:	Non-Compliance
Stage II:	Partial Compliance (Material Issue*)
Stage III:	Partial Compliance (Non-Material Issue*)
Stage IV:	Full Compliance

* “Material” refers to those issues that would have real importance to, or substantial consequences on, the implementation of the Code. “Non-material” refers to those issues that would not have that effect. If issue is not applicable, please respond by marking“N/A".

	Stage				
	I	II	III	IV	N/A
Practice #1. Test Stand Calibration					
Test stands were calibrated in accordance with the Code of Practice.					
Stand/lab LTMS charts were reviewed and verified.					
Practice #2. Test Stand Assignment					
A test stand selection algorithm was used.					
The algorithm was consistent with the Engine Test Stand Selection in Appendix D.					
Practice #3. Test Registration					
Engine tests were registered prior to test start.					
Practice #4. Test Results Reporting					
The test sponsor and ACC Monitoring Agency were simultaneously notified of final test results.					
All scheduled tests were accounted for.					
A process was in place for submission of corrected test report pages to the ACC Monitoring Agency and test sponsor.					
Practice #5. Test Severity Adjustments					
A severity adjustment process was in place.					
Laboratory severity adjustments were properly applied.					
Industry severity adjustments (or correction factors) were properly applied.					

	Stage				
	I	II	III	IV	N/A
Practice #6. Test Sponsor Instructions					
A process was in place for reviewing test sponsor request.					
The process was applied.					
Practice #7. Engine Build Records					
A process was in place for reviewing records.					
The process was applied.					
Practice #8. Stand Calibration Records					
A process was in place for reviewing records.					
The process was applied.					
Practice #9. Instrument Calibration Records					
A process was in place for reviewing records.					
The process was applied.					
Practice #10. Operational Data					
A process was in place for reviewing data.					
The process was applied.					
Practice #11. Post Test Inspection					
A process was in place for inspection.					
The process was applied.					
Practice #12. Engine Test Result Data					
A process was in place for reviewing data.					
The process was applied.					
Practice #13. Oil Analytical Data					
A process was in place for reviewing data.					
The process was applied**.**					
Verify that a quality process was in place to assure that test procedures are followed.					
Verify that a quality process was in place to assure that test precision is within that considered typical for the test method.					

	Stage				
	I	II	III	IV	N/A
General					
Verify existence of current Test Laboratory Letter of Intent.					
The most current copies of Code Bulletins and Monitoring Agency Bulletins were available.					
The most current copies of documents referenced in the Code were available (ASTM Lubricant Test Monitoring System (LTMS); ASTM D445, D2896, D5293, D4684, D4624, D4683, D4741; ASTM E29; ASTM Information Letters Re: Severity Adjustment Calculations; Test procedures for all tests included in the Code.)					

Certified by:

Signature	Auditor
Title/Laboratory	Company
Date	Date

Criteria for Assessing Test Laboratory Compliance

During the first auditable year of practice under the Code, being "in compliance" means that a laboratory has no Stage I checkmarks on the Test Laboratory Self-Evaluation Checklist of Compliance Stages.

During the second year, being "in compliance" means that a laboratory has no Stage I checkmarks and no Stage II checkmarks in Practices 1, 2, 3, 4, 5, and 6.

During the third year and all subsequent years, being "in compliance" means that a laboratory has no Stage I or II checkmarks.

AMERICAN CHEMISTRY COUNCIL
PRODUCT APPROVAL
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APPENDIX K

Template for Acceptance of New Tests

APPENDIX K

TEMPLATE FOR ACCEPTANCE OF NEW TESTS

INTRODUCTION

This Template defines the elements and the limits required for achieving precise and discriminating engine tests, processes for controlling key variables that can affect precision and discrimination, and methods to measure those key performance variables.

The “Acceptance Criteria” represent:

- the minimum acceptable levels of precision and discrimination;
- methods for precision and severity control charting;
- methods for handling multiple test results; and
- “Action Plans” for addressing variables that can affect precision and discrimination over the life of the test, or for addressing procedures that must be done during test development.

The “Action Plans”, with recommended approaches, address:

- reference oils;
- test parts;
- test fuels;
- test procedures;
- rating and reporting of results;
- calibration, monitoring, and surveillance; and
- development of guidelines for read-across and interchangeability.

PURPOSE

The main objective of the Template is to ensure through the “Acceptance Criteria” and the “Action Plans” that the accuracy of the measuring tools, the integrity of the data developed, and the interpretation of the results from these tools are founded upon technically correct and statistically sound principles; and that processes are in place to maintain quality. The end result will be more cost-effective testing and a greater confidence that a lubricant meets its intended performance.

RELATIONSHIP TO ENGINE OIL CATEGORIES

The Code specifies quality processes relating to engine tests, which when applied collectively with specific test limits, form the basis for defining an engine oil category. A demonstration oil

is necessary to establish the performance limits of the tests comprising the category. Such an oil must meet the performance limits of each of the tests within the category.

ACCEPTANCE CRITERIA

The following are requirements for acceptance of new tests into the Code:

A. Precision, Discrimination and Parameter Redundancy

The quality of a test is measured by the capability of the test to yield mutual agreement between individual results and to differentiate adequately between passing and failing oils at the performance limit. Acceptance of a test into the Code is dependent upon the test's capability to meet the defined precision and discrimination criteria.

Requirements

A.1 Discrimination

For each test parameter in A.2, at least one of the oils used in proof-of-concept testing, matrix testing, or reference testing must be significantly different from at least one of the remaining oils. This difference must be in the same direction as known performance of oils. Significant difference may be declared with a p-value of 0.10 or less. Multiple comparisons should be taken into account

A.2 Precision

The value, E_p, of repeat runs on the same lubricant must be 1.0 or greater for all proposed pass/fail criteria. All calculations must be in transformed units, where applicable, at the pass/fail limit.

$$E_p = dp/Spp$$

Where,

dp = Smallest difference of practical importance as determined by the American Chemistry Council (ACC) with input from industry as appropriate, e.g., ASTM, API, SAE, AAM, EMA.

S_{pp} = Intermediate precision standard deviation based on precision matrix data.

An example is provided below.

Parameter	dp	Spp	Ep	Ep≥1.0
A	0.3	0.2	1.5	Yes
B	0.3	0.4	0.75	No

A.3 Parameter Redundancy

If two criteria for a test must meet specified limits, there are three ways to fail the test (Pass/Fail, Fail/Pass, and Fail/Fail) and only one way to pass the test (Pass/Pass). If the repeat variability on equivalent oils were independent and the true performance level for each criterion were exactly at the pass limit, there would be a ¾ chance of failing the test and a ¼ chance of passing. If the two criteria measure the same performance characteristic of oil, i.e., if they were redundant criteria, the oil should have a ½ chance of passing the test. Therefore, if two criteria are significantly correlated across oils and the test-to-test variability within oils is not significantly correlated, this is evidence that specifying limits for the two criteria would subject oils to unjustified jeopardy.

Each pass/fail parameter has a unique and significant purpose in terms of the engine oil performance standard. Linear and non-linear relationships are possible and should be taken into account. If two passing criteria are significantly related across oils, they must also be highly related in repeated tests within oils to avoid multiple jeopardy that adds no value to evaluation of oil performance. Statisticians will use appropriate methods to analyze data and parameters.

B. Severity and Precision Control Charting

A Lubricant Test Monitoring System (LTMS) is a key gauge for evaluating overall test performance. Key attributes of any LTMS system are the monitoring and tracking of severity and precision for both abrupt and long term changes, alarm points, and alarm responses at various levels (stand, lab, industry).

Requirements

B.1 A LTMS for reference oil tests that is consistent with ACC Code Appendix A is in place.

B.2 Appropriate data transforms are applied to test results as needed in order to assure the approximate normality of the data population and/or to minimize non-constant variance.

B.3 There is a laboratory, stand or engine-based severity adjustment system which relies on reference oil performance to determine adjustments in the mild or severe direction.

C. Interpretation of Multiple Test Results

The method of interpretation of multiple test results must be a data-based approach for evaluating the quality and performance of a formulation through the consideration of all operationally valid test results. The method selected should recognize the precision of the test and the statistical reality that confidence in oil performance increases as the number of tests on the oil increases. Additionally, the method selected should include a methodology for the handling of discordant results.

Requirements

C.1 There is a system to handle the results of repeat tests run on a candidate, which takes into account current industry precision.

C.2 The appropriateness of a statistical method for the determination and handling of outlier results has been determined and the method defined.

D. Action Plan

Action plans must be developed and in place that address the following items:

D.1 Reference Oils

The choice, quantity, quality, supply, and distribution of reference oils are critical elements of the template. Reference oils are typically selected from oils within the precision matrix and suitable for LTMS. Long-term consistency and availability must be assured through documented quality systems.

To ensure that the severity and precision control charts accurately reflect the severity and precision of the test, the appropriate number of reference oils must be included to help determine shifts in test quality for all critical parameters.

Recommended Approaches

D.1.1 Consistent with the ASTM Test Development Flow Plan, at least one of the reference oils used must be representative of technology "current" when the applicable engine oil performance standard was established.

D.1.2 The intent is to have a reference oil that is at the intended performance level of the new category.

D.1.3 Oil supply and distribution are handled through an independent monitoring organization.

D.1.4 A quality control plan is defined and in place to assure the long-term quality of oils.

D.1.5 A turnover plan is defined and in place to ensure the uninterrupted supply of existing reference oils and an orderly transition to reblends.

D.1.6 A process for the introduction of replacement reference oils is defined and in place.

D.1.7 Oils are blended in a single homogeneous quantity to last five years.

D.2 Test Parts

In alignment with ASTM International's policy, development of test methods based on generic equipment (parts and fluids) is encouraged. For equipment that has a technical-based effect on test precision or severity, it may be appropriate to classify equipment as critical and to identify the source.

Requirements

D.2.1 Critical test parts, defined as those parts, which may affect severity and/or

precision, must be identified.

D.2.2 A system must be defined and in place to maintain all testing on uniform hardware through a consistent and stable single-source supply of critical parts.

D.2.3 There must be a formal system in place for engineering support and test parts supply.

Recommended Approaches

D.2.4 Critical parts are distributed through an equipment distributor (who may or may not be the test developer).

D.2.5 Critical parts are serialized, and their use documented, in the LTMS data set and test report.

D.2.6 All parts are used on a first in/first out basis.

D.2.7 All rejected (unused) critical parts are accounted for and returned to the equipment distributor.

D.2.8 The equipment distributor provides a status report to the independent industry-recognized body responsible for the calibration, monitoring, and surveillance of the test method, at least semi-annually.

D.2.9 Quality control and turnover plan is in place for critical test parts to help assure consistency of parts among laboratories. These plans include the identification and measurement of key part attributes. Furthermore, a system for part quality accountability is defined and operable. A turnover plan is in place to ensure that all testing facilities use new parts batches or supply sources simultaneously.

D.2.10 There is a formal system for engineering support and test parts supply. Examples of support include:

Active participation in the independent industry-recognized body, e.g., ASTM Surveillance Panel, CEC Surveillance Group, responsible for the calibration, monitoring, and surveillance of the test; and

Active participation in industry-sponsored test matrices.

D.3 Test Fuel

The test fuel is part of the test procedure; therefore, it is as important as any other aspect of an engine test. If small variations in test fuel quality influence the results of an engine test, the fuel must be considered a critical part.

Requirements

D.3.1 Fuel supplier(s) and fuel specification (chemical and physical properties) are identified.

Recommended Approaches

D.3.2 Approval guidelines are in place for fuel certification (batch, supplier,etc.).

D.3.3 A process is in place to monitor fuel stability over time.

D.3.4 If the test fuel is treated as a critical part of the test procedure; the following additional items are addressed: Approval engine testing plan and severity monitoring plan for each fuel batch is in place.

D.3.5 A quality control plan is defined and in place to assure the long-term quality of the fuel.

D.3.6 A turnover plan is defined, in place and demonstrated to ensure the uninterrupted supply of existing test fuel and an orderly transition to reblends.

D.4 Test Procedure

The establishment of any continuous improvement efforts requires a clear statement of a starting point. This starting point is the written test procedure where key aspects related to the running, rebuilding, and rating of a test are documented.

Requirements

D.4.1 Test preparation, operation, and validity are clearly documented in a standards format, e.g., ASTM, CEC.

D.4.2 Test stand configuration requirements are documented and standardized.

D.4.3 Operational validity is defined for all controlled parameters.

Recommended Approaches

D.4.4 A research report is published that documents the test precision.

D.4.5 There are published documents that
- document field correlation, and
- document test development history.

D.4.6 Routine engine build workshops are conducted.

D.4.7 All reported ratings and measurements must have a defined basis for judging interpretation of the test, or performance against oil specifications.

D.5 Rating and Reporting of Results

Consistent test parameter rating and the use of severity-adjusted results improve test precision and accuracy. The rating of only relevant parameters helps ensure cost effective testing. To ensure that the severity and precision control charts accurately reflect the test labs' severity and precision, no referee ratings are to be used in the determination of final test results. All reference and candidate tests

must be rated in the same manner by a qualified test laboratory rater.

Requirements

D.5.1 Reported ratings for any single parameter in a test must be from single raters. Averaging of ratings from various raters is not permitted.

Recommended Approaches

D.5.2 Routine rater workshops are conducted.

D.6 Calibration, Monitoring and Surveillance

The independent monitoring of test performance with blind reference oils provides the data necessary for tracking severity and precision. Test procedure acceptability and appropriate adjustments to test results are based on reference oil performance relative to industry targets. A reference oil system administered by an industry recognized independent body assures laboratory confidentiality and unbiased test surveillance.

Requirements

D.6.1 A process is in place for independent monitoring of severity and precision with an action plan for maintaining calibration of all laboratories.

D.6.2 Control charts based on industry reference oil data are used to judge the calibration status of laboratories, stands, and industry.

D.6.3 The specified calibration test interval should allow no more than 15 non-reference oil tests between successful calibration tests. This maximum elapsed time between reference tests is defined in the test procedure.

D.6.4 An industry panel is in place to provide test surveillance.

D.7 Guidelines for Read Across

A plan is defined for the establishment of data to assist in the development of base oil and viscosity grade read across guidelines and interchangeability. This plan will have been developed in concert with other interested parties such as API, ASTM, etc.

ADDENDUM K1

TEMPLATE CHECKLIST

Purpose

The Checklist for Comparing Tests to the Template is used to assess progress in new engine test development against the Code Acceptance Criteria and Action Plans. The checklist is updated periodically during the course of test development and is provided to, and discussed with, the appropriate ASTM test development task force.

The rating scale for comparing test development to the Template is as follows:

A - Completed

B - In Progress

C - Planned

D - No Action

Test Name_____ **Assessment Date**_____

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

Appendix K - Template for Acceptance of New Tests

Checklist for Comparing Tests to the Template

A. Precision and Discrimination

A.1 Discrimination

Requirements

A.1.1 Proof of concept- does the test discriminate between oils of differing expected performance (for example- between good and bad oils)? _____

Recommended Approaches

A.1.2 Is there evidence of additional discrimination based on all available data? _____

Use this section to record proof-of concept testing discrimination. You may also include precision matrix test discrimination as applicable.

Comments:

A.2 Precision

Requirements

A.2.1 Is the E_p 1.0 or greater for all pass/fail criteria? _____

Comments:

A.3 Parameter Redundancy

Requirements

A.3.1 For each pair of pass/fail parameters, is the correlation across oil means insignificant? If the correlation across oils is significant are these parameters closely related in repeat tests within oils? _____

B. Severity and Precision Control Charting

Requirements

B.1 Is an LTMS for reference oil tests in place which is consistent with the ACC Code Appendix A? _____

B.2 Are appropriate data transforms applied to test results? _____

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

B.3 Is a suitable severity adjustment system in place? _____

Comments:

C. Interpretation of Multiple Tests

Requirements

C.1 Is a suitable system in place to handle repeat tests on a candidate oil (MTEP)? _____
Type: MTAC TLM MRS

C.2 Has a method for the determination and handling of outlier results been defined? _____

Comments:

D. Action Plan

D.1 Reference Oils

Recommended Approaches

D.1.1 Does at least one of the reference oils represent current technology? _____

D.1.2 Is there a reference oil that is at the intended performance level of the new category? _____

D.1.3 Is reference oil supply and distribution handled through an independent organization? _____

D.1.4 Is the storage of oils defined and in place? _____

D.1.5 Is a turnover plan defined/in place to ensure uninterrupted supply of reference oil and an orderly transition to reblends? _____

D.1.6 Is a process for introducing replacement reference oils defined and in place? _____

D.1.7 Are oils blended in a homogeneous quantity to last 5 years? _____

Comments:

D.2 Test Parts

Requirements

D.2.1 Are all critical parts identified? _____

D.2.2 Is a system defined/in place to maintain uniform hardware? _____

D.2.3 Is there a system for engineering support and test parts supply? _____

Recommended Approaches (if indicating yes on D.2.1, D.2.2-7 are requirements)

D.2.4 Are critical parts distributed through a Central Parts Distributor (CPD)? _____

D.2.5 Are critical parts serialized, and their use documented in test report? _____

D.2.6 Are all parts used on a first in/first out basis? _____

D.2.7 Are all rejected critical parts accounted for and returned to the CPD? _____

D.2.8 Does the CPD make status reports to the test surveillance body at least semi-annually? _____

D.2.9 Is there a quality control and turnover plan in place for critical test parts, including identification and measurement of key part attributes, a system for parts quality accountability, a turnover plan in place for simultaneous industry-wide use of new parts or supply sources? _____

D.2.10 Is the CPD active in industry surveillance panel/group, and in industry sponsored test matrices? _____

Comments:

D.3 Test Fuel

Requirements

D.3.1 Is the fuel specified and the supplier(s) identified? _____

Recommended Approaches

D.3.2 Is a process in place to monitor fuel stability over time? _____

D.3.3 Are approval guidelines in place for fuel certification? _____

D.3.4 If the test fuel is treated as a critical part of the test procedure: Is an approval plan and severity monitoring plan for each fuel batch in place? _____

D.3.5 Is a quality control plan defined and in place to assure long term quality of the fuel? _____

D.3.6 Is a turnover plan defined, in place and demonstrated to ensure _____

uninterrupted supply of fuel?

Comments:

D.4 Test Procedure

Requirements

D.4.1 Are test preparation and operation clearly documented in a standard format, e.g., ASTM, CEC? _____

D.4.2 Are test stand configuration requirements documented and standardized? _____

D.4.3 Is operational validity defined for all controlled parameters? _____

Recommended Approaches

D.4.4 Is a research report published documenting test precision for reference oils? _____

D.4.5 Are there published documents detailing:
Field correlation? _____
Test development history? _____

D.4.6 Are routine engine builder workshops planned/conducted?

D.4.7 Do all rate and report parameters judge test interpretation, or judge engine oil performance? _____

Comments:

D.5 Rating and Reporting of Results

Requirements

D.5.1 Are the reported ratings for any single parameter in a test from single raters (i.e. not averages from various raters)? _____

Recommended Approaches

D.5.2 Are routine rater workshops conducted/planned? _____

Comments:

D.6 Calibration, Monitoring and Surveillance

Requirements

D.6.1 Is a process in place for independent monitoring of severity and precision with an action plan for maintaining calibration of all laboratories? _____

D.6.2 Are stand, lab, and industry reference oil control charts of all pass/fail criteria parameters used to judge calibration status? _____

D.6.3 Does the specified calibration test interval allow no more than 15 non-reference oil tests between successful calibration tests? _____

D.6.4 Is an industry surveillance panel in place? _____

Comments:

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

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Tab 1

Glossary of Terms

TAB 1

GLOSSARY OF TERMS

As used in this Code, key terms are defined as set forth below

Absolute Percentage Change - A percent change made to the whole.

Accuracy - Having a high degree of agreement with an accepted reference level, i.e., the true value with precision that is known and acceptable. (See ASTM E 177, latest version)

American Chemistry Council (ACC) Monitoring Agency - An impartial organization providing to the industry oversight, administrative and advisory services related to candidate engine testing in accordance with the Code (see Appendix C).

API - American Petroleum Institute.

ASTM - American Society for Testing and Materials.

ASTM Test Guidelines - Equipment specifications and test operating conditions defined in test methods and information letters approved by ASTM Subcommittee B.

ASTM Test Monitoring Center (ASTM TMC) - That part of ASTM which monitors engine test methods published by ASTM, provides reference oils to test laboratories and publishes statistical analysis of engine test precision.

Base Oil - Refer to Appendix E, E1.2.3, of API 1509 Engine Oil Licensing and Certification System.

Base Stock - Refer to Appendix E, E1.2.1, of API 1509 Engine Oil Licensing and Certification System.

Base Stock Slate - Refer to Appendix E, E1.2.2, of API 1509 Engine Oil Licensing and Certification System It is PAPTG's interpretation that the base stock manufacturer mentioned in the definition has the responsibility for determining the content of the slate. For the purpose of developing consistent ACC engine test programs for candidate oils as described in the Code of Practice, should there be a dispute as to whether a particular base stock is in a base stock slate, Section 7 of the API Lubricant Committee Procedures 2002 will be followed.

Calibrated Test Stand - Engine test stand having acceptable precision and accuracy as defined in Appendix A.

Candidate - A formulation tested for conformance to requirements established by the customer.

Candidate Data Package - Record of complete program generated by sponsor for use of the customer (see Appendix E).

Completion Date Order - The sequential ordering of tests, on an integer unit basis, relative to ascending date/time order of completion.

Component - A material which imparts a property to an oil, has a unique identifier and meets a particular manufacturer's specification. The performance package is composed of specific components.

Core Data Set - All engine tests and support data on a single performance additive package at a specified treatment level, which documents passing performance of a final formulation against customer requirements for one or more categories defined within API Publication 1509. During the development of the Core Data Set, Minor Formulation Modification Guidelines and API Guidelines for SAE Viscosity-Grade Engine Testing (API 1509 Appendix may be used. Alternatively, for a matrix approach, API Base Oil Interchangeability Guidelines (API 1509 Appendix E) may also be used.

Critical Parameter - A test parameter monitored, tracked, and controlled for both large abrupt changes and smaller consistent trends in both severity and precision.

Current Time Severity Adjustment - Correction to engine test result based on lubricant test monitoring system.

Customer - An organization or individual for whom a program is conducted.

Electronic Data Transfer (EDT) – The electronic transfer of engine test data to the ACC Monitoring Agency.

Engine Test Stand - The specific location within a test facility of equipment, including but not necessarily limited to dynamometer, engine, necessary instrumentation and control systems specific to the operation of an individual engine test.

Engineering Judgment - The application of fundamental expert knowledge to the interpretation of a process.

Formulation - An engine oil comprised of specific concentrations of base stocks and additives.

Level 1 Support - Analytical and rheological testing as defined in Appendix E, Item2.

Level 2 Support - Level 1 plus full-length, ASTM operationally valid and interpretable engine tests on oils containing performance additive package(s) representative of the chemistry in the final formulation. It is the intent that ASTM calibrated stands be used in all cases. These tests are limited to the following:

a) Statistically designed engine test matrices or
b) Complete engine test programs or
c) Partial set of tests from same technology family where no harm is demonstrated for specific test types.
In the absence of Level 2 support for a particular test type, this test must be passed on a final formulation or formulations supporting the final formulation.

Monitoring Agency Advisory Group - A subgroup of the American Chemistry Council Product Approval Protocol Task Group that provides guidance on policy, technical and operational matters to the American Chemistry Council Monitoring Agency.

Multiple Test Evaluation Procedures (MTEP) - Any data-based approach for evaluation of the quality and performance of a candidate formulation where one or more tests have been conducted (see Appendix F).

No Harm - "No harm" is demonstrable by test results, which reflect no statistically significant difference. Minor modifications are made with the expectation that the modified formulation will meet all chemical & physical and engine test requirements.

Non-Critical Parameter - A test parameter monitored, tracked and controlled for both large abrupt changes and smaller consistent trends in severity only.

OEM - Original Equipment Manufacturer, for example Ford, General Motors, Toyota, Caterpillar, Cummins, Mack and Chrysler.

Oil Grades - A specific combination of SAE viscosity grade and customer performance requirement.

Operationally Valid - Carried out with test equipment, which is in specification, and completed with all test details and operational parameters fully within ASTM test guidelines and Code Appendix G.

Passing Limits - The target performance level to which candidate tests results, including appropriate severity adjustments, are compared.

Performance Additive Package - Combination of detergents, dispersants, inhibitors and/or other chemicals which when blended into the base oil, with or without other additives, is intended to meet specific engine and chemical & physical test requirements. Historically, “performance additive package” has also been commonly referred to as a detergent inhibitor or DI package.

Petroleum Additives Panel - American Chemistry Council industry group of active developers, manufacturers or marketers of performance enhancing chemicals for use in automotive and industrial petroleum fuels and/or lubricants.

Precision - Degree of mutual agreement between individual results (ASTM E177, latest version).

Product Approval Protocol Task Group - A task group of the Petroleum Additives Panel responsible for the development of the Code and input to the new category implementation and product approval processes through interaction with other trade associations.

Program - All engine tests and support data demonstrating conformance to customer requirements of one or more oil grades.

Rebalance - A change in the relative amount of one zinc dialkyl dithiophosphate to another zinc dialkyl dithiophosphate or of one metallic detergent to another metallic detergent within the candidate formulation.

Registration - The process of notifying the American Chemistry Council Monitoring Agency of the intent to conduct a candidate test (see Appendix B).

Relative Percentage Change - A percent change made to a portion of the whole.

Soap Content - The active organic chemical content of the detergent (for sulfonates ASTM D 3712).

Sponsor - That individual, company or organization which has financial and administrative responsibility for conducting a program.

Suspect Result - A result from an operationally valid engine test that is atypical of the true performance of the formulation.

Technical Advisory Group - An advisory group composed of statisticians, test engineers and other resource personnel from Product Approval Protocol Task Group (PAPTG) member companies that address technical issues and tasks assigned by PAPTG.

Test Order - Same as Completion Date Order.

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Tab 2

American Chemistry
Council Code Bulletins

Note: In August 2006, the ACC PAPTG reached consensus to remove Tab 2 from the Code of Practice. Future Code Bulletins will be posted on the ACC website http://www.americanchemistry.com/paptg. Past Code Bulletins have been archived and are available by request to the ACC PAPTG Manager.

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TAB 3

ACC Monitoring Agency Bulletins

ACC MONITORING AGENCY BULLETINS

All ACC Monitoring Agency Bulletins have been archived and are available for download on the ACC Monitoring Agency website (https://acc-ma.org). Please contact the ACC Monitoring Agency Manager, Frank Farber (Phone Number: 412-365-1030, Email: fmf@astmtmc.cmu.edu) to obtain a user ID and password.

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Tab 4

Code Interpretations

March 25, 2011

Mr. Richard P. Leach
Global Industry Advocacy
Advisor ExxonMobil
Lubricants & Specialties 3225
Gallows Road
Fairfax, VA 22037

Dear Richard,

The American Chemistry Council's Product Approval Protocol Task Group (ACC PAPTG) has reviewed your letter dated February 9, 2011, which requested clarification on several points related to minor formulation modifications described in Appendix H of the ACC Code of Practice. ACC PAPTG's responses to the three questions asked in your letter, which is included with this letter, are provided below.

(1) Is there an element of time / sequencing associated with the use of minor formulation modifications during the development of a program?

There is no time / sequencing associated with the use of minor formulation modifications during the development of a program. The Modification part of the Formulation/Stand Code (described in ACC Code, Appendix B) is intended to differentiate minor modification of a formulation used in a core program. In the Formulation/Stand Code, the combination of ID, Sponsor Code, and Modification identifies a unique blend formula. The Modification (letter) designation of the Formulation/Stand Code is independent of time/sequencing. The underlying guidance is that the DI/VM chemistry for all test formulations must be able to reach the final formulation in a Core Program using the guidelines of Appendix H and that the final formulation contains all minor formulation modifications used during the conduct of the engine test program. Additionally, if the core program is a matrix core program, then API 1509 Appendix E (Base Oil Interchange Guidelines) and/or API 1509 Viscosity Grade Read Across Guidelines (Appendix F) are also followed.

(2) If there are no time related limitations, is it permissible to create and test minor formulation modifications containing lower levels of additive than oils that have previously passed other engine tests? For example, is it acceptable to make a Level 1 reduction in the antioxidant concentration of a formulation that passed the Sequence IIIG, then run the resulting formulation with the lower additive level in one of the other Sequence tests?

Since there are no time related limitations, it is permissible to create an alternate formulation for the program at any time as long as the performance additive package

commercialized for sale includes all minor modifications used to support the final formulation. Please note, the Code does not contain the term "level 1 reduction".

(3) If it is permissible to create and test minor formulation modifications containing lower levels of additive than oils that have previously passed other engine tests, is it intended that any formulation created via a reduction in additive levels during a program be less robust than previous formulations in the completed and remaining engine tests? In other words, additive reductions during a program are intended to create a more severe testing scenario compared to the final formulation, correct?

It would be difficult to determine the intent of formulation changes; however, the expectation is the final formulation will pass all engine tests. It is the intent that minor modifications will not deteriorate performance in the final formulation.

Please do not hesitate to contact me if you have any questions with the responses provided by ACC PAPTG. Thank you.

Regards,

W.D. Anderson

W.D. Anderson
Petroleum Additives Panel Manager

ExxonMobil Lubricants & Petroleum Specialties Company 3225 Gallows Road
Fairfax, VA 22037

ExxonMobil Lubricants & Specialties

February 9, 2011

Mr. Doug Anderson
Petroleum Additives Panel
Manager American
Chemistry Council
700 2nd Street,
NE Washington,
DC 20002

Dear Mr. Anderson:

This letter is to request clarification on several points related to the application of the minor formulation modifications described in Appendix H of the Code of Practice. Although it is clear that all minor modifications must be included in the final formulation, and data supporting technical integrity of the modifications used during a program is required, clarification on interpreting timing and relative composition requirements for formulations with minor modifications is being requested.

(1) Is there an element of time / sequencing associated with the use of minor formulation modifications during a development program?

(2) If there are no time related limitations, is it permissible to create and test minor formulation modifications containing lower levels of additive than oils that have previously passed other engine tests? For example, is it acceptable to make a Level 1 reduction in the antioxidant concentration of a formulation that passed the Sequence IIIG, then run the resulting formulation with the lower additive level in one of the other Sequence tests?

(3) If it is permissible to create and test minor formulation modifications containing lower levels of additive than oils that have previously passed other engine tests, is it intended that any formulation created via a reduction in additive levels during a program be less robust than previous formulations in the completed and remaining engine tests? In other words, additive reductions during a program are intended to create a more severe testing scenario compared to the final formulation, correct?

I look forward to your answers to the above questions and appreciate your help with the interpretation of the ACC Code of Practice.

Sincerely,

Richard P. Leach
Global Industry Advocacy Advisor

American Chemistry Council
Code of Practice Interpretation

This is an interpretation of the American Chemistry Council (ACC) Code of Practice based upon the consensus opinion of the ACC Product Approval Protocol Task Group. Any questions related to this or any other Code interpretation should be directed to the PAPTG Manager.

Note: The text provided below has been transcribed from electronic mail received by W.D. Anderson and sent from A. Omar.

Dear Sir:

I'm asking for your help to understand some points mentioned in Appendix H & Appendix I. As we use the protocol to evaluate DI offered by additive companies I found that your help is needed on the following:

- Appendix H as a guide for minor formulation modification for developing PCMO engine test programs, does that mean if any changes during DEO testing program or changes in final formulation need retesting (Generally in case of any modifications DEO engine tests must be retested)?

Response: It is not mandated to retest DEO tests if minor modifications have been made to a formulation. An additive company applies fundamental knowledge of engine performance of their additive chemistry to determine if a DEO test needs to be repeated. Appendix H numbered guidelines apply only to the following tests as listed on Page H-2 of the Code of Practice: Sequences IIIF, IIIG (recently added), IVA, VG, VIB, and VIII.

Example
For CF performance level, after successful program testing the VIII and 1MPC, its needed to increase TBN for the final formulation App H guideline 4 may be applied for VIII (new component added) and not for the 1MPC, does that mean that IMPC need retesting?

Response: After a Core program is completed any formulation adjustments are then covered by Appendix I, Program Guidelines. Appendix H, Guidelines for Minor Formulation Modifications, applies only to the conduct of a Core program. For the example given, the TBN increase is covered by Appendix I, Guideline 1. The VIII and 1MPC do not need to be rerun, provided the TBN increase is covered by Level 2 support data for both tests which shows no harm.

In case of Appling Appendix I guideline 1 amount of up treat is not restricted (restricted in App. H); it's not mentioned if that role applies for PCMO (VIII) or DEO (1MPC) engine tests or both?

Response: Appendix I applies to both PCMO and DEO tests.

Level 2 support in case it is needed, is it issued by ASTM or tests sponsor
(Support Data)?

Response: Level 2 support data is supplied by the test sponsor.

Core Data Set

As mentioned in Appendix H using minor formulation modification (PCMO Sequences) with API 1509 App. E & F (PCMO and DEO) for developing core data set raises the question again if you need to rerun DEO tests in case minor formulation changes are done through that developing (program for fleet lubricants with both gasoline and diesel rating)?

Response: Numbered guidelines within Appendix H do not apply to DEO tests. They apply only to the tests listed on Page H-2 of the Code of Practice: Sequences IIIF, IIIG (recently added), IVA, VG, VIB, and VIII. It is not required to rerun DEO tests if minor modifications have been made to a formulation. An additive company applies fundamental knowledge of engine performance of their additive chemistry to determine if a DEO test needs to be repeated.

When using a matrix core data set on the PCMO Sequences, changes are restricted to four including BOI, its not mentioned in case of DEO program i.e. CI-4 how many changes can take place for the matrix data core as it mentioned in App. H illustration 0, is it restricted for 4 changes as PCMO Sequences or are there no restriction for the number of changes?

Response: For the PCMO tests that are part of a PCMO + DEO program as in Illustration 0 (Appendix H, page H-5 of the Code of Practice), only four minor formulation modifications are allowed. The number of minor formulation modifications in the DEO tests is unrestricted.

Matrix core data set, is it apply for the same formulation number or can it be used for reading between different formulation numbers as the treat rate of the DI is still the same?

Response: A Matrix Core Data Set will likely include several different oil blends, each with their own formulation code. It is common practice to give a formulation code to a specific base oil/VM/DI combination. When the base stock changes, then typically a new formulation code is assigned. Formulation encoding is addressed in the Code of Practice, Appendix B.

For example, the four oils in Appendix H, Illustration 0, might be identified as follows:

Base Stock (Group)	**A(I)**	**B(I)**	**C(I)**	**D(II)**
Formulation Code	**AP-1234-A-1**	**AP-1245-A-1**	**AP-1267-A-1**	**AP-1289-A-1**

Is it permitted during changes to replace VM (VII) even when its from the same chemistry and the same producer and how many times VII changes permitted during changes, App. H guideline 8 limit the VII changes and App. I guideline 3, permit change with level 2 support?

Response: During the development of a Core Data Set, the VM must stay the same with Level 1 support. The level of the VM can change as needed to adjust for blend viscometrics. There is no restriction on the number of times the VM level can change. Appendix H, Guideline 8, will apply only to the PCMO tests.

Only after a Core Data Set is in place can the VM be changed to another VM of the same chemical family (type) by the same manufacturer with corresponding Level 2 support, according to Appendix I, Guideline 3.

As the first time addressing you, I hope you will accept my e-mail and the questions I have. I look forwarded for your reply.

Ahmed Taha Omar
Production Department Manager
Misr Petroleum Co.
Technical Affair General Department
Cairo, Egypt

A test sponsor has raised a question regarding the completion of ACC Test Laboratory Conformance Statement for ACC-Registered engine tests that are terminated prior to completion. In response, the ACC Product Approval Protocol Task Group (PAPTG) considered it appropriate to clarify the original intent of the provisions that allow either a test laboratory or test sponsor to terminate a test early under the ACC Code of Practice.

Early Test Termination by the Test Laboratory

Appropriate reasons for the test laboratory to terminate an ACC-Registered Test early are:

- The test laboratory determines that a test in progress does not meet the operation validity criteria as stated in Appendix G of the ACC Code of Practice;
- The test laboratory is unable to control test operational parameters within specified limits;
- The test laboratory has made an error resulting in the wrong test oil being installed in the test engine; or
- The test sponsor requests the test laboratory to terminate the test early.

If a test is terminated for any of the above reasons, the test is considered Operationally Invalid and the ACC Code of Practice Test Laboratory Conformance Statement is completed as follows[4]:

- The response to Declaration Number 2 is "No" since the test did not run the full duration specified in the Declaration;
- The Conclusion stating the "Operational review of this test indicates that the results should not be included in Multiple Test Acceptance Criteria calculations" is checked; and
- The reason for terminating the test early is stated under "Comments".

Early Test Termination at Sponsor Request

Under the ACC Code of Practice, the test sponsor may request a test laboratory to terminate a test early without further explanation of the test laboratory. The intent of the Code, however, is to provide the test sponsor with appropriate flexibility; it is not to provide a means for a test sponsor to discard a predicted poor result from MTAC calculations.

In cases when the test laboratory is requested to terminate a test early, the test is considered Operationally Invalid and the ACC Code of Practice Test Laboratory Conformance Statement is completed as follows:

- The response to Declaration Number 2 is "No" since the test did not run the full duration specified in the Declaration;
- The Conclusion stating the "Operational review of this test indicates that the results should not be included in Multiple Test Acceptance Criteria calculations" is checked; and
- The statement "Terminated at sponsor request" is shown under "Comments".

[4] The Caterpillar 1G2 Test is not covered by this requirement since it has no MTAC requirements.

September 15, 1997

CMA Code of Practice Interpretation

This is an interpretation of the CMA Code of Practice based upon the consensus opinion of the CMA Product Approval Protocol Task Group.

When the Code was updated in March 1996, a process for excluding suspect operationally valid tests from MTAC calculations was included in Section 8 of Code Appendix E (Candidate Data Package). The inclusion of this process clarified the intent of the ability of a test sponsor to request information from the CMA Monitoring Agency relative to the validity of a specific test result(s). A detailed procedure for requesting this information in the form of data base analyses was included in the March 1995 edition of the Code.

The intent of this process is to recognize that MTAC calculations should be based solely on test results representative of the performance of the candidate formulation. If suspect results from an operationally valid test are discarded, the process requires that certain supporting data requirements are met.

The test for which the results are discarded is included in the summary of registered tests generated by the CMA Monitoring Agency and the full report of the test is included in the sponsor's candidate data package. The test from which the results are discarded as non- representative cannot be counted toward the total number of times the candidate has been tested (see Code Appendix F).

CHEMICAL MANUFACTURERS ASSOCIATION

December 13, 1994

Mr. Richard J. C. Biggin
Additives Technical Committee
Lubrizol International Laboratories, Ltd.
P.O. Box 88
Belper, Derby DE56 1QN

Dear Richard:

The Product Approval Protocol Task Group has been asked to describe the obligation of the additive marketer and oil company customer when representing the performance of an oil tested under the CMA Petroleum Additives Product Approval Code of Practice.

Each practitioner of the Code who has signed a Letter of Intent obligates his company and all of its affiliates, operating companies, subsidiaries, etc. globally to conduct those tests designated within the Code according to procedures specified by the Code. This includes quality representations based on statistical treatment of all data for each test run on the candidate by the use of Multiple Test Acceptance Criteria (MTAC), inclusion of all test data and MTAC calculations in the Candidate Data Package, and presentation of the data and MTAC results to the customer.

MTAC, as described in Appendix F of the Code, outlines a process for uniform treatment of multiple test results. For performance designations which do not include a specifically defined MTAC, Appendix F defines a method of averaging operationally valid test results which is to be used for those tests included in the Code.

The Code is voluntary and applies to those who are signatories of the Letter of Intent. We hope this information is helpful in defining obligations of the stakeholders in sustaining compliance with the Code.

Sincerely,

James L. Newcombe
Chairman
Petroleum Additives PAPTG

Carol R. Stack, Ph.D.
Manager
Petroleum Additives PAPTG

CHEMICAL MANUFACTURERS ASSOCIATION

December 5, 1994

Mr. Silvano Fattori
Euron S.p.A.
via Maritano, 26
San Donato Milanese 20097
Milano Italy

Dear Mr. Fattori:

Thank you for your letter of October 17 requesting clarification on Appendix H (Guidelines for Minor Formulation Modifications) of the CMA Petroleum Additives Product Approval Code of Practice.

You asked if the Code allows an interchange of a single component of the additive package or a viscosity modifier with another component or viscosity modifier considered equivalent based on internal evaluation criteria during the development of a program or after its successful completion.

During the development of the core data set (conduct of the engine test program) the treatment level of components of the performance additive package may not be reduced other than for rebalances of ZDPs or detergents (Guidelines 5 and 6). Rebalances of ashes dispersants are not allowed. Since interchanging a component or viscosity modifier requires a reduction (removal) of the existing component or viscosity modifier, such interchanges are not allowed under the Code.

Substitution of one viscosity modifier for another is allowed under the Program Guidelines (Appendix I) if the change is within the same chemical type and manufacturer. Such a change requires Level 2 support. Application of the Program Guidelines is to be made after the Core Data Set has been developed.

The Code does not address interchanges or substitutions of components of the additive package or of viscosity modifiers after the test program has been completed.

Definitions for the terms "relative" and "absolute" appear in the Glossary of Terms within the Code. Please refer to Page H1 of the Code which states that all modifications are relative except those that are noted as absolute. Numerical examples which should help define these terms appear below:

Minor Formulation Modifications Guideline 8: Base stock ratio and viscosity modifier treatment level (not type) are acceptable changes with Level 1 support. This guideline is intended to allow formulation adjustments which may be necessary to retain candidate viscometrics as minor formulation modifications are made during the conduct of an engine test program.

a) Base stock ratio may change no more than 15% absolute.

Example: The base oil present in the candidate formulation is comprised of 50% of base stock A and 50% of base stock B. The base oil blend may be changed within the range of 65% A and 35% B to 35% A and 65% B (50% plus or minus 15%).

b) If a new base stock is added and is in the same base stock slate, the change is limited to a maximum of 15% of the base oil (base stock blend). If a new base stock is added and is in a different base stock slate, and that slate is either API Group I or Group II, the change is limited to a maximum of 10% absolute of the formulation (the finished blend of base stocks and additives).

Example 1: The base oil in the candidate formulation is comprised of 50% of base stock A and 50% of base stock B. Base stock C from the same slate may be added up to a maximum of 15% so that the minimum amount of A or B in the base stock blend is 50% minus 15% (equals 35%). The total of all of the base stocks is 50% plus 35% plus 15% (equals 100%).

Example 2: In addition to base stocks A and B, the oil contains 10% performance package and 10% viscosity modifiers so that the finished blend of the base stocks and additives is 80% base stock A plus base stock B, 10% performance package, and 10% viscosity modifier. If base stock C from a different base stock slate is added, the maximum amount is 10% absolute of the formulation as follows.

70% Base Stock A plus Base Stock B
10% Performance Additive
10% Viscosity Modifier
10% Base Stock C

The minimum amount of base stock A or base stock B in the finished blend of base stocks and additives is 25% minus 10% (equals 25%). Assuming base stocks A and B are present in equal amounts (35% each), the minimum amount of base stock A or base stock B in the finished blend (base stocks and additives) is 35% minus 10% (equals 25%).

c) Viscosity modifier (either dispersant or non-dispersant type) treatment level may change no more than 10%.

Example: The candidate formulation contains 10% viscosity modifier. The viscosity modifier treatment may be varied from 9% to 11% together with adjustments to base stocks and/or base stock ratios, as described above, to retain candidate viscometrics (normally 100°C kinematics viscosity and CCS) as minor formulation modifications are made during the conduct of an engine test program.

Program Guideline 5: Following completion of a program according to the CMA Code, substitution of PAO for up to 30% of the mineral oil is allowed for PCMO with Level 1 support. Level 2 support is required for API heavy duty diesel categories more recent than API CD. Substitution of other synthetic for up to 10% of the mineral oil is allowed with Level 2 support.

Example: The base oil in the candidate PCMO formulation is comprised of 50% of base stock A and 50% of base stock B. Up to 30% PAO may be added with Level 1 support. The minimum amount of base stock A or base stock B in the base stock blend is 50% minus 30% (equals 20%). Alternately, 10% of other synthetic is allowed with Level 2 support. The minimum amount of base stock A or base stock B in the base stock blend, is 50% minus 10% (equals 40%).

For Guideline 8(b) of Appendix H, Guidelines for Minor Formulation Modifications and Guideline 5 of Appendix I, Program Guidelines, the word "absolute" has been omitted in error. These guidelines should read:

Minor Formulation Modifications Guideline 8(b): If a new base stock is added and is in the same base stock slate, the change is limited to a maximum of 15% absolute of the base oil (base stock blend)....

Program Guideline 5: Following completion of a program according to the CMA Code, substitution of PAO for up to 30% absolute of the mineral oil is allowed for PCMO with Level 1 support....

These corrections will be made at the time the Code is updated in early 1995.
We hope these comments and examples are helpful.

Sincerely,

James L. Newcombe
Chairman
Petroleum Additives PAPTG

Carol R Stack
Manager
Petroleum Additives PAPTG

FACSIMILE MESSAGE Nr. TO CMA Attn: of Mrs. C. R. Stack Fax Nr: 001 202 887 5427 From EURON S.p.A. Authorized by_____	EURON S.P.A VIA MARITANO, 26 20097 SAN DONATO MILANESE (MILANO) ITALY Fax Nr. (39) 2 52037171 Date 17th October 1994 Total Nr. (pages:)
If you don't receive all the pages or the message is distorted, please call: (39) 2 52035307 and speak to fax operator	

Dear Mrs. Stack,

We would like to submit a couple of questions to you in order to get a thorough explanation of the Guidelines for Minor Formulation Modifications.

We would appreciate a reply from you about the possibility of interchanging a single component of the additive package (e.g., a dispersant, a detergent, a ZDP) or a VII with another component considered equivalent on the basis of internal evaluation criteria during the development of a program according to the CMA Code or after its successful completion.

We are very interested in receiving more details about the actual meaning of the terms "relative" and "absolute" as quoted in the phase of Appendix H (CMA Code of Practice - Page H1): "All modifications are relative except those that are noted as absolute".

Besides we would be extremely grateful if you could kindly provide us with numerical examples of Illustrations 8-1 and 8-2 Guideline 8 (CMA Code of Practice - Page H6) with reference to the complete starting and final oil formulations. The same kind of clarifications would be extremely useful to us for Guideline 5 of Appendix I (CMA Code of Practice - Page I1).

We take pleasure in thanking you for your assistance.

Best Regards

S. Fattori

CHEMICAL MANUFACTURERS ASSOCIATION

Petroleum Additives
Product Approval Code of Practice Interpretations

Appendix H - Guidelines for Minor Formulation Modifications

1) **Company**: PARAMINS--Exxon Chemical Company

Inquiry: A program with SH, CF-4 qualifications was completed and the company wanted to replace 30% of mineral base stock with PAO. Will the new product still carry SH, CF- 4 qualifications?

Response: The new product would carry SH qualifications; however, because CF-4 is not covered by the tests in the guidelines, the new product would not carry CF-4 qualifications.

2) **Company**: Adibis

Inquiry:

I run a single SH programme:

Stage 1	**Stage 2**
Add. A+Bs A	Add. A+Bs A +Rust Inhibitor
5E Pass	
3E Pass	
2D Fail	2D Pass
L38 Fail	L38 Pass

I need Level 2 support for the new component (rust inhibitor). Does this mean I have to rerun 5E/3E? If so, I've rerun the whole programme, so Level 2 support is meaningless. Please advise.

Response: If there is no Level 2 support available for the new component (rust inhibitor), then a rerun of SE and 3E would be required to ensure that the rust inhibitor does not cause harm in the 5E and 3E tests. Although in this instance it would require the rerunning of a complete program, the data that are developed would provide Level 2 support for future modifications.

3) **Company**: Adibis

Inquiry:

I run a multiple SH programme:

Stage 1		**Stage 2**	
Add. A+Bs A	Add. A+Bs B	Add. A+Bs A +Rust Inhibitor	Add. A+Bs B +Rust Inhibitor
SE Pass	5E --		SE Pass
3E Pass	5E --		3E Pass
2D Fail		2D Pass	
L38 --		L38 Pass	

Do I need to rerun the 5E/3E in Bs A or do the 5E/3E run in Bs B count as Level 2 support for the first programme?

In the definition of Level 2 support (Page H3) what is meant exactly by the definitions (a), (b), and (c) (e.g., what exactly is a "partial set of tests from same technology family"?).

Can you give examples to illustrate?

Response: If the formula outlined in Level 2 is the intended final product, then a rerun of 5E/3E is not necessary.

Illustrations for Level 2 support:

a) Statistically designed engine matrices -- need to be provided
b) Complete engine test programs -- need to be provided
c) Partial set of tests from same technology family -- multiple tests with the same additives at the same relative treatment levels.

4) **Company**: Chevron Oronite Additives

Inquiry: An engine test program has completed the core program using one minor formulation modification. In applying the program guidelines for API base oil interchange it has been found necessary to make an additional formulation change. We have been asked if it is possible to make two changes in the base oil interchange program and incorporate these changes back into the core program (i.e., the core package in the original base stock would be boosted as well). In doing this, the total number of changes in the core formulation becomes three, but the second two changes were actually made during base oil interchange testing. For the sake of this example, let's assume all changes were Level 1 modifications.

Response: Under Program Guideline 2, as previously written, only one minor formulation modification was allowed for base oil interchange.

This guideline has been enhanced to address the need for greater formulation flexibility for different base oils and for extending the core data set for multiple base oil interchanges. The situation described is now accommodated under the rewritten Guidelines.

Appendix J -- Compliance Audit

1) **Company**: Adibis

Inquiry: On SH programmes which have been started, but not completed, i.e., terminated or still in progress, are analytical data required for the audit? I believe the procedure says that finished oil and
base oil data should be available for all oils that have run CMA registered tests. On the other hand, the meeting on April 1st (Editor note: Reference is to CMA sponsor compliance workshop) indicated that such data are superfluous except for complete programmes. Can you clarify Please?

Response: Programs incomplete and or in progress, or programs terminated prior to completion, do not require complete physical properties, chemical analysis and analysis of base stocks unless required by the customer.

2) **Company**: Adibis

Inquiry: Is it necessary for the auditors to have assess to confidential formulation details? What ground rules apply?

Response: The auditor is to review compliance by the sponsor to nine practices, including adherence to Guidelines for Minor Formulation Modifications (Appendix H) and the conduct of programs (Appendix I). The auditor must be made sufficiently aware of the use of the Guidelines by the sponsor to verify specific elements of the process.

Sponsors should provide information which includes a descriptive audit trail of Minor Formulation Modifications made in the conduct of a test program. The information should include a description of the type and nature of change based on the Guidelines and the allowable examples in Appendix H. Disclosure of confidential information is not a requirement of the audit process.

1/4/94
CRS

Shell Chemicals

Shell International Chemical Company Limited

Mr. J R Sanders
Chairman CMA Protocol Additives Panel
c/o Chevron Chemical Co.
Oronite Additives Division
6001 Bollinger Canyon Road, Building T
San Ramon, CA 94583, USA

Direct lines:
Tel: S211
Fax: 3558

8th April 1993

Your ref:

Our ref: CMKS

Dear Sir
SUBJECT: PETROLEUM ADDITIVE PANEL

I regret that I will not be able to attend the Panel meeting on 25th May. As you are aware I had intended to be at the meeting called for 21st May and arranged my schedule accordingly. Postponement of the meeting means that I cannot amend. I imagine you will appreciate the added difficulties of accommodating changes for travelers from Europe.

There is one particular issue that I would have raised in person at the meeting but will now address in writing to you with the request that you bring the matter forward at the PAP on June 2nd.

As Vice President of Shell Additives I have recently signed the Letter of Intent extending our commitment to the spirit and letter of the CMA product approval Code of Practice, for another year. We in Shell Additives move into the second year interpreting and applying the Code as we did in the first year. We believe it is appropriate at this time to share our interpretation of the consequences for signatories of the Letter of Intent with respect to the practical application of the Code of Practice. We would hope that all signatories interpret their obligations in the same way and through the Chairman of the PAP we would invite their confirmation that this is the case.

Shell Additives' interpretation of the requirements of signatories is that ANY candidate commercial lubricant to be tested in ANY test covered by the Code of Practice MUST be tested in accordance with the Code of Practice, irrespective of the performance level claimed or the geographical location of the market place for which the lubricant is destined.

We believe that a common understanding and commitment to the interpretation and application, as practiced by Shell Additives, is essential to the credibility of the system, and its acceptance and standing both within CMA and, perhaps most importantly, throughout the oil and OEM communities and

consumer associations. Should our understanding prove to be significantly different from that of other members we would propose that the obligations arising from the Code of Practice are more clearly defined.

As panel members will be aware a European Approval and Licensing system is now under consideration - EELCS. The Technical Committee of Petroleum Additive Manufacturers in Europe (ATC) have agreed a response to the proposal which seeks to minimize bureaucracy and cost whilst effecting a step improvement in the quality of engine testing in Europe. ATC strategy is to promote the adoption and use of the CMA Code of Practice in Europe as part of any system developed. We believe it is important that the application as given above can be confirmed as a clear, unambiguous reference point when considering the adoption of the system in the European theater.

We believe the above matters are important and worthy of consideration by the Petroleum Additives Panel and trust that you can raise them on our behalf on 2nd June.

Yours sincerely

Shell International Chemical Company Limited

M. Arque
Head of Speciality Chemicals

cc: Chemical Manufacturers Association
2501 M Street NW
Washington
DC 20037
USA.

Attn: Dr. C. Stack Ph.D
Manager Petroleum Additives Panel

CHEMICAL MANUFACTURERS ASSOCIATION

June 1, 1993

Mr. Michael Arque
Shell International Chemical Company Ltd.
Shell Centre
London SE1 7NA
ENGLAND

Dear Mr. Arque:

Thank you for your letter of April 8, 1993. As you requested, the Shell Additives interpretation of the obligations of companies which are signatories to Letters of Intent to comply with the Code of Practice was discussed as part of the Product Approval Protocol Task Group report at the May 25 Panel meeting.

The correct interpretation, as stated in your letter, is that any candidate lubricant to be tested in any test covered by the Product Approval Code of Practice must be tested in accordance with the Code, irrespective of the performance level claimed or the geological location of the market place for which the lubricant is destined.

We hope that this response from the Petroleum Additives Panel addresses your concerns satisfactorily.

Sincerely,

John R. Sanders
Chairman, Petroleum Additives Panel

Carol R. Stack
Manager, Petroleum Additives Panel

cc: Petroleum Additives Panel
Product Approval Protocol Task Group

INTEVEP, S.A. Centro de Investigación y Apoyo Tecnológico, Fillai de Petroleos de Venezuela, S.A.

Fecha: 16/09/92
Reference: No. RPPP2-92-00163

To: Mrs. Carol Stack Manager, Petroleum Additives Panel.
Chemical Manufacturers Association. 2501 M Street, NW,
Washington, D.C. 20037, USA.
Fax No. (202) 887-1237.

From: Manuel A. Gonzalez D. Intevep S.A. Research and Development Center
for the Petroleum Industry Venezuela Departmente de Productes del
Petróleo. Sección de Bancos Motores.
Telephone: 58-2-9087697
-9086810
FAX No. 58-2-9087723
-9086447

Subject: Viscosity Modifier.

In the CMA Code of Practice, Appendix H, guideline 8 specifies:

Base stock ratio and viscosity modifier treatment level (not type) are acceptable changes with Level 1 support.

We are interested on understanding the technical definition of "viscosity modifier type" in the context of the code, to be able to differentiate and classify our lubricant formulations.

We very much appreciate your answer to our question, and your consideration for inclusion on your mailing list for receiving communications dealing with technical modifications or improvements to the CMA Code.

Best regards,

Mr. Manuel A. Gonzalez D.

cc: Carmen Cabello, RPPP/32

CHEMICAL MANUFACTURES ASSOCIATION

Mr. Manuel A. Gonzalez D.
INTEVEP, S.A.
Apdo. 76343
Caracas - 107A
Venezuela

Dear Mr. Gonzalez:

I am responding to your recent inquiry regarding the technical definition of "viscosity modifier type" in the context of the CMA Code of Practice.

In the Guidelines for Minor Formulation Modifications (Code Appendix H), Page H2, Guideline 8 -- "type" means a specific molecular structure with a specific trade stability characterized by a specific trade name, stock or code number.

In the Program Guidelines (Code Appendix I), Guideline 3 -"chemical type" means chemical family such as, but not limited to: styrene ester, polymethacrylate, styrene butadiene, styrene isoprene, polyisoprene, olefin copolymer and polyisobutylene.
Code.

I hope this clarifies the meaning of these terms as used in the

Sincerely,

Carol R. Stack, Ph.D.
Manager
Petroleum Additives Panel

Motor Vehicle Manufacturers Association

Thomas H. Hanna
President and Chief Executive Officer

September 11, 1992

Dr. Carol R. Stack, Director
Chemical Manufacturers Association
2501 M Street, N.W.
Washington, DC 20037

Dear Carol:

Re: Clarification of Guidelines Impacting Sequence VI Performance Claims

MVMA requests written clarification of three issues related to the minor formulation guidelines of the Chemical Manufacturers Association (CMA) and the American Petroleum Institute (API) viscosity grade "read-across" guidelines and base oil interchangeability guidelines as used in the CMA Petroleum Additives Product Approval Code of Practice. This action is needed to eliminate potential misinterpretation or abuse of the intent of these guidelines. As the guidelines are written, MVMA believes the possibility exists for some products to indirectly claim certain fuel economy benefits which could not be substantiated by direct testing.

The three areas of concern/potential confusion are:

l. Reference the CMA Petroleum Additives Product Approval Code of Practice Feb. 92, Appendix H, item 8(a).

SAE paper 920659 documented the fuel economy benefits which high VI base oils have over more conventional base oils. MVMA does not believe it was CMA's intent to have formulators add high VI base oils, under the guise of minor base oil interchanges, solely to enhance sequence VI performance. Such testing practices could be used to produce higher performance test results than would be produced if tests were conducted on the marketed product which did not consistently contain the same amount of high VI base oil. The potential exists for the generation of performance claims which may not be consistent with the marketed product.

2. Reference the CMA Petroleum Additives Product Approval Code of Practice Feb. 92. Appendix H, item 8(b).

In this section of the document, the allowance of a 10% VI improver change must be clarified or qualified to ensure this is not permitted for purposes of sequence VI testing. All sequence VI testing must be conducted at the viscosity treat rate of the final formulation which is intended-for market. Absent this clarification, there is a potential for an uneven application of these guidelines and possible fraud, which was certainly not the intent of the CMA Petroleum

Additives Panel. In fact, the first sentence under the Code's purpose states, in this Code of Practice will help ensure that a particular engine lubricant meets its performance specifications".

3. Reference the American Petroleum Institute Engine Oil Licensing and Certification System, Final Draft, April 20, 1992, Appendix G, pp. 2,8.

Viscosity grade read across for sequence VI should also be clarified to ensure no fuel economy testing performed on an oil, which doesn't claim diesel performance, is read to a lower viscosity oil which does claim diesel performance. The guidelines permit such a practice if the same Detergent/DI package is used at same or higher amounts. However, there is a real question about the adverse effects increasing amounts of certain detergents could have on fuel economy performance. Such a practice does not appear to be reasonable and may result in false fuel economy performance claims.

Sincerely,

James P. Steiger, Director
Fuels, Lubricants & Special Projects

JPS/srd
cc: H. Newhall, Chevron

CHEMICAL MANUFACTURERS ASSOCIATION

October 15, 1992

Mr. James P. Steiger
Motor Vehicle Manufacturer Association
7430 Second Avenue
Suite 300
Detroit, MI 48202

Dear Jim:

Thank you for your letter of September 11 requesting written clarification on two issues relating to minor formulation modifications under the CMA Petroleum Additives Product Approval Code of Practice and A third issue relating to the API viscosity grade guidelines.

It is clearly outside the spirit of the Code to make minor modifications under Guideline 8 for the purpose of selecting particular formulation for Sequence VI testing, then commercializing for sale an alternate formulation on which the fuel economy performance is unsubstantiated. Guideline 8 of Appendix H, Guidelines for Minor Formulation Modifications, appears below:

> Base stock ratio and viscosity odifier treatment level (not tvPe) are acceptable changes with Level 1 support.
>
> a) Base stock ratio may change no more than 15X absolute.
>
> b) If a new base stock is added, it must be the same API stock category.
>
> c) Viscosity modifier treatment level may change no more than 10%.

The minor modifications allowed under this guideline are for the sole purpose of fine tuning the viscometrics of the candidate formulation without altering Sequence VI performance.

We agree with the comment regarding the API viscosity grade guidelines which permit reading the fuel economy performance of a particular candidate across to a lower viscosity oil which contains a higher treatment level of the same performance additive package. Unless the performance additive package is used at equal treatment level or no greater than 30 percent higher treatment level with Level 2 support, a Sequence VI test should be run on the lower viscosity oil to substantiate fuel economy performance.

We hope that these comments clarify CMA's position on these issues.

Sincerely,

Carol R. Stack
Manager
Petroleum Additives Panel

AMERICAN CHEMISTRY COUNCIL
PRODUCT APPROVAL
CODE OF PRACTICE

Tab 5

Procedural Information

TAB 5

PROCEDURAL INFORMATION

I. Requesting American Chemistry Council Monitoring Agency Analyses and Opinions

Introduction

There are four types of opinions and industry analyses that may be sought from the American Chemistry Council (ACC) Monitoring Agency. The requirements and procedures for seeking these opinions and analyses are detailed below:

1. Engine Test Operational Validity Opinions

Function- To provide impartial expert opinions on the operational validity of specific engine tests when requested by the test laboratory or test sponsor.

Requesting ACC Test Operational Validity Opinions- If questions arise as to the operational validity of a specific test, the test sponsor or test laboratory may request a test operational validity opinion from the ACC Monitoring Agency. The request shall be addressed in writing to the Monitoring Agency and must provide all background information pertinent to the assessment of the operational validity of the test as well as the specific concerns of the requester. Any proprietary information contained in the request will be held confidential by the ACC Monitoring Agency. The Monitoring Agency will contact the requester if there are any questions or if further information is needed on the request.

ACC Monitoring Agency Response- The Monitoring Agency must issue either the completed written opinion or an interim written response to the requester within 10 working days of receiving the opinion request. If the Monitoring Agency and the test laboratory agree on the operational validity of a test, that decision is binding. In the event of a disagreement, the requester may seek the opinion of one or more third parties as described in the Code, Appendix E, Item 6.

2. Engine Test Result Validity Analyses

Function- To provide data based analyses relative to the validity of specific test results when requested by the test sponsor.

Requesting ACC test result validity analyses- Should the test sponsor have a reason to question the validity determination of a certain test whether valid or invalid, the test sponsor may request an ACC candidate oil engine test result validity analyses . Requests shall be made in writing to the ACC Monitoring Agency and must provide all background information pertinent to the assessment of the validity of the test result. Any proprietary information contained in the request will be held confidential by the ACC Monitoring Agency. The Monitoring Agency will contact the requester if there are any questions or if further information is needed on the request.

Monitoring Agency Response- The Monitoring Agency must issue either the completed written analyses or an interim response to the requester within 30 calendar days of receiving the request.

3. Requests for Industry Candidate Data Analyses

Function- To provide appropriate candidate data analyses for the identification and resolution of test precision and severity problems.

Requesting ACC Analyses- Requests must address industry-wide engine test issues. Any party with a legitimate interest in engine testing or engine test approval may request analyses of ACC candidate data. Such requests should be coordinated through the appropriate ASTM Classification or Surveillance Panel, but may be made directly to the ACC Monitoring Agency if action is not taken by the ASTM Surveillance Panel. All requests must be addressed in writing to the ACC Monitoring Agency and must clearly state the reason for the requested analyses. The inclusion of any proprietary information in the request should be avoided.

Screening of Requests for Industry Candidate Data Analyses- Requests will be sent by the Monitoring Agency to the Manager of the ACC Petroleum Additives Product Approval Protocol Task Group (PAPTG) and to the Monitoring Agency Advisory Group (MAAG). The Manager of the ACC PAPTG will screen the request to ensure that it does not involve the release of any proprietary information, and the MAAG will screen the request to ensure that:

a) The purpose of the requested analysis is to identify and resolve an industry-wide engine test precision and/or severity issue,

b) The Monitoring Agency has the resources to respond to the request, and

c) It utilizes Monitoring Agency's resources cost-effectively.

All requests should recognize that data can only be released in a fashion that preserves its proprietary nature. In extraordinary cases where it is clearly justified, individual test results may be released if written permission of the test sponsor(s) is secured. All data or data analyses released will be coded to ensure that no test sponsor or laboratory is identified.

If either the ACC PAPTG Manager, the MAAG, or the PAPTG have concerns regarding the request, these concerns will be transmitted to the requester for resolution, if possible.

Data Analyses Authorization- If in agreement with the conduct of the requested analyses, both the Manager of the ACC PAPTG and the Chairman of MAAG will authorize the Monitoring Agency to conduct the requested analyses, and will stipulate any conditions or clarifications of the analyses to be released.

Requestor Notification- Upon receipt of the authorizations, the Monitoring Agency will notify the requester that the analyses have been authorized and will provide an estimate of the time required to complete the analyses. A copy of this notification will be sent to the ACC PAPTG Manager, chairman of the MAAG and to the chairman of the appropriate ASTM Surveillance Panel.

Conduct of the Analyses- The ACC Monitoring Agency must forward either the completed analyses or an interim response to the ACC PAPTG Manager within thirty calendar days from receipt of the request. The ACC PAPTG Manager will review the response to ensure that it preserves the confidentiality of the data and will authorize its release to the MAAG if no problems are detected.

The MAAG will ensure that the analyses are responsive to the original request. The MAAG may request additional analyses if deemed necessary to respond to the request

ACC Monitoring Agency Response- The response will be issued in writing from the Monitoring Agency to the requester. A copy of the response will be placed on the Monitoring Agency website in the Industry Analyses Section.

Files On Responses- The ACC Monitoring Agency will have primary responsibility for maintaining complete files on all industry requests and Monitoring Agency responses for candidate data analyses.

4. Requests Made by ACC PAPTG and Work Groups

Function- To provide industry data analyses to ACC PAPTG Work Groups.

Requesting ACC Monitoring Agency Analyses- An ACC Petroleum Additives Work Group may request industry data analyses from the Monitoring Agency. The ACC Manager of the Work Group will screen the request for confidentiality concerns and verify with the Work Group Chairman that the request is consistent with the data analyses requirements of the Work Group. It is the responsibility of the ACC Manager of the Work Group to summarize the request in a letter directed to the Monitoring Agency authorizing the work. The Work Group is copied on the authorization letter.

Conduct and Reporting of the Analyses- The ACC Monitoring Agency will forward either the completed analyses or an interim report to the ACC Manager of the Work Group within 30 days. The Manager will review the response for confidentiality concerns and distribute the response to the appropriate ACC Work Group. The data analyses are for ACC Work Group use only and shall be stamped "Do Not Copy." The analyses may be shared internally on a "Read Only" basis with experts within a member company when additional input may be beneficial for carrying out the objectives of the ACC Work Group.

Files on the Responses- The ACC Manager of the Work Group will have primary responsibility for maintaining complete files on all ACC Work Group requests for data analyses, including the original requests and the analyses conducted.

II. Scheduling and Registration of Demonstration Oils and New Engine Tests

1. Demonstration Oils: Consistent with API Publication 1509, Appendix C, ACC allowed for the registration of tests on demonstration oils that may become reference oils meeting the physical, chemical, and chemical & physical and engine testing requirements specified in a new minimum performance standard. If a sponsor is interested in developing a reference oil, tests may be scheduled, registered and information reported to the ACC Monitoring Agency.*

Test scheduling and registration follow the same procedure as that for a candidate formulation. A unique identifier developed and communicated by the ACC Monitoring Agency is added to the test type in the Formulation Code. To ensure a minimum level of experience in testing, only test laboratories that have participated in the ASTM matrix program may conduct tests used to develop demonstration oils. Test laboratories must submit a complete test report and an Interim Declarations

Statement, developed by the ACC Monitoring Agency that is specific to the test type.

*For further information contact the ACC Monitoring Agency

Tests scheduled and registered as demonstration oils may not be used as primary candidate data and they do not become part of the ACC Monitoring Agency candidate database.

2. **New Engine Tests:** Scheduling and registration of candidate formulations can begin on new engine tests only after:

- a LTMS is in place and ASTM-calibrated stands are available; and
- the engine test has been reviewed against the Template (Appendix K) and accepted into the Code.