AUTOMOTIVE DIESEL ENGINE OIL STANDARD

(JASO M 355: 2021)

APPLICATION MANUAL

May, 2021

JASO Engine Oil Standards Implementation Panel

NOTICE: As to the quality, performance and marking of a diesel engine oil which has been reported and kept on file using this Automotive Diesel Engine Oil Standard (JASO M 355: 2021) Utilization System, classification and guarantee shall be done at the submitter's judgment and responsibility, and the submitter shall assume liability for such quality, performance and marking.

Hence, it is not intended that the JASO Engine Oil Standards Implementation Panel should guarantee the quality and performance, and the Panel shall not be held liable for the system.

If any problem has occurred concerning the quality, performance and marking, the user of the standard and this system shall solve the problem by him- or herself.

In order to ensure that the Automotive Diesel Engine Oil Standard (JASO M 355: 2021) will be implemented properly, before using the standard and this system, the user is requested to fully understand the contents of this manual.

Note that if the contents of this manual have been changed, such change will be notified through the website of the "JASO Engine Oil Standards Implementation Panel" (http://www.jalos.or.jp/onfile/) and others. Please make sure that you have checked the latest information before submission.

This English langage version shall be only for reference, and the Japanese language version of this manual shall be the official text hereof. If any difference of interpretation occurs between the Japanese and the English versions, the Japanese version shall prevail.

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1. Introduction

This document has been prepared as part of the activities of the JASO Engine Oil Standards Implementation Panel, which was established voluntarily by various types of industrial organizations and academic associations related to engine oils in Japan, to ensure proper implementation of JASO Engine Oil Standards in Japan and overseas. Explained in this document are the procedures, etc. to be taken by lubricant sellers and others for reporting and keeping on file products that meet the requirements of the Automotive Diesel Engine Oil Standard (JASO M 355: 2021) that was established by the Society of Automotive Engineers of Japan, Inc. in accordance with the Standard.

In this document, the term “diesel engine” means a four-stroke cycle engine driven by using light oil as a fuel, and the term "diesel engine oil” means a lubricant for four-stroke cycle diesel engines.

This reporting/on-file system was revised as the application manual through deliberation by the JASO Engine Oil Standards Implementation Panel.

- In 2000, in response to a request for advice that was made by the "Automotive/Lubricant Joint Committee" which is a joint committee of the Petroleum Association of Japan and the Japan Automobile Manufacturers Association, Inc., this reporting/on-file system was drafted by the "JASO 'DX-1' Working Group" which is subordinate to the Engine Oil Sub Committee. With support provided by relevant industrial organizations and academic associations, etc., the "Automotive Diesel Engine Oil Standard" (JASO M 355: 2000) was established as the JASO M355: 2000 application manual.
- In 2005, on the occasion of revision of the Automotive Diesel Engine Oil Standard (JASO M 355: 2005) to which new classifications, DH-2 and DL-1, were added, revision of the application manual was drafted by the "Diesel Oil Working Group" which is subordinate to the "Engine Oil Sub Committee" and the manual was revised as the JASO M355: 2005 application manual.
- On the basis of the alternative engine test procedure proposed in 2012 by a joint task force consisting of members of the Japan Automobile Manufacturers Association and the Petroleum Association of Japan, in 2014, by taking into consideration its compatibility with the previous test standard values, the revised test procedure was issued as the "Automotive Diesel Engine Oils – Detergency Test Procedure (JASO M 336: 2014)." Consequently, the "Automotive Diesel Engine Oil Standard" was also revised as the JASO M 355: 2014 and the manual was revised as the JASO M355: 2014 application manual.
- Also in 2015, the revised test procedure was issued as the "Automotive Diesel Engine Oils – Valve Train Wear Test Procedure (JASO M 354: 2015)." Consequently, the revised standard was issued as the "Automotive Diesel Engine Oil Standard (JASO M 355: 2015)" and the manual was revised as the JASO M355: 2015 application manual.
- In 2017, the "Automotive Diesel Engine Oils - Fuel Economy Test Procedure" (JASO M 362: 2017) was established; a new DH-2F classification was added; a new DL-0 classification proposed by the "PCMO Working Group" which is subordinate to the "Engine Oil Sub Committee" was added; some of the quality standards were changed. In conjunction with these additions and the changes, the revised standard was issued as the "Automotive Diesel Engine Oil Standard (JASO M 355: 2017)." On the occasion of this revision, the manual was revised as the JASO M355: 2017 application manual.
- Furthermore in 2021, the Automotive Diesel Engine Oil Standard (JASO M 355: 2021) was revised due to the addition of a new DL-2 calssification proposed by the "PCMO Working Group" which is subordinate to the "Engine Oil Sub Committee" and some changes of quality standards. On the occasion of this revision, the manual was revised as the JASO M355: 2021 application manual.

2. Purpose of Automotive Diesel Engine Oil Standard (JASO M 355: 2021) Utilization System and Its Operating Organizations

2.1 Purpose

This system has been established for the purpose of ensuring the conformity of the Automotive Diesel Engine Oil Standard (JASO M 355: 2021) to diesel engine vehicles. Through the implementation of this system by diesel engine oil sellers, criteria for optimum selection when customers purchase diesel engine oils are clarified, and it is expected that the reliability of engines will be improved thereby.

2.2 Operating Organizations

With regard to the utilization of the Automotive Diesel Engine Oil Standard (JASO M 355: 2021), the Diesel Engine Oils Steering Committee (DEO Steering Committee) has been set up on the same level as the existing 2-cycle Oils Steering Committee (2T Steering Committee) and 4-cycle Oils Steering Committee (4T Steering Committee) under the JASO Engine Oil Standards Implementation Panel as shown in Figure 1. Under the DEO Steering Committee, the DEO Technical Committee has been set up which presides over the Valve Train Wear Test Surveillance Panel, the Detergency Test Surveillance Panel, the Fuel Economy Test Surveillance Panel, and the Market Survey Panel. The Technical Committee is presided over by the chairpersons of the Engine Oil Subcommittee as chairperson and vice chairperson, and the leaders of the panels mentioned above take part in the Technical Committee as members, and the Society of Automotive Engineers of Japan, Inc. and the Japan Petroleum Institute participate as liaison members.

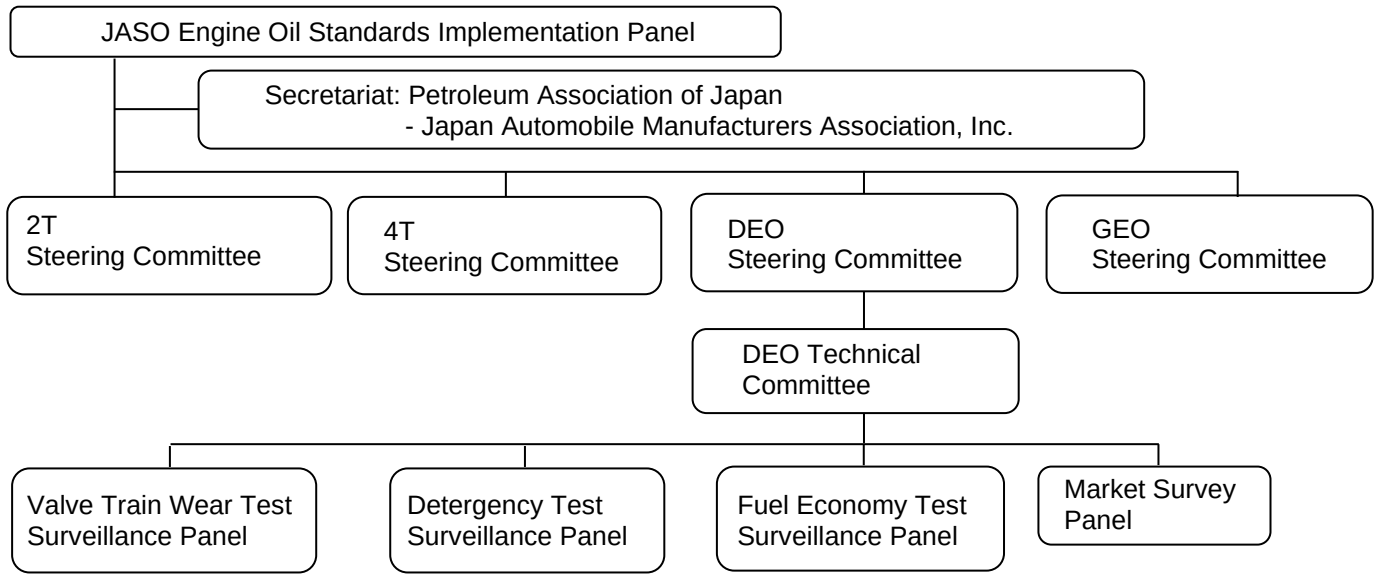

Fig. 1 Operating Organization Chart

The Valve Train Wear Test Surveillance Panel, the Detergency Test Surveillance Panel, and the Fuel Economy Test Surveillance Panel examine measures for solving problems that may be encountered by the users of each test when they actually conduct it. The Market Survey Panel works out a market survey plan when there arises the need to carry out a market survey and analyzes the result of the survey. Each panel is mainly composed of members from automobile manufacturers, petroleum manufacturers, and additive manufacturers, and participation from other industries may be requested where necessary.

3. On the Automotive Diesel Engine Oil Standard (JASO M 355: 2021)

3.1 Overview of the Standard

Engine oils conforming to the Automotive Diesel Engine Oil Standard JASO M 355: 2021 are classified into DH-1, DH-2、DH-2F、DL-0, DL-1 and DL-2, and the Standard applies to four-cycle diesel engines.

The DH-1 and DL-0 classification has been developed for use for diesel engines that comply with the requirements for long-term emission control regulations (Euro4 emission control regulations). Engine oils conforming to the requirements for the DH-1 and DL-0 classification (hereinafter called the “DH-1 Oils” and “DL-0 Oils”) have performance such that the deterioration of piston detergency, formation of deposits at high temperatures, foaming, oil consumption due to evaporation oil losses, decrease in shear viscosity, deterioration of oil seals, etc. are suppressed.

The DH-1 and DL-0 Oils can also be used for engines predating the long-term emission control regulations (Euro4 emission control regulations), and they are applicable to cases where light oils of which sulfur content exceeds 0.05% as well on the assumption that the intervals for oil replacement as recommended by the engine manufacturer are observed.

The DH-2, DH-2F, DL-1 and DL-2 classifications have been developed for use for engines equipped with an after-treatment device such as a Diesel Particulate Filter (DPF) or catalyst in order to comply with the requirements for emission control regulations subsequent to the new short-term regulations. Oils conforming to the requirements of there classifications (hereinafter called the “DH-2 Oils”, “DH-2F Oils”, “DL-1 Oils” and “DL-2 Oils”) have excellent applicability to the DPF and catalyst while keeping the same level of performance as that required for the DH-1 classification. Note that because required levels of engine oils differ between those for trucks/buses and those for passenger car classes in terms of engine durability, distance involving oil replacement, fuel economy, etc., the DH-2 and DH-2F classification has been specified for heavy duty uses on trucks/buses and the DL-1 and DL-2 classification for light-duty uses on passenger car classes.

The DH-2 Oils, DH-2F Oils DL-1 Oils and DL-2 Oils are used only in an environment where low-sulfur light oils of which sulfur content is not more than 0.005%.

Note that the DH-2 Oils can be used for engines predating the new short-term emission control regulations as well, on the assumption that low-sulfur light oils of which sulfur content is not more than 0.005% are used and the intervals for oil replacement as recommended by the engine manufacturer are observed.

3.2 Developments That Led to the Establishment of the Standard

In Japan, it is common practice to use the API Service Classification as the quality standard for automotive diesel engine oils. However, partly due to differences between engine designs in Japan and those in the United States, engine oils that better suit the characteristics of engines manufactured in Japan are required. For this reason, special performance is added to a majority of engine oils that are widely used in Japan, such as the strengthening of wear prevention performance of a valve train of the sliding rocker-arm type, so that the engine oils are fit for use on the engines manufactured in Japan. Also, automotive manufacturers in Japan have expressed their desire that new oil quality standards should be established that are fit for the requirements for engines that comply with the emission control regulations in recent years.

In the meantime, in the Asian market where the market share of Japanese cars is high, establishment of quality standards similar to those in Japan are desired, and the SAE Fuel and Lubricant Division Steering Committee for Asia in which Japanese car manufacturers likewise participate and carry out activities has also made a request that the quality standards for automotive diesel engine oils should be established.

In such a context, it was decided to establish quality standards that are fit for the requirements for Japanese diesel engines, and quality standards were established after undergoing the following processes.

- In April 1994, the Engine Oil Subcommittee of the Society of Automotive Engineers of Japan, Inc. started, in collaboration with the Japan Lubricating Oil Society, to develop a test procedure for diesel oil engines using low-sulfur light oils (with a sulfur content of 0.05%), and in March 1998 established

the detergency test procedure (JASO M 336: 1998) using an engine manufactured by Nissan Diesel Motor (TD25), and then in March 1999 established the valve train wear test procedure (JASO M 354: 1999) using an engine manufactured by Mitsubishi Motors Corporation (currently Mitsubishi Fuso Truck and Bus Corporation) (4D34T4).

- Subsequently in April 1999, the Japan Automobile Manufacturers Association, Inc. and the Petroleum Association of Japan proposed a diesel oil quality standard that specified 11 items in total by using a detergency test procedure, a valve train wear test procedure, a hot tube test procedure, etc. and 9 other test procedures, and therefore its validity was verified through comparison and examination, etc. with the oils on the market, and in October 2000 the Quality Standard (JASO M 355: 2000) was established.
- In diesel engine vehicles conforming to emission control; regulations subsequent to the new short-term regulations which are equipped with after-treatment devices such as the DPF and NOx deoxidization catalyst, in addition to the existing standards, quality standards that specify chemical compositions such as ash, phosphorus, and sulfur contents are required. In April 2003, Japan Automobile Manufacturers Association, Inc. and the Petroleum Association of Japan established, as guidelines, the DH-2 for trucks/buses and the DL-1 for passenger car classes. After the validity of these guidelines was verified, the Automotive Diesel Engine Oil Standard (JASO M 355: 2005) was revised in April 2005 by adding the DH-2 and DL-1 classifications to the existing DH-1 classification.
- On the occasion of the revision of the valve train wear test procedure (JASO M 354: 2005), in the Automotive Diesel Engine Oil Standard (JASO M 355: 2005), the quality standard for the DH-1 classification was also reconsidered.
- The upper limit values of the chlorine content of engine oils that were specified in the DH-2 and DL-1 were reconsidered, and in April 2008 the revised standard was issued as the Automotive Diesel Engine Oil Standard (JASO M 355: 2008).
- Since supply of test engines for the Detergency Test Procedure (JASO M 336: 1998) ended in 2009, based on the alternative engine test procedure proposed by a joint task force consisting of members of the Japan Automobile Manufacturers Association and Petroleum Association of Japan, the revised procedure was issued in April 2012 as JASO M 336: 2014. Concurrently with this revision, the revised standard was issued as the JASO Automotive Diesel Engine Oil Standard (JASO M 355: 2014 by considering compatibility with the previous standard values.
- A period of 15 years elapsed after establishment of the valve train test procedure (JASO M 354: 2006), and considering the stop of supply of the standard oil DV1 and the stop of supply of additives for the standard oil DV2 as well as the stability of supply of test engines, alternative standard oils and the latest engines were specified and the revised procedure was issued as JASO M 354: 2015. Concurrently with this revision, the revised standard was issued as the JASO Automotive Diesel Engine Oil Standard (JASO M 355: 2015 by considering consistency with the previous standard values as well.
- Due to the growing demand for carbon dioxide reduction, "Automotive Diesel Engine Oils - Fuel Economy Test Procedure" (JASO M 362: 2017) was established. Concurrently with this establishment, a specified value for fuel economy was newly set in the JASO M355: 2017 and a new DH-2F classification was specified by adding fuel economy performance to the existing DH-2 classification. In addition, new classification DL-0 which complies with emission regulations before Euro 4 was established as an alternative to API CF-4 standard certification ended in 2008. Concurrently with this revision, the revised standard was issued as the JASO Automotive Diesel Engine Oil Standard (JASO M 355: 2017) by considering compatibility with the previous standard values.

- The following revisions were made in the Automotive Diesel Engine Oil Standard (JASO M 355: 2021).

(1) Review of high temperature oxidation test

ASTM D6984 (Sequence IIIF) and ASTM D7320 (Sequence IIIG) cited in this standard was not able to be tested because the engine supply was stopped. Since the standard value using ASTM D8111

(Sequence IIIH) as an alternative test method was decide by API in 2019, it was examined whether it was appropraiate as a quality certification for high temperature oxidation test of JASO M355 and was reviewed.

(2) Addition of the DL-2 classification

A new classification DL-2 compatible with after-treatment devices was added. It was expanded sulfated ash standard value to ACEA C2, C3, C5, while distinguishing it from the DL-1 standard, which specified a low sulfated ash content.

3.3 Test Items and Acceptance Criteria

Table 1 and 2 shows the required performance and acceptance criteria specified in the Automotive Diesel Engine Oil Standard (JASO M 355: 2021).

Some characteristic values that need to be reported at the time of on-file registration are not specified in the Automotive Diesel Engine Oil Standard (JASO M 355: 2021). For these items, refer to Appendix 3.

Note that when carrying out the engine tests and bench tests listed in Table 1, the procedures shown in the Comparison Table in Appendix 2 may be used as alternative test procedures. In this case, which procedure was used for obtaining the result of measurement must be specified on the reporting document, etc.

When the Automotive Diesel Engine Oil Standard (JASO M 355) is revised, it is required to use the latest version. Also, regarding the test procedures specified in the Automotive Diesel Engine Oil Standard (JASO M 355) as well, the latest version of the relevant test procedure shall be used if the year of establishment is not specified. However, regarding JASO M 336 and JASO M 354 as well as the standards cited in these test procedures, the latest version at the time of carrying out the test may be used.

Table 1 Required Performance and Acceptance Criterion (Quality Standards) Specified in the Automotive Diesel Engine Oil Standard (JASO M 355: 2021)

Items			Unit	Performance Criteria						Test Method
				DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21	
Viscosity Grade				—				XW-30, XW-20		SAE J300
Piston Detergency	WTD(Weighted Total Demerit)		ection demerit evaluation point	740 Max.						JASO M 336
	TGF(Top Groove Fill)		vol%	Report						
	Piston Ring Stickings			All free						
	Deposits on Ring Lands		Merit Rating	Report						
Valve Train Wear Protection	Tappet Wear		μm	11.3 Max.						JASO M 354
Soot Dispersancy	Viscosity Increase (100～150H) @100℃		$mm^2/s/h$	0.2 Max.						ASTM D 5967 (Mack T8A)
High Temperature Oxidation Stability	Viscosity Increase@40℃(60H) or		%	249 Max				—		ASTM D 8111
	Viscosity Increase@40℃(70H)		%	—				181 Max		ASTM D 8111
Fuel Economy (NOTE 2)	average fuel economy improvement rate (NOTE1) (fresh oils)		%	—		3.7 Min.	—			JASO-M362
	sum of average fuel economy improvement rate (NOTE2) (fresh + aged oils (NOTE3))		%	—		6.8 Min.	—			
	Fuel Economy Improvement		%	—				2.5 Min.		CEC-L-054-96
Hot Surface Deposit Control	@280℃		Merit Rating	7.0 Min.						JPI-5S-55
Anti-foaming	Sequence I	Foaming/ Stability	mL/mL	10/0 Max.						JIS K 2518
	Sequence II		mL/mL	50/0 Max.						
	Sequence III		mL/mL	10/0 Max.						
High Temperature Anti-foaming	Sequence IV		mL/mL	—			100/0 Max.			ASTM D 6082
Volatility	Evaporation Loss@250℃		mass %	18.0 Max.			15 Max			JPI-5S-41
Anti-corrosion	Copper		mass ppm	20 Max.						ASTM D 6594
	Lead		mass ppm	120 Max.	100 Max.		120 Max.			
	Tin		mass ppm	50 Max.						
	Discoloration of Copper Coupon after Test @135℃			3Max						ASTM D 130
Shear Stability (NOTE 3)	Kinetic Viscosity of Oil after Test@100℃		mm^2/s	Stay-in-grade of virgin oil viscosity classification in SAE J300				XW-30:8.6 Min. XW-20: Stay-in-grade of virgin oil viscosity classification in J300		ASTM D 6278
Sulfated Ash			mass %	—	1.0±0.1		1.6 Max.	0.6 Max.	0.7 Min. 0.8 Max.	JIS K 2272
Base Number			mgKOH/g	10.0 Min.	—					JIS K 2501 2003 8. ASTM D 4739
				—	5.5 Min.		—			JIS K 2501 2003 8.
				—			8.0 Min.	—		JIS K 2501 2003 9. ASTM D 2896

Table 1　Required Performance and Acceptance Criterion (Quality Standards) Specified in the Automotive Diesel Engine Oil Standard (JASO M 355: 2021) continuation

Items			Unit	Performance Criteria						Test Method
				DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21	
Phosphorus			mass %	－	0.12 Max		－	0.10 Max		JPI-5S-38
Sulfur			mass %	－	0.5 Max		－	0.5 Max		JIS K 2541-5.
Chlorine			mass ppm	－	150 Max		－	150 Max		JPI-5S-64
Seal Compatibility	NBR (Nitrile)	Hardness Change	Point	－5～+7						ASTM D7216
		Tensile Strength Rate of Change	%	－**TMC1006**～+10						
		Elongation Rate of Change	%	－**TMC1006**～+10						
		Volume Rate of Change	%	－3～+5						
	ACM (Acrylic)	Hardness Change	Point	－5～+8						
		Tensile Strength Rate of Change	%	－15～+18						
		Elongation Rate of Change	%	－35～+10						
		Volume Rate of Change	%	－3～+5						
	FKM (Fluoro)	Hardness Change	Point	－5～+7						
		Tensile Strength Rate of Change	%	－**TMC1006**～+10						
		Elongation Rate of Change	%	－**TMC1006**～+10						
		Volume Rate of Change	%	－2～+5						
	VMQ (Silicon)	Hardness Change	Point	－**TMC1006**～+5						
		Tensile Strength Rate of Change	%	－45～+10						
		Elongation Rate of Change	%	－30～+20						
		Volume Rate of Change	%	－3～+**TMC1006**						
	MAC (Ethylene Acrylic)	Hardness Change	Point	－**TMC1006**～+5						
		Tensile Strength Rate of Change	%	－**TMC1006**～+10						
		Elongation Rate of Change	%	－**TMC1006**～+10						
		Volume Rate of Change	%	－3～+**TMC1006**						

(NOTE 1) The average fuel economy improvement rate is a simple mean value of improvement rates, which are fuel economy test results, for the fresh or aged oil fuel economy of engine oils under test with respect to the fresh oil fuel economy of the base line engine oils at engine oil temperatures of 60°C and 90°C.
(NOTE 2) Sum of the average fuel economy improvement rates for fresh and aged oils.
(NOTE 3) Aged oil after 200-hr operation, which was obtained according to the JASO M 336 or JASO M 354, shall be used.
(NOTE 4) Shear stability shall be specified only for multi-grade oils.
(NOTE 5) A value +/-TMC1006 shall be specified with the result of the reference test using TMC1006.

3.4　On the Filing of an Oil conforming to the Standard, the Effective Period of On-File, and the Indication of Classification of the Standard

The first dates when classification indication is allowed, the last dates when a new reporting is accepted, and the on-file termination dates for engine oils conforming to the Automotive Diesel Engine Oil Standard (JASO M 355: 2005), the Automotive Diesel Engine Oil Standard (JASO M 355: 2008), the Automotive Diesel Engine Oil Standard (JASO M 355: 2014), the Automotive Diesel Engine Oil Standard (JASO M 355: 2015), the Automotive Diesel Engine Oil Standard (JASO M 355: 2017) and the Automotive Diesel Engine Oil Standard (JASO M 355: 2021) shall be as follows:

The on-file termination date for engine oils conforming to the JASO M 355: 2015 standard for which a reporting was made by March 31, 2018 shall be March 31, 2022. The first date when this classification indication is allowed for engine oils conforming to the JASO M 355: 2021 standard shall be October 1, 2021.

As to the reported (on-file) engine oils conforming to the JASO M 355: 2015 and the JASO M355: 2017 standards, re-registration is not required in this revision. On-file registration and indication will be continued and valid until the termination dates indicated in the table below.

Standard	Year of Issuance of the Standard	First date when Classification Indication is allowed	Last date when a New Reporting is Accepted	On-file Termination Date
M355-2005	2005	October 1, 2005	July 31, 2008	September 30, 2019
M355-2008	2008	August 1, 2008	March 31, 2016	September 30, 2019
M355-2014	2014	October 1, 2014	March 31, 2017	September 30, 2020
M355-2015	2015	October 1, 2015	March 31, 2018	March 31, 2022
M355-2017	2017	October 1, 2017	March 31, 2022	
M355-2021	2021	October 1, 2021		

Regarding the indication of classification of the standards, the year described in the classification shall not be indicated. DH-1-21 shall be indicated as DH-1, DH-2-21 shall be indicated as DH-2, DH-2F-21 shall be indicated as DH-2F, DL-0-21 shall be indicated as DL-0, and DL-1-21 shall be indicated as DL-1, and DL-2-21 shall be indicated as DL-2.

4. Selection of Test Organization

4.1 General

In the Automotive Diesel Engine Oil Standard (JASO M 355: 2021), the requirements are specified concerning various engine tests, bench tests and physical/chemical properties. For on-file (to be described later), it is required to report the results of tests conducted by a test organization. That is, the test results are valid only under if the following requirements are satisfied.

4.2 JASO Engine Test (M 336 and M 354 and M 362)

As to the JASO M 336 (Automotive Diesel Engine Oils - Detergency Test Procedure), the JASO M 354 (Automotive Diesel Engine Oils - Valve Train Wear Test Method), and the JASO M 362 (Automotive Diesel Engine Oils - Fuel Economy Test), it is required to submit results of tests that have been carried out by a test organization providing test accuracy specified in each test method.

In submission of the test results, it is also required to include results of a standard oil test which has been carried out by a test organization for the engine test concerned. The standard oil test result data to be included shall be the latest test result attained within a period of one year from the start date of test of oil to be registered, and shall meet test acceptance criteria as indicated in Form 4a-b , Form 4b-b and Form 4e-b of Appendix 3.

And a test organization which has no rater certified by Japan Petroleum Institute (JPI) like oversea test organizations shall participate the rating symposium that JPI sponsors, because the piston deposit rating is specified in JPI-5S-15 (Ground Diesel Engine Piston Rating Method) for piston detergency test procedure (JASO M 336). Therefore the member who is certified or recommended as a rater by

JPI shall conduct the piston rating.

Conduct the confirmation test using the standard oil DD8 or DV4 listed in the table below for any of the following conditions:

- New installation of N04C engine bench
- Relocation or modification of N04C engine bench
- A year has passed since the last confirmation test was run using the standard oil. However, if a test site owns multiple N04C engine benches then confirmation test shall be conducted on either one of the engine bench. The conditions shall be as follows.
  - The N04C engine bench that conducts the confirmation test shall be changed in turn every year.
  - The N04C engine bench that does not conduct the confirmation test shall maintain the test precision equivalent to the confirmation testing for the candidate testing.

- If a test site that has multiple engine benches installs a new engine bench, then conduct a confirmation test using a standard oil even though the site's confirmation test is still valid.

Further, it's specified below as well as the above conditions about the application of the standard oils for JASO M 336 or JASO M 354.

For confirmation test using standard oils, such as DD8 (JASO M336 standard oil) and DV4 (JASO M354 standard oil), conduct tests separately for each standard oils

4.3 ASTM Engine Test (ASTM D 5967 and D7156, and D 6984 and D7320 and D8111 and D8048)

As to Soot dispersancy test (Mack T-8A and 8E:ASTM D 5967, T-11:ASTM D7156) and high-temperature oxidation stability test , Sequence IIIF and IIIF HD:ASTM D6984, Sequence IIIG:ASTM D7320, Sequence IIIH:ASTM D8111, Volvo T-13:ASTM D8048) for engine oils, it is required to conform to the ACC Product Approval Code of Practice specified by ACC (the American Chemistry Council). For the purpose of submitting test results, the tests must be conducted in one of test organizations certified by the ASTM Test Monitoring Center in accordance with the ACC Product Approval Code of Practice.

4.4 CEC Engine Test (CEC-L-54-T-96)

As to fuel economy test for diesel engine oils (CEC-L-54-T-96), it is required to conform to the ATIEL Code of Practice specified by ATIEL (the Association Technique de L'Industrie Europeanne des Lubrifiants, EEIG). For the purpose of submitting test results, the test must be conducted in one of test organizations certified by CEC in accordance with the ATIEL Code of Practice.

4.5 Bench Test

As to the JPI-5S-55-99 (Hot Tube Test, HTT), ASTM D 6594 (Standard Test Method for Evaluation of Corrosiveness of Diesel Engine Oils), ASTM D 6278 (Shear Stability Test), CEC-L-39-T-96 (Evaluation of Oil-Elastomer Compatibility), ASTM D 7216 (Evaluation of Oil-Elastomer Compatibility), defoaming characteristic, volatility, Base Number and other physical/chemical properties to be reported for on-file, any test organization may be selected under condition that accuracy specified for each test method is satisfied.

4.6 Public Information on Test Organization

Test organizations that can carry out JASO engine tests in request from an outside party (if disclosure is allowed) are publicized at the Web site of the JASO Engine Oil Standards Implementation Panel (http://www.jalos.or.jp/onfiles/) or through any other means. When the disclosure is desired, enter

necessary data in the Application Form of Notification of Desired Consignee Test Laboratory (Appendix 1) and submit it to the JASO Engine Oil Standards Implementation Panel. Inquiries or test requests to the publicized test organizations shall be made directly by each Standard user, i.e., the JASO Engine Oil Standards Implementation Panel will not provide mediation between each Standard user and the publicized test organizations.

5. Standard Application Procedures (Reporting, On-Filing)

5.1 General

Each oil seller or supplier using the Automotive Diesel Engine Oil Standard (JASO M 355:2021) through this system shall ensure that each product subject to reporting has such required performance, etc. as stipulated in the Automotive Diesel Engine Oil Standard (JASO M 355:2021) by confirmation, in accordance with the guidance of this Manual, of a test organization designated by this Manual and shall use the Standard application procedures for each product brand and for each prescription as described in subsequent sections of “Reporting and On-Filing” and “Custody and Submission of Test Data.”

This system is for each user of the Standard to give a public notice of the conformity of the user’s product with the Standard, on its own responsibility, by way of on-filing of a product together with its test data, and is not for this system or the Panel to certify or acknowledge the conformity of any product with the Standard. Each user of this system shall fully understand such nature of the system. Each user shall be careful so as not to cause misunderstanding by end users including consumers, and is required to make a sincere effort to maintain the conformity with the Standard of the said product on the market.

5.2 Procedure Flow Chart

The outline of the reporting and on-filing procedure is shown in Figure 2.

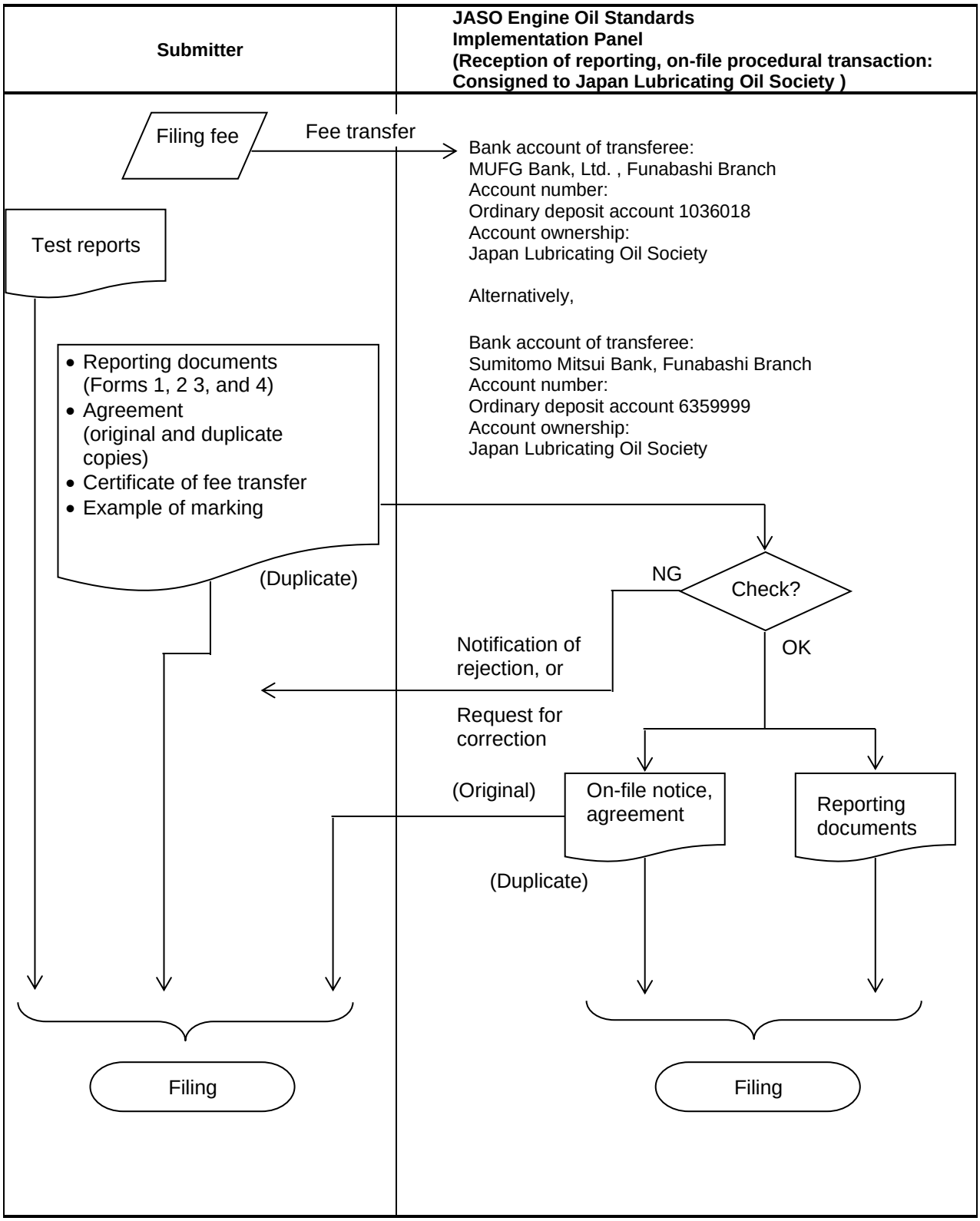

Fig. 2 Procedure Flow Chart for Reporting and Filing

5.3 Reporting and On-Filing

Prior to on-filing, the submitter shall transfer a filing fee indicated in Appendix 1 to the specified bank account of the JASO Engine Oil Standards Implementation Panel. Thereafter, the submitter shall prepare the reporting documents (forms 1, 2, 3 and 4 in Appendix 3) and enter necessary data in form B of the original and duplicate copies of the notice and agreement documents (Appendix 4). Together with a certificate of a filing fee, the submitter shall send the reporting documents to the JASO Engine Oil Standards Implementation Panel. Note that transactions for receipt of reporting and on-filing are to be consigned to the Japan Lubricating Oil Society. Therefore, the reporting documents and the filing fee certificate shall be sent to the address shown below:

Address: 2-16-1 Hinode, Funabashi, Chiba
273-0015 Japan
Japan Lubricating Oil Society
c/o Business Department

Any cost required for transferring a filing fee to the specified bank account shall be borne by the submitter. Note that the reporting documents and the filing fee will not be returned after reception. If a change in the amount of filing fee is made, it will be communicated by the JASO Engine Oil Standards Implementation Panel through related associations.

At the time of reporting, the submitter shall submit to the JASO Engine Oil Standards Implementation Panel a representative example of performance classification marking on the diesel engine oil product container and an entire product label (design allowable). (Refer to 6 - Marking.)

5.4 Custody and Submission of Test Data

JASO engine test reports (basic data for reporting) shall be prepared in a format specified in the JASO Standard, and the submitter shall maintain responsibility for the JASO engine test reports. Further, data of ASTM engine and bench test results shall also be maintained by the submitter. The period of maintenance of test results and reports shall be until the submitter cancels on-file of the product concerned.

The submitter shall submit the test reports as promptly as possible upon receipt of a request for them from the JASO Engine Oil Standards Implementation Panel.

5.5 Documents Check

Upon receipt of reporting documents, the JASO Engine Oil Standards Implementation Panel shall check:

(1) whether all the necessary items have been entered.

(2) whether infrared absorption spectral data has been attached in the specified format.

(3) whether engine oil performance data has been entered as specified.
Further, the JASO Engine Oil Standards Implementation Panel shall check:

(4) against the specified values as to the bench test characteristic items for which the specified values have been determined.

(5) against the criteria of acceptance as to the JASO and ASTM engine test results.

Further, the JASO Engine Oil Standards Implementation Panel shall check the performance classification documents and product labels for any improper points or unclear expressions.

If any improper or inadequate item is found, the JASO Engine Oil Standards Implementation Panel shall return a notice of on-file rejection (with information on reasoning) to the submitter or it shall request the submitter to make a correction.

If all the documents are satisfied, the JASO Engine Oil Standards Implementation Panel shall send an on-file notice to the submitter and put its copy into a file of the reporting documents.

5.6 Oil Code

An oil code shall be determined by the submitter and recorded by the JASO Diesel Engine Oil Standards Implementation Panel.
Each oil code shall be set up in the format shown below:

D	○○○	△△△	□□□
(1)	(2)	(3)	(4)

(1) Category code (one alphabetic capital letter):
"D" shall be assigned to a diesel engine oil product.

(2) Country number (three digits):
An international telephone country number of a nation where the submitter resides or the diesel engine oil is manufactured.
(Example: Japan: 081, USA: 001, England: 044, ...)

(3) Seller code (three alphabetic capital letters):
Any three alphabetic capital letters desired by the submitter (e.g., Hino: HNM, JXTG Nippon Oil & Energy Corporation: JXE, ...)
Basically one submitter shall use one seller code, but also multiple codes are allowed.
However there is only one case that one submitter can use multiple codes, that is the case when a submitter keep the existing code with such as merger or inheritation of brand and also JASO Engine Oil Standards Implementation Panel approve that.

If a seller code desired by the submitter has already been used by any other submitter, the JASO Engine Oil Standards Implementation Panel may request a change of the seller code to prevent duplication.

(4) Control number (three digits):
A voluntary control number to be assigned by the submitter arbitrarily. It is not allowed for one submitter to assign the same control number followed by same seller code to different products or different trial products.

For reference, examples of assigned oil codes are shown in Appendix 6. When the registered oil meets two or more quality standards for the DH-1, DH-2, DH-2F, DL-0, and DL-1 classifications, the submitter can register the oil by using one oil code. However, with one oil code, all the performance classifications for the registered oil must be indicated. For reference, examples of performance classification marking are shown in Appendix 7.

5.7 Disclosure of On-File Information

For promotion and public recognition of the Automotive Diesel Engine Oil Standard (JASO M 355: 2021), and diesel engine oil products, the JASO Engine Oil Standards Implementation Panel will publicize

product names, submitter names, viscosity grades, oil codes and classifications of on-file products through such communication media as the Internet according to the Standard.

JASO Engine Oil Standards Implementation Panel will announce the information disclosed to the submitter before disclosure. If the information is incorrect in those the submitter has submitted, the submitter shall notice the correction in written materials as soon as possible.

JASO Engine Oil Standards Implementation Panel does not have any responsibilities on the loss and the damage of submitters caused by the information which has been agreed between JASO Engine Oil Standards Implementation Panel and submitters.

5.8 On-File Maintenance

If continuation of on-file of the product concerned is desired on and after January 1 of the year subsequent to the year of on-file, the submitter (requesting continuation of on-file) shall notify the JASO Engine Oil Standards Implementation Panel by the end of February of the subsequent year as to the amount of on-file maintenance fee, which is to be calculated according to the sales quantity (from January to December of the preceding year) in the method specified in Appendix 3. Upon notification from the submitter requesting continuation of on-file, the JASO Engine Oil Standards Implementation Panel will check it and send an invoice to the submitter requesting continuation of on-file. After receiving the invoice, the submitter requesting continuation of on-file shall promptly transfer an on-file maintenance fee to the specified bank account of the JASO Engine Oil Standards Implementation Panel. Any cost required for transfer of the on-file maintenance fee to the specified bank account shall be borne by the submitter. Note that the on-file maintenance fee will not be returned once received by the JASO Engine Oil Standards Implementation Panel.

In case that the on-file maintenance fee and calculation method are to be revised, the JASO Engine Oil Standards Implementation Panel will issue notification through the related organizations.

If the submitter requesting continuation of on-file does not transfer the on-file maintenance fee to the specified bank account, the JASO Engine Oil Standards Implementation Panel will judge that the sale of the product concerned has been discontinued. In this case, the on-file of the product concerned may be canceled.

Figure 3 shows a general flow of on-file maintenance procedure.

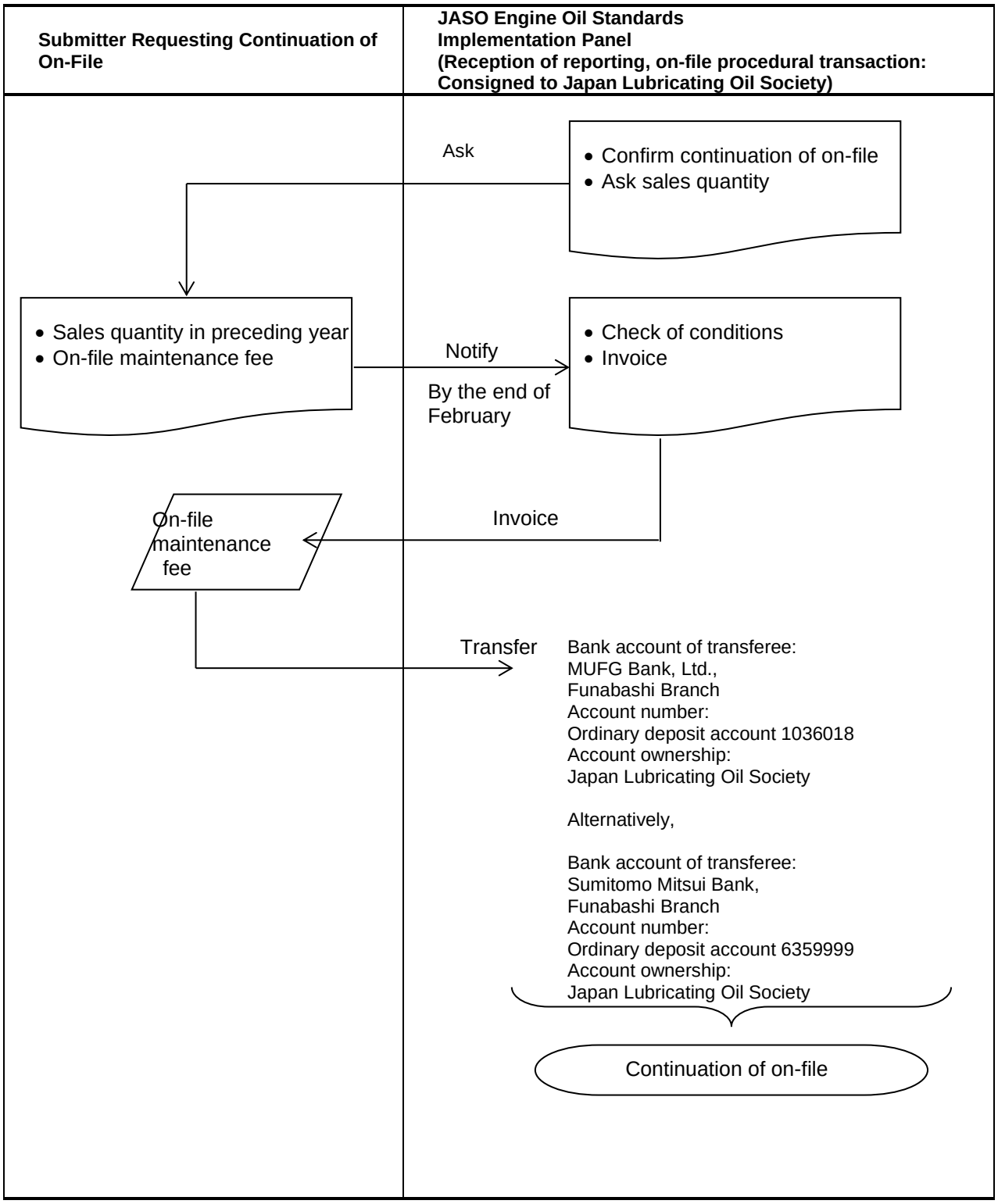

Fig. 3 On-File Continuation Procedure Flow

5.9 Liability for Product Quality

As to the quality and performance of each diesel engine oil product filed (on file) through this system, classification and guarantee shall be the submitter's responsibility, and the submitter (seller) shall assume liability for the quality of the product concerned.

This system is not intended for the JASO Engine Oil Standards Implementation Panel to provide warranty on quality and performance of engine oil products on file. The JASO Engine Oil Standards Implementation Panel shall not be responsible for any loss or damage which may occur as a result of the use of an engine oil product on file.

If any trouble takes place concerning the quality and performance of an on-file engine oil product, the submitter shall take respond to solve the problem as his own responsibility.

If this system is contradictory to any legal regulations of the country concerned (including local administration regulations), the legal regulations take precedence over this system. Therefore, as to loss or damage arising from the use of this system without regard to inconsistency with legal regulations, the JASO Engine Oil Standards Implementation Panel will not assume any responsibility.

5.10 Information Security

Except for the conditions mentioned in Item 5.7 - Disclosure of
On-File Information, the JASO Engine Oil Standards Implementation Panel will not disclose on-file information to a third party without the written permission of the submitter, except if disclosure of on-file information is required as a legislative action by public organizations. Even if submitted or filed information is inadvertently disclosed to a third party, the JASO Engine Oil Standards Implementation Panel will not be responsible for compensation as to any loss or damage due to information disclosure.

If any questions arise regarding a filed product and a party concerned makes reference in writing to the JASO Engine Oil Standards Implementation Panel, it is allowed for the JASO Engine Oil Standards Implementation Panel to inform the questioner as to the on-file status of the diesel engine oil product corresponding to the oil code concerned and the name of the seller concerned. Further, if the questioner desires communication with the submitter, the JASO Engine Oil Standards Implementation Panel will notify the submitter and leave any responses to the submitter. In this event, the JASO Engine Oil Standards Implementation Panel will not take any further action by itself.

5.11 Change in File

In any of the following cases, the submitter shall report to the JASO Engine Oil Standards Implementation Panel in advance. In any of these cases, the submitter shall make necessary payment as specified in Item 5.3 and update the oil code concerned.

(1) Change of the seller code

(2) Change of the company name together with the change of seller code

(3) Change of the product name

(4) Addition/change of the viscosity grade (Reporting is required even if the read-across allowable range shown in Appendix 5 is satisfied.)

(5) Change of the performance classification marking form

In any of the following cases, the submitter shall promptly report to the JASO Engine Oil Standards Implementation Panel. Note that it is not required to pay a on-file fee specified in Item 5.3 or update the oil code concerned in the case of (1) and (2) listed below. The submitter shall make necessary payment

as specified in item 5.3 but the update of the oil code in not needed concerned in the case of (3) listed below.

(1) Change of the information on communication with the submitter (address, telephone number, etc.) (In this case, it is required to submit documents in forms 5 and 6 shown in Appendix 3.)

(2) Change of any condition other than the viscosity grade within the read-across allowable range shown in Appendix 5
(In this case, it is required to submit reporting documents in forms 5, 6, 7 and 8 shown in Appendix 3.)

(3) Change of the company name (Only when supplier code is same due to company merger or brand inheritance. In this case, it is required to submit documents in forms 5 and 6 shown in Appendix3, original on-file report form and performance classification marking form described by the new company name.)

If another submitter makes a change in an already filed product within the read-across allowable range shown in Appendix 5, it is required to provide on-file according to Item 5.3.

Also, if said submitter makes changes in the files product concerned as to any condition other than the viscosity grade within the read-across allowable range shown in Appendix 5, the contents of the change shall be promptly reported to the JASO Engine Oil Standards Implementation Panel.

Appendix 6 presents examples of reporting and notification.

5.12 Precautions for Submitter

The submitter shall pay particular attention to the following points according to this system.

(1) The quality, performance and marking of the product to be sold shall meet those entered in the on-file documents.

(2) If any questions occur as to the quality, performance and/or marking of the product, the submitter is responsible for any responses.

(3) As to the quality, performance and marking of the diesel engine oil product filed, the submitter shall provide classification and guarantee on his own responsibility, and information on this responsibility shall be publicized to general consumers through sales channels of the submitter.

If the submitter discontinues sales of the on-file diesel engine oil product, the submitter shall promptly notify the JASO Engine Oil Standards Implementation Panel as to cancellation of on-file.

6. Indication

After receipt of the on-file notice, the submitter shall, on its own responsibility, indicate the oil code concerned and its performance classifications on the product container using the form examples shown in Appendix 7.

When the registered oil meets two or more quality standards for the DH-1, DH-2, DH-2F, DL-0, and DL-1 classifications, the submitter can register the oil for two or more performance classifications and indicate the markings by using one oil code, as shown in the entry examples shown in Appendix 8.

In advertisements or the like, the user of this system shall not use such an expression as will lead to a misunderstanding that the quality/performance of the diesel engine oil concerned has been certified by the JASO Engine Oil Standards Implementation Panel.

As specified in Item 5.3, the user of this system shall send a representative example of performance classification marking and a representative example of an entire product label (design acceptable) to the JASO Engine Oil Standards Implementation Panel.

7. Market Survey

For ensuring proper interests of consumers and on-file submitters, the JASO Engine Oil Standards Implementation Panel will conduct market survey regarding diesel engine oil products for which on-filing is maintained and check that the Automotive Diesel Engine Oil Standard (JASO M 355: 2021) are used correctly on the market. Therefore, the JASO Engine Oil Standards Implementation Panel may take arbitrary samples of JASO engine oil category DH-1 from the market, examine the performance marking form and quality/performance items specified in the Automotive Diesel Engine Oil Standard (JASO M 355: 2021), and check them against the on-file documents concerned. If any clear discrepancy from the on-file document concerned is found in this market survey, the JASO Engine Oil Standards Implementation Panel may ask the on-file for its reason in writing or make a request for improvement.

The JASO Engine Oil Standards Implementation Panel may disclose the results of market survey in a manner that particular submitter names and oil product names are not identifiable.

8. Use of Standard by Vehicle Manufacturers or Sellers

Any vehicle manufacturer or seller may utilize the Automotive Diesel Engine Oil Standard (JASO M 355:2021), under his own judgment and on his own responsibility. For instance, in owner's manual or any other document, the vehicle manufacturer or seller may indicate a recommended diesel engine oil product to be used by consumers according to the Automotive Diesel Engine Oil Standard (JASO M 355:2021).

In recommending any diesel engine oil product, the user of this system shall not provide such an expression as will lead to a misunderstanding that the quality/performance of the diesel engine oil concerned has been certified by the JASO Engine Oil Standards Implementation Panel (e.g., diesel engine oil certified or assured by the JASO Engine Oil Standards Implementation Panel).

As to the above recommendation, the user of this system shall send a representative example in the owner's manual concerned to the JASO Engine Oil Standards Implementation Panel.

9. Information Available

For details of conditions regarding this system, contact the following organizations.

9.1 Information on Destination Addresses of On-file Documents and On-file Forms

JASO Engine Oil Standards Implementation Panel
2-16-1 Hinode, Funabashi,
Chiba 273-0015 Japan
Japan Lubricating Oil Society
c/o Business Department
Tel : 81-47-433-5181
Fax : 81-47-431-9579
URL : http://www.jalos.or.jp/onfile/

9.2 Information on Test Methods (JASO Standards)

Society of Automotive Engineers of Japan, Inc. (JSAE)
Publishing Team
Publishing, E-NET & Professional Development Group
5 Bancho Center Building 5F
10-2, 5 Bancho, Chiyoda-ku, Tokyo
102-0076 Japan
Tel : 81-3-3262-8215(Direct)

Fax : 81-3-3261-2204

9.3 Information on Standard Reference Oil

Japan Lubricating Oil Society
Technical Center
2-16-1 Hinode, Funabashi,
Chiba 273-0015 Japan
Tel : 81-47-433-5181
Fax : 81-47-431-9579

9.4 Information on Test Engines and Parts

9.4.1 JASO M 336, JASO M 354 and JASO M 362 (N04C engine/parts)

Hino Motors, Ltd.
Corporate Sales & Marketing Dept.
3-1-1, Hino-dai, Hino-shi, Tokyo 191-8660,
Tokyo 191-8660 Japan
Tel: +81-42-586-5675
Fax: +81-42-586-5222

9.4.2 JPI-5S-55-99 (Hot tube test, HTT)

Nikko Create Co., Ltd.
Ninagawa Factory Industrial Equipment Department
188 Onoguchi machi, Tochigi shi
Tochigi, 323-0065, Japan
Tel: 81-282-20-1170
Fax: 81-282-20-1157

9.5 Information on Overseas Related Test Methods

9.5.1 Information on ASTM Test Methods and Test Implementation Organization

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959, U.S.A.
Tel:(+1)610-832-9585 FAX:(+1)610-832-9555
Website: http://www.astm.org
e:mail: service@astm.org

9.5.2 Information on CEC Test Methods and Test Implementation Organization

Interlynk Administrative Services Ltd
P.O. Box 6475, Earl Shilton
Leicester LE 9 9ZB, United Kingdom
Tel:(+44)1455-821993 Fax:(+44)1455-821994
Website: http://www.cectests.org
e:mail: cecinfo@interlynk.co.uk

APPENDIX 1

Application Form of Notification of Desired Consignee Test Laboratory

Date on-file (year, month, day) : year, month, day	
Submitter (Company) Company seal	**Contact address**
Person in charge of on-file Name Seal Department/Section, Title	Name Department/Section Address Tel Fax

Desired engine test to be consigned (Enter "○" for desired test.)		
JASO High Temperature and high Load Detergency Test (JASO M336)		Result data of the latest standard oil test carried out within one year shall be included using forms 4a-b and 4b-b and 4e-b.
JASO Value Train Wear Test (JASO M354)		
JASO Fuel Economy Test (JASO M XXX)		

NOTE:
1. For continuation of the consignment-desired test, the relevant test shall be carried out using standard oil per year and the test result data shall be submitted.
2. The names and addresses of the authorized test laboratories to be selected are publicized at the Panel Web site. A1-
3. For cancellation of on-file of the consignee test laboratory, notification shall be made to the Panel.

To be entered by the JASO Engine Oil Standards Implementation Panel
Person in charge of receipt: Seal
Date received (year, month, day): year, month, day
Receipt number:
Remarks:

APPENDIX 2

COMPARISON TABLE FOR TEST METHODSJIS/JPI Test and ASTM Test

Test Item	Test method	JIS/JPI test No.	ASTM test No.
Density	Oscillating U-Tube Method	JIS K 2249-1：2011	ASTM D 1298
	Hydrometer Method	JIS K 2249-2：2011.	ASTM D 4052
Flash Point(COC)	Cleveland Open Cup Method	JIS K 2265-4-2007	ASTM D 92
Kinematic viscosity		JIS K 2283-2000 5.	ASTM D 445
Viscosity Index		JIS K 2283-2000 6.	ASTM D 2270
CCS viscosity		JIS K 2010-1993 Attachment A	ASTM D 5293
MRV viscosity		JPI-5S-42-2004	ASTM D 4684
High temperature high shear viscosity		JPI-5S-36-2003	ASTM D 4683
Sulfated Ash		JIS K 2272-1998 5.	ASTM D 874
Carbon residue	Conradson Method	JIS K 2270-1:2009.	ASTM D 189
	Micro Method	JIS K 2270-2:2009.	ASTM D 4530
Acid number	Potentiometric Titration Method	JIS K 2501-2003 7.	ASTM D 664
Base number	Potentiometric Titration Method (Hydrochloric Acid)	JIS K 2501-2003 8. (DH-1、DH-2、DH-2F)	ASTM D 4739 (DH-1)
	Potentiometric Titration Method (Perchloric Acid)	JIS K 2501-2003 9.	ASTM D 2896
Volatility	Noack Method	JPI-5S-41-2004	ASTM D 5800
Color	ASTM Color Test Method	JIS K 2580-2003 6.	ASTM D 1500
Ca	ICP Method	JPI-5S-38-2003	ASTM D 5185
Mg			
Zn			
P			
B			
N	Macro Kjeldahl Method	JIS K 2609-1998 3.	ASTM D 3228
	Chemiluminescence Detection	JIS K 2609-1998 4.	ASTM D 4629
	Micro Electricity Titration	JIS K 2609-1998 5.	—
S	Wavelength Dispersive X-ray Fluorescence Spectrometry	JIS K 2541-7-2003	ASTM D 2622
	ICP Method	JPI-5S-38-2003	ASTM D 5185
Anti-foaming	Sequence I,II,III	JIS K 2518-2003	ASTM D 892
High temperature Anti-foaming	Sequence IV(DL-1)	JIS K 2518-2003 Attachment 1	ASTM D 6082

APPENDIX 3

Diesel Engine Oil Reporting and On-File Maintenance

Contents

1. Notes on Entries in Report Forms

(1) When entering data in the report forms, refer to the text in the standard application manual.

(2) As to an item concerning any test method without indication of a year (in the report forms), adopt a test method which is the latest version at the time of reporting.

(3) If a marking/sale corresponding to false reporting is made, the authorities concerned may impose a punishment according to the Act Against Unjustifiable Premium and Misleading Representation (Article 4 - Clause 1) or the Act of Prevention of Unfair Competition (Article 2-item 1 - Clause 12).

2. On-File Reporting Procedure

(1) Filing Fee

Filing fee required for
oil item : ¥40,000 per oil item to be filed

(2) Submission and Transfer of Filing Fee

Prior to reporting of oil item to be filed, a filing fee indicated in 2.(1) shall be transferred to the following bank account (per oil item to be filed). At the time of reporting, a certificate of the fee transfer into the bank account and necessary documents shown below shall be prepared and submitted to the panel.

Bank account of transferee:
MUFG Bank, Ltd. , Funabashi Branch
Account number:
Ordinary deposit account 1036018
Account ownership:
Japan Lubricating Oil Society

Alternatively,

Bank account of transferee:
Sumitomo Mitsui Bank, Funabashi Branch
Account number:
Ordinary deposit account 6359999
Account ownership:
Japan Lubricating Oil Society

- Document required for filing

Certificate of filing fee transfer
Form 1 : Front sheet of reporting
Form 2 : Bench test results
Form 3 : Blending change rule application data
Form 4 : Engine test results

Representative example of performance classification marking, and representative example of entire product label (Design figure acceptable)
Entry samples of Forms 1 to 4 are shown in Appendix 8.

3. On-File Maintenance Fee

As to on-file registration maintenance, a term of one year starts from January 1 and ends with December 31 of the current year.

To maintain on-file registration on and after January 1 of the year subsequent to the year of registration, it is required to pay an on-file maintenance fee. For each registrant, an on-file maintenance fee is calculated as shown below according to the total sales quantity of each registered oil in the previous year.

Total Sales Quantity of Each Registered Oil in the Previous Year	**On-File Maintenance Fee**
Less than 1,000 kl	¥30,000
1,000 kl or more	To be calculated in increments of ¥30 per kl

- Calculation Example – 1

  In case that on-file registration has been completed October 1, 2021, and 1,250 kl of oil has been sold by December 31, 2021:

  The term of the first year means a period between October 1, 2021 and December 31, 2021, and the term of the second year means a period between January 1, 2022 and December 31, 2022.

  An on-file maintenance fee to be paid in the second year is calculated on the basis of the previous year. In this case, it is determined according to declaration of sales quantity during a period of October 1, 2021 to December 31, 2021.

  Hence,

- Calculation Example – 2

  In case that on-file registration of oil A has been completed on October 1, 2021, 500 kl of oil A has been sold by December 31, 2021, 2,000 kl of oil A has been sold in the year 2022, on-file registration of oil B has been completed on May 1, 2022, and 1,000 kl of oil B has been sold by December 31, 2022: (See Fig. 3.1.)

  Since the total sales quantity of oil A in the year 2021 is 500 kl, an on-file maintenance fee to be paid in the year 2022 is ¥30,000. The total sales quantity of oil in the year 2022 is 3,000 kl, i.e., 2,000 kl of oil A plus 1,000 kl of oil B. Hence, an on-file maintenance fee to be paid in the year 2023 is calculated as indicated below.

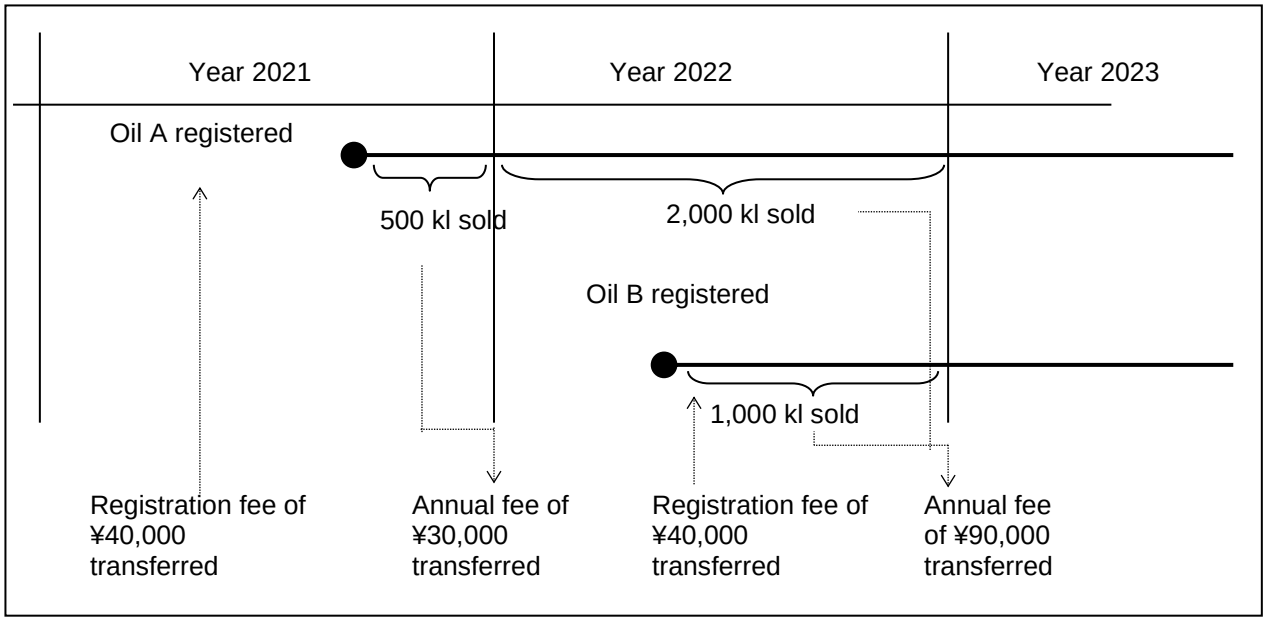

Fig. 3.1 Calculation Example of On-File Maintenance Fee

4. On-File Change Notification Procedure

Where the registrant wants to change the contents described in the on-file report, the following documents shall be prepared even if renewal of the oil code is not required. These documents shall then be submitted to the JASO Engine Oil Standards Implementation Panel. Refer to Item 5.11 in the Standards Application Manual.

(1) To change the contact address of the registrant:

Documents required for notification
Form 5: Notice of change
Form 6: Front sheet for change notification reporting

(2) To change any condition other than viscosity grade within the read-across allowable range indicated in Appendix 3:

Documents required for notification
Form 5: Notice of change
Form 6: Front sheet for change notification reporting
Form 7: For change notification; bench test result data
Form 8: Blending change rule application data

(3) In case of the change of the company name and/or the contact details for the submitter

Prior to submission of the change, a fee ¥40,000 per one submission shall be transferred to the following bank account. At the time of submission a certificate of the fee transfer into the bank account and the following documents shown in 4. and listed below shall be prepared and submitted to the JASO Engine Oil Standards Implementation Panel.

Bank account of transferee:
MUFG Bank, Ltd. , Funabashi Branch
Account number:
Ordinary deposit account 1036018
Account ownership:
Japan Lubricating Oil Society

Alternatively,

Bank account of transferee:
Sumitomo Mitsui Bank, Funabashi Branch
Account number:
Ordinary deposit account 6359999
Account ownership:
Japan Lubricating Oil Society

- Document required for filing

Certificate of filing fee transfer
Form 5 : Notice of change
Form 6 : Front sheet for change notification reporting
Original on-file report form
Representative example of performance classification marking form, and representative example of entire product label (Design figure acceptable)

Form 1: Front sheet of reporting

Diesel Engine Oil Reporting

Date registration (year, month, day): year, month, day		
Registrant (Company)	Company seal	**Contact address**
Person in charge of registration Name Seal Department/Section, Title Signature		Name Department/Section Address Tel Fax

Registered Oil	
Intra-company designation or code number	
Product name	
Classification	□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2
Viscosity grade	
Oil code	

Form 2: Bench test results □DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE4)

Items		Test Method	Unit	Measured Value					
			Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
Density (15 °C)		☐ JIS K 2249-1:2011 ☐ JIS K 2249-2:2011.	g/cm^3						
			Criteria	Reported					
Flash point	COC	JIS K 2265-4-2007	°C						
			Criteria	Reported					
Kinematic viscosity (40 °C)		JIS K 2283-2000 5.	mm^2/s						
			Criteria	Reported					
Kinematic viscosity (100 °C)		JIS K 2283-2000 5.	mm^2/s						
			Criteria	SAE J300					
Viscosity index		JIS K 2283-2000 6.							
			Criteria	Reported					
CCS viscosity		JIS K 2010-1993 Attachment A	mPa·s						
			Criteria	SAE J300					
MRV viscosity		JPI-5S-42-2004	mPa·s						
			Criteria	SAE J300					
High-temperature high-shear-stability viscosity(150 °C)		JPI-5S-36-2003	mPa·s						
			Criteria	SAE J300					
Ash sulfate		JIS K 2272-1998 5.	mass%						
			Criteria	Reported	1.0±0.1		1.6 Max	0.6 Max	0.7 Min. 0.8 Max.
Residual carbon		☐ JIS K 2270-1:2009 ☐ JIS K 2270-2:2009	mass%						
			Criteria	Reported					
Acid number		JIS K 2501-2003 7.	mgKOH/g						
			Criteria	Reported					
Base number	$HClO_4$	☐ JIS K 2501-2003 9. ☐ ASTM D 2896	mgKOH/g						
			Criteria	Reported			8.0 Min	Reported	
	HCl or TriSolvent	☐ JIS K2501-2003 8. ☐ ASTM D 4739	mgKOH/g						
			Criteria	10.0 Min					
	HCl	JIS K 2501-2003 8.	mgKOH/g						
			Criteria		5.5 Min			Reported	
Volatility	NOACK	JPI-5S-41-2004	mass %						
			Criteria	18.0 Max			15 Max		
Color		JIS K 2580-2003 6.							
			Criteria	Reported					
Element analysis value	Ca	JPI-5S-38-2003	mass%						
			Criteria	Reported					
	Mg	JPI-5S-38-2003	mass%						
			Criteria	Reproted					
	Zn	JPI-5S-38-2003	mass%						
			Criteria	Reported					
	P	JPI-5S-38-2003	mass%						
			Criteria	Reported	0.12 Max		Reported	0.10 Max	
	B	JPI-5S-38-2003	mass%						
			Criteria	Reported					
	N	☐ JIS K 2609-1998 3. ☐ JIS K 2609-1998 4. ☐ JIS K 2609-1998 5.	mass%						
			Criteria	Reported					
	S	☐ JIS K 2541-7-2003 ☐ JPI-5S-38-2003	mass%						
			Criteria	Reported	0.5 Max		Reported	0.5 Max	
	Cl	☐ JPI 5S-64-2002 ☐ ASTM D6443	Mass ppm						
			Criteria		150 Max			150 Max	
	Other element (NOTE7)	[ ]	mass%						
			Criteria	Reported					

Form 2: Bench test results continuation

□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE4)

Items		Test Method	Unit	Measured Value					
			Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
Infrared absorption spectrum	in use of 0.1 mm fixed cell								
			Criteria	IR chart attached,A4					
Anti-foaming	Sequence I	JIS K 2518-2003	ml						
			Criteria	10/0 Max. (Foaming/Stability)					
	Sequence II		ml						
			Criteria	50/0 Max. (Foaming/Stability)					
	Sequence III		ml						
			Criteria	10/0 Max. (Foaming/Stability)					
High-temperature anti-foaming	Sequence IV	ASTM D 6082	ml						
			Criteria				100/0 Max. (Foaming/Stability)		
Shear Stability	Kinetic Viscosity of Oil after Test @100 °C mm^2/s	ASTM D6278	mm^2/s						
			Criteria	SAE J300 (NOTE8)				XW_30 8.6 Min XW_20 SAE J300 (NOTE8)	
Hot Surface Deposit Control	Hot Tube Test @ 280 °C	JPI-5S-55 99	Merit Rating						
			Criteria	7.0 Min					
Anti corrosion	Cu	ASTM D 6594	ppm						
			Criteria	20 Max.					
	Pb	ASTM D 6594	ppm						
			Criteria	120 Max	100 Max		120 Max		
	Sn	ASTM D 6594	ppm						
			Criteria	50 Max					
	Discoloration of Copper Coupon after test @135 °C	ASTM D130							
			Criteria	3 Max					

Form 2: Bench test results continuation

□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE4)

Items			Test Method	Unit	Measured Value					
				Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
□Oil Elastomer Compatibility (NOTE9-1)										
NBR	Hardness Change		ASTM D7216 □Before adjustment □After adjustment (NOTE9-1)	Point						
				Criteria	-5～+7 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Volume Rate of Change			%						
				Criteria	-3～+5 ( ) Attach Test report.					
ACM	Hardness Change			Point						
				Criteria	-5～+8 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%						
				Criteria	-15～+18 ( ) Attach Test report.					
	Elongation Rate of Change			%						
				Criteria	-35～+10 ( ) Attach Test report.					
	Volume Rate of Change			%						
				Criteria	-3～+5 ( ) Attach Test report.					
FKM	Hardness Change			Point						
				Criteria	-5～+7 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Volume Rate of Change			%						
				Criteria	-2～+5( ) Attach Test report.					
VMQ	Hardness Change			Point						
				Criteria	-**TMC1006**～+5 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%						
				Criteria	-45～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%						
				Criteria	-30～+20 ( ) Attach Test report.					
	Volume Rate of Change			%						
				Criteria	-3～+ **TMC1006** ( ) Attach Test report.					
MAC	Hardness Change			Point						
				Criteria	- **TMC1006**～+5 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Volume Rate of Change			%						
				Criteria	-3～+**TMC1006** ( ) Attach Test report.					

Form 2: Bench test results continuation

□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE4)

Items			Test Method	Unit	Measured Value					
				Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
☐Oil Elastomer Compatibility (NOTE9-2)										
RE1	Hardness Change		CEC L-039-96	Point						
				Criteria	-1～+5					
	Tensile Strength Rate of Change			%						
				Criteria	-40～+10					
	Elongation Rate of Change			%						
				Criteria	-50～+10					
	Volume Rate of Change			%						
				Criteria	-1～+5					
RE2 ☐ New ☐ Old (NOTE10)	Hardness Change			Point						
				Criteria	-5～+8 (-5～+5)					
	Tensile Strength Rate of Change			%						
				Criteria	-15～+18 (-15～+10)					
	Elongation Rate of Change			%						
				Criteria	-35～+10 (-35～+10)					
	Volume Rate of Change			%						
				Criteria	-7～+5 (-5～+5)					
RE3 ☐ New ☐ Old (NOTE10)	Hardness Change			Point						
				Criteria	-22～+1,DH-2,DH-2F/-25～+1 (-25～+1)					
	Tensile Strength Rate of Change			%						
				Criteria	-30～+10,DH-2,DH-2F/-45～+10 (-45～+10)					
	Elongation Rate of Change			%						
				Criteria	-20～+10,DH-2,DH-2F/-20～+10 (-20～+10)					
	Volume Rate of Change			%						
				Criteria	-1～+22,DH-2,DH-2F-1～+30 (-1～+30)					
RE4	Hardness Change			Point						
				Criteria	-5～+5					
	Tensile Strength Rate of Change			%						
				Criteria	-20～+10					
	Elongation Rate of Change			%						
				Criteria	-50～+10					
	Volume Rate of Change			%						
				Criteria	-5～+5					
DBL-AEM	Hardness Change			Point						
				Criteria	-5～+10					
	Tensile Strength Rate of Change			%						
				Criteria	-35～					
	Elongation Rate of Change			%						
				Criteria	-50～					
	Volume Rate of Change			%						
				Criteria	-5～+15					

NOTE: 4. Check all the applicable check boxes.

5. The latest version of new SAE viscosity classification shall be applied to the viscosity criteria.

6 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

7 "Other element" refers to any other element of which content is 0.01 mass% or more, except for C, H, and O.

8 The kinematic viscosity (100 °C) after the shear stability test shall conform to the SAE viscosity classification (SAE J 300). This is not required for single-grade oils.

9 The oil elastomer compatibility test shall be performed according to one of the following methods:

(1) API CJ-4 Standard (ASTM D7216; 14 days; 5 elastomer materials, NBR (100℃), ACM (150℃), FKM (150℃), VMQ (150℃), MAC (150℃))

For the criteria, both the original one before adjustment and the adjusted one are acceptable. Please note that the submitter shall show which one is applied indicating the check in each box. And if used the adjusted one, please describe the adjusted one in the brackets.

Please note both test results of the two test oils if used base oil interchange. As specified in Appendix 5 Table. A, base oil interchange is allowed when the saturates and sulfur content of the base oil of onfiled oil fall within the range of the saturates and sulfur content of the two test oils which satisfy the requirement of oil elastomer compatibility test and the DI packeage is unchanged.

(2) RE1, RE2, RE3, RE4 and Daimler AG Standard AEM: D 8948/200.1 (150℃)

10 As to the test elastomer materials, RE2 and RE3, in the oil elastomer compatibility test, the material and criteria have been changed. Both the new criteria of the new elastomer materials, RE2-99 and RE3-04, and the old criteria, in parentheses, of the old elastomer are shown in the Table. Indicate whether the new or old elastomer materials have been used by checking the New or Old check box. Apply the new criteria to the new elastomer, RE2-99 and RE3-04; apply the old criteria to the old elastomer .

Form 3: Blending change rule application data

Where registered oil is different from oil which has been used to generate engine test result data (where a change is made in oil blending), enter “X” in the following table in the reporting form.

This indication shall be given for a test in which each rule has been applied. For use of each rule, follow the guidelines specified in Appendix 5.

Items	**Detergency test**	**Valve train wear test**	**High-temperature oxidation stability test**	**Soot dispersancy test for diesel engine oil**	**Fuel economy**		**Anti corrosion**	**Oil elastomer compatibility**
					test (DL-1)	**test (DH-2F)**		
Test Method	JASO M 336:2014 (N04C)	JASO M 354:2015 (N04C)	ASTM D6984 (Sequence IIIF) ASTM D7320 (Sequence IIIG) ASTM D8111 (Sequence IIIH) or ASTM D8048 (Volvo T-13)	ASTM D 5967 (T-8A or 8E) or ASTM D7156 (Mack T-11)	CEC L-54-T-96 (M111)	JASO M 362:2017 (N04C)	ASTM D6594	ASTM D7216
Minor change in additive formulation								
Change in base oil								
Read-across for grade of viscosity								

Form 4: Engine test result data

Form 4a: Detergency test (JASO M 336 2014, N04C)

Form 4a-a: Test result data of registered oil
□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE 11)

Date of Start of Test						
Date of End of Test						
No.	**Item**		**Evaluation Method**	**Unit of Measure**	**Test Result**	**Specified Value**
1	Piston ring sticking		JPI-5S-15			Free
•Deposit in piston						
2	WTD(Weighted Total Demerit)		JPI-5S-15	Correction demerit evaluation point		740 max
3	TGF(Top Groove Fill)			%		Reported
4	Ring groove	First		Merit evaluation point		Reported
		Second		Merit evaluation point		
		Third		Merit evaluation point		
5	Ring land	First		Merit evaluation point		Reported
		Second		Merit evaluation point		
		Third		Merit evaluation point		
6	Underside			Merit evaluation point		Reported
•Analysis of oil						
7	Residual carbon New oil Oil after operation for 200 Hr		☐JIS K 2270-1:2009. □JIS K 2270-2:2009.	mass%		Reported
8	Carbon residue increase (NOTE 12)		□ JIS K 2270-1:2009. □ JIS K 2270-2:2009.	mass%		3.0 min (NOTE13)
9	Base number New Oil Oil after operation for 200 Hr		□ JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only).	mgKOH/g		Reported

NOTE: 11. Check all the applicable check boxes.

12 the carbon residue increase shall be calculated relative to 0 hours.

13 this value is a criterion for the test validity, not a standard value.

14 when one item includes two or more test methods, a measured value according to either one test method may be entered. in this case, the test method that was used shall be indicated (check the corresponding check box).

Form 4a-b: Test results of standard oil (DH-1, DH-2, DH-2F, DL-0, DL-1, DL-2)

Name of Standard Oil Used						
Date of Start of Test						
Date of End of Test						
No.	**Item**		**Evaluation Method**	**Unit of Measure**	**Test Result**	**Criterion for test validity**
1	Piston ring sticking		JPI-5S-15			Free
•Deposit in piston						
2	WTD(Weighted Total Demerit)		JPI-5S-15	Correction demerit evaluation point		600-810 (NOTE15)
3	TGF(Top Groove Fill)			%		Reported
4	Ring groove	First		Merit evaluation point		Reported
		Second		Merit evaluation point		
		Third		Merit evaluation point		
5	Ring land	First		Merit evaluation point		Reported
		Second		Merit evaluation point		
		Third		Merit evaluation point		
6	Underside			Merit evaluation point		Reported
•Analysis of oil						
7	Residual carbon New oil Oil after operation for 200 Hr		□JIS K 2270-1:2009. □JIS K 2270-2:2009.	mass%		Reported
8	Carbon residue increase		□ JIS K 2270-1:2009 □ JIS K 2270-2:2009	mass%		3.0 min
9	Base number New Oil Oil after operation for 200 Hr		□JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only).	mgKOH/g		Reported

NOTE: 15. The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.

16 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

17 Refer to the 4.2 JASO Engine test(M336, M354 and M362) as to the standard oil test

Form 4b: Valve train wear test (JASO M 354:2015, N04C)

Form 4b-a: Test result data of registered oil
□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE 18)

	Date of Start of Test				
	Date of End of Test				
No.	**Item**		**Unit of Measure**	**Test Result**	**Specified Value**
•Degree of wear					
1	Tappet Wear		μm		11.3 max
•Analysis of oil used					
2	Carbon residue New oil 200Hr	□JIS K 2270-1:2009 □JIS K 2270-2:2009	mass%		
3	Carbon residue increase (NOTE19)	□JIS K 2270-1:2009 □JIS K 2270-2:2009			3.0 min (NOTE20)
4	Base Number New oil 200Hr	□JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only)	mgKOH/g		Reported

NOTE: 18. Check all the applicable check boxes.
19 The carbon residue increase shall be calculated relative to 0 hours.
20 This value is a criterion for the test validity, not a standard value.
21 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

Form 4b-b: Test results of standard oil (DH-1, DH-2, DH-2F, DL-0, DL-1, DL-2)

	Name of Standard Oil Used				
	Date of Start of Test				
	Date of End of Test				
No.	**Item**		**Unit of Measure**	**Test Result**	**Acceptance criterion**
•Degree of wear					
1	Tappet wear		μm		9.3 ~ 15.7 (NOTE22)
•Analysis of oil used					
2	Carbon residue New oil 200Hr	□JIS K 2270-1:2009 □JIS K 2270-2:2009	mass%		
3	Carbon residue increase	□JIS K 2270-1:2009 □JIS K 2270-2:2009			3.0 min
4	Base Number New oil 200Hr	□JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only)	mgKOH/g		Reported

NOTE: 22. The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.
23 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).
24 Refer to the 4.2 JASO Engine test(M336, M354 and M362) as to the standard oil test

Form 4c: High-temperature oxidation stability Test

Form 4c-a: High-temperature oxidation stability Test (ASTM D6984, Sequence IIIF, ASTM D7320, Sequence IIIG, ASTM D8111, Sequence IIIH, ASTM D8048, Volvo -13), Test results of registered oil (DH-1, DH-2, DH-2F, DL-0) (NOTE 25)

No.	Item	Unit of Measure	Test Result	Specified Value
1	☐Sequence IIIF Kinematic viscosity at 40 °C, rate of increase after 60 Hr(NOTE26) ☐Sequence IIIG Kinematic viscosity at 40 °C, rate of increase after100 Hr(NOTE26) ☐Sequence IIIH -Kinematic viscosity at 40 °C, rate of increase after 60 Hr(NOTE26) ☐Volvo T13 Kinematic viscosity at 40 °C, rate of increase after 300-360 Hr(NOTE26)	%		295 max 150 max 249 max ☐1st test, 75 max ☐2nd test, 85 max ☐3rd test, 90 max (NOTE26)

NOTE: 25. Check all the applicable check boxes.

26. Perform Sequence IIIF, Sequence IIIG, Sequence IIIH or Volvo T13 and indicate which test has been carried out by checking the corresponding check box. If Sequence IIIH is performed at 90hr, correct the result at 60hr. For the implementation of the multiple times of Volvo T13, indicate the number of tests performed by checking the corresponding check box in the specified value column.

Form 4c-b: High-temperature oxidation stability Test (ASTM D 6984, Sequence IIIF or ASTM D7320, Sequence IIIG, ASTM D8111, Sequence IIIH), Test results of registered oil (□DL-1 □DL-2)

No.	Item	Unit of Measure	Test Result	Specified Value
1	☐Sequence IIIF Kinematic viscosity at 40 °C, rate of increase after 80 Hr(NOTE27) ☐Sequence IIIG Kinematic viscosity at 40 °C, rate of increase after100 Hr(NOTE27) ☐Sequence IIIH Kinematic viscosity at 40 °C, rate of increase after 70 Hr(NOTE27) Kinematic viscosity at 40 °C, rate of increase after 90 Hr(NOTE27)	%		275 max. 150 max. ☐181 max. ☐150 max.

NOTE: 27 Perform Sequence IIIF, Sequence IIIG or Sequence IIIH and indicate which test has been carried out by checking the corresponding check box. For the implementation of Sequence IIIH, indicate the test time performed by checking the corresponding check box in the specified value column.

Form 4d: Soot Dispersancy Test for Diesel Engine Oils (ASTM D 5967, T-8A and T-8E, and ASTM D7156, T-11), Test result data of registered oil (DH-1, DH-2, DH-2F, DL-0, DL-1, DL-2) (NOTE 28)

No.	Item	Unit of Measure	Test Result	Specified Value
1	☐ Mack T-8A (NOTE 29) Viscosity Increase (100 to 150 Hr) at 100°C	$mm^2/s/hr$		0.2 max.
	☐ Mack T-8E (NOTE 29) Maximum Relative Viscosity at 4.8% Soot	—		□1st test, 2.1max. □2nd test, 2.2max. □3rd test, 2.3max. (NOTE 29)
	☐ Mack T-11 (NOTE 29) Minimum TGA Soot @4.0mm^2/s increase @100°C	%		□1st test, 3.5min. □2nd test, 3.4min. □3rd test, 3.3min. (NOTE 29)
	Minimum TGA Soot @12.0mm^2/s increase @100°C	%		□1st test, 6.0min. □2nd test, 5.9min. □3rd test, 5.9min. (NOTE 29)
	Minimum TGA Soot @15.0mm^2/s increase @100°C	%		□1st test, 6.7min. □2nd test, 6.6min. □3rd test, 6.5min. (NOTE 29)

NOTE: 28 Check all the applicable check boxes.

29 Perform T-8A, T-8E or T11 and indicate which test has been carried out by checking the corresponding check box. For the implementation of the multiple times of T-8E or T-11, indicate the number of tests performed by checking the corresponding check box in the specified value column.

Form 4e. Fuel Economy Test (JASO M 362:2017, N04C)

Form 4e-a: Test result data of registered oil (DH-2F)

Date of Start of Test					
Date of End of Test					
No.	**Item**	**Unit of Measure**	**Test Result**		**Specified Value**
1	Base line oil fuel economy (engine oil temperature 60°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L	Fresh oil		8.0～9.1 (NOTE 30)
			Aged oil		
2	Base line oil fuel economy (engine oil temperature 90°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L	Fresh oil		8.6～9.7 (NOTE 30)
			Aged oil		
3	Variable range for base line oil fuel economy before and after evaluated oils (Variation in fuel economy values calculated for base line oil twice before and after with respect to the average fuel economy value calculated)	%	Fresh oil 60ºC		1.4 max (NOTE 30)
			Fresh oil 90ºC		
			Aged oil 60ºC		
			Aged oil 90ºC		
4	Average fuel economy improvement rate (Fresh oil)	%			3.7 min
5	Sum of average fuel economy improvement rate (Fresh oil + Aged oil)	%			6.8 min

NOTE: 30 This value is a criterion for the test validity, not a standard value. The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.

Form 4e-b: Test results of standard oil (DH-2F)

Name of Base Line oil used					
Name of standard oil used					
Date of Start of Test					
Date of End of Test					
No.	**Item**	**Unit of Measure**	**Test Result**		**Acceptance criterion (NOTE 31)**
1	Base line oil fuel economy (engine oil temperature 60°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L			8.0～9.1
2	Base line oil fuel economy (engine oil temperature 90°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L			8.6～9.7
3	Variable range for base line oil fuel economy before and after evaluated oils (Variation in fuel economy values calculated for base line oil twice before and after with respect to the average fuel economy value calculated)	%	Fresh oil 60ºC		1.4 max
			Fresh oil 90ºC		
4	Average fuel economy improvement rate (Fresh oil)	%			3.90～4.97

NOTE: 31 The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.

Form 4f: Fuel Economy Test (CEC L-54-T-96, M111), Test result data of registered oil (DL-1, DL-2)

No.	Item	Unit of Measure	Test Result	Specified Value
1	Fuel economy improvement	%		2.5 min

To be Entered by the JASO Engine Oil Standards Implementation Panel	
Person in charge of receipt:	Seal
Date received (year, month, day):	year, month, day
Receipt number:	
Remarks:	

Form 5: Notice of change

Diesel Engine Oil/Lubricant Notice of Change in On-File Data

To: JASO Engine Oil Standards Implementation Panel

With the receipt number indicated below, we hereby notify changes in the on-file data of diesel engine oil according to Item 5.11 in the Standards Application Manual.

•Diesel engine oil concerning changes in on-file data

Receipt number : _____
Intra-company designation, number : _____
Product name : _____
Classification □DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2
Grade of viscosity : _____
Oil code : _____

•Changes in on-file data, and documents submitted

*	Changes in Data	Documents Submitted
	Change of the address of the registrant	Form 5 Form 6
	Change of the data within the read-across allowable range indicated in Appendix 5, other than grade of viscosity	Form 5 Form 6 Form 7 Form 8
	Change of the company name (only case if the submitter doesn't change the seller code)	Form 5 Form6 Original on-file report Performance classification marking form

* Enter "X" for changes concerned. When there are multiple change points, Enter all.

Date reported
(year, month, day) : _____year, _____month, _____day
Registrant (Company) : _____Company seal
Person in charge of reporting : _____Seal
Department/Section, Title : _____
Sign : _____

To be entered by the JASO Engine Oil Standards Implementation Panel	
Person in charge of receipt:	Seal
Date received (year, month, day): year, month, day	
Receipt number:	
Remarks:	

Form 6: Front sheet for change notification reporting

Diesel Engine Oil Reporting (For notification of change)

Date registration (year, month, day): year, month, day		
Registrant (Company)	Company seal	**Contact address** Name Department/Section Address Tel Fax
Person in charge of registration Name Seal Department/Section, Title Signature		

Registered Oil	
Intra-company designation or code number	
Product name	
Classification	□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2
Grade of viscosity	
Oil code	

Form 7: For change notification; bench test result data
□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE32)

Items		Test Method	Unit	Measured Value					
			Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
Density (15 °C)		☐ JIS K 2249-1:2011 ☐ JIS K 2249-2:2011.	g/cm^3						
			Criteria	Reported					
Flash point	COC	JIS K 2265-4-2007	°C						
			Criteria	Reported					
Kinematic viscosity (40 °C)		JIS K 2283-2000 5.	mm^2/s						
			Criteria	Reported					
Kinematic viscosity (100 °C)		JIS K 2283-2000 5.	mm^2/s						
			Criteria	SAE J300					
Viscosity index		JIS K 2283-2000 6.							
			Criteria	Reported					
CCS viscosity		JIS K 2010-1993 Attachment A	mPa·s						
			Criteria	SAE J300					
MRV viscosity		JPI-5S-42-2004	mPa·s						
			Criteria	SAE J300					
High-temperature high-shear-stability viscosity(150 °C)		JPI-5S-36-2003	mPa·s						
			Criteria	SAE J300					
Ash sulfate		JIS K 2272-1998 5.	mass%						
			Criteria	Reported	1.0±0.1		1.6 Max	0.6 Max	0.7 Min. 0.8 Max.
Residual carbon		☐ JIS K 2270-1:2009 ☐ JIS K 2270-2:2009	mass%						
			Criteria	Reported					
Acid number		JIS K 2501-2003 7.	mgKOH/g						
			Criteria	Reported					
Base number	$HClO_4$	☐ JIS K 2501-2003 9. ☐ ASTM D 2896	mgKOH/g						
			Criteria	Reported			8.0 Min	Reported	
	HCl or TriSolvent	☐ JIS K2501-2003 8. ☐ ASTM D 4739	mgKOH/g						
			Criteria	10.0 Min					
	HCl	JIS K 2501-2003 8.	mgKOH/g						
			Criteria		5.5 Min		Reported		
Volatility	NOACK	JPI-5S-41-2004	mass %						
			Criteria	18.0 Max			15 Max		
Color		JIS K 2580-2003 6.							
			Criteria	Reported					
Element analysis value	Ca	JPI-5S-38-2003	mass%						
			Criteria	Reported					
	Mg	JPI-5S-38-2003	mass%						
			Criteria	Reproted					
	Zn	JPI-5S-38-2003	mass%						
			Criteria	Reported					
	P	JPI-5S-38-2003	mass%						
			Criteria	Reported	0.12 Max		Reported	0.10 Max	
	B	JPI-5S-38-2003	mass%						
			Criteria	Reported					
	N	☐ JIS K 2609-1998 3. ☐ JIS K 2609-1998 4. ☐ JIS K 2609-1998 5.	mass%						
			Criteria	Reported					
	S	☐ JIS K 2541-7-2003 ☐ JPI-5S-38-2003	mass%						
			Criteria	Reported	0.5 Max		Reported	0.5 Max	
	Cl	☐ JPI 5S-64-2002 ☐ ASTM D6443	Mass ppm						
			Criteria		150 Max			150 Max	
	Other element (NOTE35)	[ ]	mass%						
			Criteria	Reported					

Form 7: Bench test results continuation

□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE32)

Items		Test Method	Unit	Measured Value					
			Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
Infrared absorption spectrum	in use of 0.1 mm fixed cell								
			Criteria	IR chart attached,A4					
Anti-foaming	Sequence I	JIS K 2518-2003	ml						
			Criteria	10/0 Max. (Foaming/Stability)					
	Sequence II		ml						
			Criteria	50/0 Max. (Foaming/Stability)					
	Sequence III		ml						
			Criteria	10/0 Max. (Foaming/Stability)					
High-temperature anti-foaming	Sequence IV	ASTM D 6082	ml						
			Criteria				100/0 Max. (Foaming/Stability)		
Shear Stability	Kinetic Viscosity of Oil after Test @100 °C mm^2/s	ASTM D6278	mm^2/s						
			Criteria	SAE J300 (NOTE36)				XW_30 8.6 Min XW_20 SAE J300 (NOTE36)	
Hot Surface Deposit Control	Hot Tube Test @ 280 °C	JPI-5S-55 99	Merit Rating						
			Criteria	7.0 Min					
Anti corrosion	Cu	ASTM D 6594	ppm						
			Criteria	20 Max.					
	Pb	ASTM D 6594	ppm						
			Criteria	120 Max	100 Max		120 Max		
	Sn	ASTM D 6594	ppm						
			Criteria	50 Max					
	Discoloration of Copper Coupon after test @135 °C	ASTM D130							
			Criteria	3 Max					

Form 7: Bench test results continuation
□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE32)

Items			Test Method	Unit	Measured Value					
				Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
□Oil Elastomer Compatibility (NOTE37-1)										
	NBR	Hardness Change	ASTM D7216 □Before adjustment □After adjustment (NOTE37-1)	Point						
				Criteria	-5～+7 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Volume Rate of Change		%						
				Criteria	-3～+5 ( ) Attach Test report.					
	ACM	Hardness Change		Point						
				Criteria	-5～+8 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%						
				Criteria	-15～+18 ( ) Attach Test report.					
		Elongation Rate of Change		%						
				Criteria	-35～+10 ( ) Attach Test report.					
		Volume Rate of Change		%						
				Criteria	-3～+5 ( ) Attach Test report.					
	FKM	Hardness Change		Point						
				Criteria	-5～+7 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Volume Rate of Change		%						
				Criteria	-2～+5( ) Attach Test report.					
	VMQ	Hardness Change		Point						
				Criteria	-**TMC1006**～+5 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%						
				Criteria	-45～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%						
				Criteria	-30～+20 ( ) Attach Test report.					
		Volume Rate of Change		%						
				Criteria	-3～+ **TMC1006** ( ) Attach Test report.					
	MAC	Hardness Change		Point						
				Criteria	- **TMC1006**～+5 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%						
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Volume Rate of Change		%						
				Criteria	-3～+**TMC1006** ( ) Attach Test report.					

Form 7: Bench test results continuation

□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE32)

Items			Test Method	Unit	Measured Value					
				Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
☐Oil Elastomer Compatibility (NOTE37-2)										
	RE1	Hardness Change	CEC L-039-96	Point						
				Criteria	-1～+5					
		Tensile Strength Rate of Change		%						
				Criteria	-40～+10					
		Elongation Rate of Change		%						
				Criteria	-50～+10					
		Volume Rate of Change		%						
				Criteria	-1～+5					
	RE2 ☐ New ☐ Old (NOTE38)	Hardness Change		Point						
				Criteria	-5～+8 (-5～+5)					
		Tensile Strength Rate of Change		%						
				Criteria	-15～+18 (-15～+10)					
		Elongation Rate of Change		%						
				Criteria	-35～+10 (-35～+10)					
		Volume Rate of Change		%						
				Criteria	-7～+5 (-5～+5)					
	RE3 ☐ New ☐ Old (NOTE38)	Hardness Change		Point						
				Criteria	-22～+1,DH-2,DH-2F/-25～+1 (-25～+1)					
		Tensile Strength Rate of Change		%						
				Criteria	-30～+10,DH-2,DH-2F/-45～+10 (-45～+10)					
		Elongation Rate of Change		%						
				Criteria	-20～+10,DH-2,DH-2F/-20～+10 (-20～+10)					
		Volume Rate of Change		%						
				Criteria	-1～+22,DH-2,DH-2F-1～+30 (-1～+30)					
	RE4	Hardness Change		Point						
				Criteria	-5～+5					
		Tensile Strength Rate of Change		%						
				Criteria	-20～+10					
		Elongation Rate of Change		%						
				Criteria	-50～+10					
		Volume Rate of Change		%						
				Criteria	-5～+5					
	DBL-AEM	Hardness Change		Point						
				Criteria	-5～+10					
		Tensile Strength Rate of Change		%						
				Criteria	-35～					
		Elongation Rate of Change		%						
				Criteria	-50～					
		Volume Rate of Change		%						
				Criteria	-5～+15					

NOTE: 32. Check all the applicable check boxes.

33 The latest version of new SAE viscosity classification shall be applied to the viscosity criteria.

34 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

35 "Other element" refers to any other element of which content is 0.01 mass% or more, except for C, H, and O.

36 The kinematic viscosity (100 °C) after the shear stability test shall conform to the SAE viscosity classification (SAE J 300). This is not required for single-grade oils.

37 The oil elastomer compatibility test shall be performed according to one of the following methods:

(1) API CJ-4 Standard (ASTM D7216; 14 days; 5 elastomer materials, NBR (100℃), ACM (150℃), FKM (150℃), VMQ (150℃), MAC (150℃))

For the criteria, both the original one before adjustment and the adjusted one are acceptable. Please note that the submitter shall show which one is applied indicating the check in each box. And if used the adjusted one, please describe the adjusted one in the brackets.

Please note both test results of the two test oils if used base oil interchange. As specified in Appendix 5 Table. A, base oil interchange is allowed when the saturates and sulfur content of the base oil of onfiled oil fall within the range of the saturates and sulfur content of the two test oils which satisfy the requirement of oil elastomer compatibility test and the DI packeage is unchanged.

(2) RE1, RE2, RE3, RE4 and Daimler AG Standard AEM: D 8948/200.1 (150℃)

38 As to the test elastomer materials, RE2 and RE3, in the oil elastomer compatibility test, the material and criteria have been changed. Both the new criteria of the new elastomer materials, RE2-99 and RE3-04, and the old criteria, in parentheses, of the old elastomer are shown in the Table. Indicate whether the new or old elastomer materials have been used by checking the New or Old check box. Apply the new criteria to the new elastomer, RE2-99 and RE3-04; apply the old criteria to the old elastomer .

Form 8: For change notification; blending change rule application data

Where registered oil is different from oil which has been used to generate engine test result data (where a change is made in oil blending), enter “X” in the following table in the reporting form.

This indication shall be given for a test in which each rule has been applied. For use of each rule, follow the guidelines specified in Appendix 5.

Items	**Detergency test**	**Valve train wear test**	**High-temperature oxidation stability test**	**Soot dispersancy test for diesel engine oil**	**Fuel economy**		**Anti corrosion**	**Oil elastomer compatibility**
					test (DL-1)	**test (DH-2F)**		
Test Method	JASO M 336:2014 (N04C)	JASO M 354:2015 (N04C)	ASTM D6984 (Sequence IIIF) ASTM D7320 (Sequence IIIG) ASTM D8111 (Sequence IIIH) or ASTM D8048 (Volvo T-13)	ASTM D 5967 (T-8A or 8E) or ASTM D7156 (Mack T-11)	CEC L-54-T-96 (M111)	JASO M 362:2017 (N04C)	ASTM D6594	ASTM D7216
Minor change in additive formulation								
Change in base oil								
Read-across for grade of viscosity								

APPENDIX 4

(Original) **Form A**

Diesel Engine Oil/Lubricant On-File Notice

To: Date (____year, ____month, ___day)

JASO Engine Oil Standards
Implementation Panel

_____Seal

We hereby notifies that for a diesel engine oil product having the following receipt number which was reported by you, an oil code and performance class thereof have been filed as indicated below.

Description

Receipt number	:	_____
Intra-company designation, number	:	_____
Product name	:	_____
Classification		□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2
Grade of viscosity	:	_____
Oil code	:	_____

(Original) **Form B**

On-File Agreement Concerning Diesel Engine Oil/Lubricant On-File Agreement

To JASO Engine Oil Standards Implementation Panel

We hereby agree the following conditions in sales of the on-file diesel engine oil indicated above.

1. As to the quality, performance and marking of the diesel engine oil concerned, classification and guarantee shall be made on submitter's own responsibility, and the relevant information shall be publicized to general consumers through the sales channels of the submitter.
2. If any troubles take~~s~~ place on the market due to use of the diesel engine oil concerned, the submitter shall solve it on his own responsibility. In such an event, no responsibility shall be assumed by the JASO Engine Oil Standards Implementation Panel.
3. The submitter declares that the quality/performance data and marking example indicated in the report document represent the diesel engine oil concerned to be sold actually.
4. In advertisements or the like, the submitter shall not use such an expression as will lead to a misunderstanding that the quality/performance of the diesel engine oil concerned has been certified by the JASO Engine Oil Standards Implementation Panel.
5. Upon request for submitting JASO engine test result record to the JASO Engine Oil Standards Implementation Panel, the submitter shall promptly submit relevant documents to the JASO Engine Oil Standards Implementation Panel.
6. The submitter shall approve that the JASO Engine Oil Standards Implementation Panel may disclose product names, submitter names, viscosity grades, oil codes and classifications through communication media including the Internet and other publications. Further, where market survey is conducted by the JASO Engine Oil Standards Implementation Panel, the submitter shall approve that the JASO Engine Oil Standards Implementation Panel may disclose the results of the market survey in a form of that the submitter and oil name are not identifiable.
7. The submitter shall pay an on-file maintenance fee specified in the Standard~~s~~ Application Manual by due date each year.
8. When the sale of the diesel engine oil concerned is discontinued, the submitter shall promptly inform the JASO Engine Oil Standards Implementation Panel as to cancellation of the on-file data.
9. As to other items than those mentioned above, the submitter shall agree each condition/requirement contained in the Standard~~s~~ Application Manual with clear understanding thereof.

Date reported (year, month, day)	:	_____year, _____month, _____day
Submitter (Company)	:	_____Company seal
Person in charge of reporting	:	_____Seal
Department/Section, Title	:	_____
Signature	:	_____

(Duplicate)

Form A

Diesel Engine Oil/Lubricant On-File Notice

To:

Date (____year, ____month, ___day)
JASO Engine Oil Standards
Implementation Panel
_____Seal

We hereby notifies that for a diesel engine oil product having the following receipt number which was reported by you, an oil code and performance class thereof have been filed as indicated below.

Description

Receipt number	:	_____
Intra-company designation, number	:	_____
Product name	:	_____
Classification		□DH-1 □DH-2 □DH-2F □DL-0 □DL-1 □DL-2
Grade of viscosity	:	_____
Oil code	:	_____

(Duplicate)

Form B

On-File Agreement Concerning Diesel Engine Oil/Lubricant On-File Agreement

To JASO Engine Oil Standards Implementation Panel

We hereby agree the following conditions in sales of the on-file diesel engine oil indicated above.

1. As to the quality, performance and marking of the diesel engine oil concerned, classification and guarantee shall be made on submitter's own responsibility, and the relevant information shall be publicized to general consumers through the sales channels of the submitter.
2. If any troubles take~~s~~ place on the market due to use of the diesel engine oil concerned, the submitter shall solve it on his own responsibility. In such an event, no responsibility shall be assumed by the JASO Engine Oil Standards Implementation Panel.
3. The submitter declares that the quality/performance data and marking example indicated in the report document represent the diesel engine oil concerned to be sold actually.
4. In advertisements or the like, the submitter shall not use such an expression as will lead to a misunderstanding that the quality/performance of the diesel engine oil concerned has been certified by the JASO Engine Oil Standards Implementation Panel.
5. Upon request for submitting JASO engine test result record to the JASO Engine Oil Standards Implementation Panel, the submitter shall promptly submit relevant documents to the JASO Engine Oil Standards Implementation Panel.
6. The submitter shall approve that the JASO Engine Oil Standards Implementation Panel may disclose product names, submitter names, viscosity grades, oil codes and classifications through communication media including the Internet and other publications. Further, where market survey is conducted by the JASO Engine Oil Standards Implementation Panel, the submitter shall approve that the JASO Engine Oil Standards Implementation Panel may disclose the results of the market survey in a form of that the submitter and oil name are not identifiable.
7. The submitter shall pay an on-file maintenance fee specified in the Standard~~s~~ Application Manual by due date each year.
8. When the sale of the diesel engine oil concerned is discontinued, the submitter shall promptly inform the JASO Engine Oil Standards Implementation Panel as to cancellation of the on-file data.
9. As to other items than those mentioned above, the submitter shall agree each condition/requirement contained in the Standard~~s~~ Application Manual with clear understanding thereof.

Date reported		
(year, month, day)	:	_____year, _____month, _____day
Submitter (Company)	:	_____Company seal
Person in charge of reporting	:	_____Seal
Department/Section, Title	:	_____
Signature	:	_____

APPENDIX 5

Read-Across Allowable Range for Change in Diesel Engine Oil Formulation

A change of base oil or any additive in diesel engine oil may give significant effects to performance characteristics of the diesel engine oil. Therefore, if a change has been made regarding the viscosity grade, components or compounding ratio of a filed diesel engine oil product, each of the tests specified by the standard shall be carried out for the product changed.

Note, however, that as to JASO engine tests, equivalent performance could be recognized if a change is within the standard allowable range indicated below in this document.

The product concerned will be exempted from the JASO engine test if the standard allowable range is satisfied. As to ASTM engine tests and bench tests, changes can be allowed in conformance with the ACC Code of Practice and API EOLCS guidelines. As to CEC engine tests and bench tests, changes can be allowed in conformance with the ATC Code of Practice and ATIEL Code of Practice. (Referred to as read-across)

Tables A to G indicate the read-across standard allowable ranges for respective engine tests.

Table A List of Read-Across Standard Allowable Ranges

Item	Change in Developmental FORMULATION			Change from the ORIGINAL FORMULATION at the time of the on-file or Change in filed FORMULATION				Remarks
	JASO Engine Test	ASTM Engine Test and Bench Test	CEC Engine Test and Bench Test	JASO Engine Test		ASTM Engine Test and Bench Test	CEC Engine Test and Bench Test	
Change in base oil	Read-across allowed within the range specified in Table B	Conforming to API EOLCS guidelines (NOTE 37)	Conforming to ATIEL Code of Practice	Read-across allowed within the range specified in Table B		Conforming to API EOLCS guidelines (NOTE 37)	Conforming to ATIEL Code of Practice	For any item, a degree of cumulative changes with respect to the standard FORMULATION shall be within each applicable standard range.
Minor change in major additives	No read-across allowed	Conforming to ACC Code of Practice	Conforming to ATC Code of Practice	Read-across allowed within the range specified in Table C		Conforming to ACC Code of Practice	Conforming to ATC Code of Practice	
Change in viscosity index improver	No read-across allowed	Conforming to ACC Code of Practice	Conforming to ATC Code of Practice	JASO detergency test(M-336:2014):	Read-across allowed within the range specified in Table D (NOTE 38)	Conforming to ACC Code of Practice	Conforming to ATC Code of Practice	
				JASO valve train wear test (M-354:2015):				
				JASO fuel economy test (M-362:2017):	No read-across allowed (NOTE 39)			
Change in pour point depressant/ defoamer	Read-across allowed	Conforming to ACC Code of Practice	Conforming to ATC Code of Practice	Read-across allowed		Conforming to ACC Code of Practice	Conforming to ATC Code of Practice	
Read-across for grade of viscosity	No read-across allowed	Conforming to API EOLCS guidelines (NOTE 37)	Conforming to ATIEL Code of Practice	JASO detergency test(M-336:2014):	Read-across allowed within the range specified in Table E	Conforming to API EOLCS guidelines (NOTE 37)	Conforming to ATIEL Code of Practice	
				JASO valve train wear test (M-354:2015):	Read-across is allowed where the HTHS viscosity is equivalent to or higher than that indicated in the original prescription and also the kinematic viscosity at 100 °C after shear stability test is equivalent or higher than that indicated therein.			
				JASO fuel economy test (M-362:2017):	No read-across allowed			

NOTE: 37. Read-across in soot dispersancy test for diesel engine oil (ASTM D 5967, Mack T-8A and T-8E) are in conformance to Table-F and G. Also about ASTM D 7156, Mack T-11 is in conformance with that in API CJ-4 standard.

NOTE: 38. Change in VII treat rate is not restricted when Viscosity Grade Read Across and/or Base Oil Interchange (as per Table B) are applied..

.<Terminology>

(1) Base oil ..... A main component base material of diesel engine oil. Mineral oil, synthetic lubricant, or a mixture thereof not including the following components (2), (3) and (4).

(2) Major additives ..... To be added to the base oil for the purpose of enhancing diesel engine oil performance, e.g., detergents, dispersants, anti-wear additives, friction modifiers, anti-oxidants, etc.

(3) Viscosity index improver ..... To be added to the base oil for the purpose of improving viscosity characteristic of diesel engine oil.

(4) Pour point depressant/defoamer ..... To be added to the base oil for the purpose of improving fluidity characteristic and foaming characteristic of diesel engine oil.

NOTE: 39. Change in VII treat rate is not restricted only when Base Oil Interchange (as per Table B) is applied.

Table B Guidelines for Base Oil Interchange in JASO Engine Tests

<table>
<tr><th rowspan="2">Base Oil in Original Prescription</th><th colspan="6">Base Oil After Replacement (Note 40) (Note 41)</th></tr>
<tr><th colspan="2">Group I</th><th colspan="2">Group II</th><th>Group III</th><th>Group IV</th><th>Group V</th></tr>
<tr><td>Group I</td><td colspan="2">M362 (NOTE 42)</td><td colspan="2">M362
(NOTE 42)</td><td>M362
(NOTE 42)</td><td>M362
(NOTE 42)</td><td>M336,
M354, M362</td></tr>
<tr><td rowspan="2">Group II</td><td>≤10%</td><td>M362 (NOTE 42)</td><td colspan="2" rowspan="2">M362
(NOTE 42)</td><td rowspan="2">M362
(NOTE 42)</td><td rowspan="2">M362
(NOTE 42)</td><td rowspan="2">M336,
M354, M362</td></tr>
<tr><td>> 10%</td><td>M336, M362</td></tr>
<tr><td rowspan="2">Group III</td><td>≤10%</td><td>M362 (NOTE 42)</td><td>≤10%</td><td>M362 (NOTE 42)</td><td rowspan="2">M362
(NOTE 42)</td><td rowspan="2">M362
(NOTE 42)</td><td rowspan="2">M336,
M354, M362</td></tr>
<tr><td>> 10%</td><td>M336, M354, M362</td><td>> 10%</td><td>M336, M362</td></tr>
<tr><td rowspan="2">Group IV</td><td>≤10%</td><td>M362 (NOTE 42)</td><td>≤10%</td><td>M362 (NOTE 42)</td><td rowspan="2">M362
(NOTE 42)</td><td rowspan="2">M362
(NOTE 42)</td><td rowspan="2">M336,
M354, M362</td></tr>
<tr><td>> 10%</td><td>M336, M354, M362</td><td>> 10%</td><td>M336, M362</td></tr>
<tr><td>Group V</td><td colspan="2">M336, M354, M362</td><td colspan="2">M336, M354, M362</td><td>M336,
M354, M362</td><td>M336,
M354, M362</td><td>M336,
M354, M362</td></tr>
</table>

NOTE: 40. The engine test to be carried out after replacement of base oil is indicated.
M336: Detergency Test (JASO M 336:2014, N04C)
M354: Valve Train Wear Test (JASO M 354:2015, N04C)
M362: Fuel Economy Test (JASO M 362:2017, N04C)

41. Groups I to V of base oil conform to the base oil categories specified by API and ATIEL.

42. Read-across for M362 is allowed where the kinematic viscosity at 40 °C is equivalent to or lower than that indicated in the original prescription and also the base oil saturation (ASTM D2007) is equivalent to or higher than that indicated therein.

Table C Guidelines for Change in Formulation of Major Additives in JASO Engine Tests (MFM)

Change in prescription of major additives	Level-1	Level-2
Decrease in concentration of each additive component	Not allowed	Not allowed except for the purpose of rebalancing of detergents
Increase in additive package	≤20%	> 20% to ≤30%
Increase in concentration of component - 1.0% or more in product	≤20%	> 20% to ≤30%
- Less than 1.0% in product > 0.6% to ≤1.0%	≤30%	> 30% to ≤ 100% (NOTE: 1.3% at maximum in product)
> 0.3% to ≤ 0.6%	≤50%	> 50% to ≤100%
≤0.3%	≤100%	> 100% to ≤ 200% (NOTE: 0.6% at maximum in product)
Addition of new component	Not allowed	Within the range not exceeding 10% of additive package
ZnDTP rebalancing	Not allowed	Not allowed
Rebalancing of metal detergents	Not allowed	Allowed under condition that the sulfated ash content remains unchanged and the soap content is not decreased (only once). The allowable range of an increase of the soap content in each detergent is up to 30%.
Other rules	For MFM, a change in each element is counted as one time. Up to three times are allowed in total. In the result by MFM, an increase shall not exceed 30% as to any component having a concentration of 1.0% or more in product.	

LEVEL: 1. To be regarded as equivalent in performance so that each engine test is exempted for the MFM.

2. To be regarded as equivalent in performance so that each engine test is exempted for the MFM if backup data is available. Note, however, that when submission of the backup data concerned is requested by the JASO Engine Oil Standards Implementation Panel, the backup data must be submitted to them without delay.

Table D Guidelines for Change in Viscosity Index Improver (VII) in JASO Engine Tests

(Applicable only to the JASO M336 Detergency Test and JASO M354 Valve Train Wear Test)

Change in treat rate of VII	Max ±15mass%
Change in VII type	Allowed for dispersant type polymer, if the dispersibility is equivalent or higher and if the chemical types and SSI levels are the same (±5%).
	Allowed for non-dispersant type polymer, if the chemical types and SSI levels are the same (±5%).

<Terminology>

Dispersant type polymer : Polymer molecule contains polar group having dispersibility.
Non-dispersant type polymer : Polymer molecule dose not contain polar group having dispersibility.
Chemical type polymer : OCP, PMA, SDC, Mix
SSI (shear stability index) : To be calculated using the following equation with kinematic viscosity at 100 °C before and after shear stability test (ASTM D 6278-98) and 100 °C kinematic viscosity of base oil:

$$SSI\ (\%) = \left(1 - \frac{\text{Viscosity after shear stability test} - \text{Viscosity of base oil}}{\text{Viscosity before shear stability test} - \text{Viscosity of base oil}} \right) \times 100$$

Table E Guidelines for Change in Grade of Viscosity Regarding JASO M 336

Oil Tested	Grade Allowable for Read-across												
	5W30	5W40	10W	10W30	10W40	15W40	15W50	20W	20W40	20W50	30	40	50
5W30	■		×	×	×	×	×	×	×	×	×	×	×
5W40	×	■	×	×	×	×	×	×	×	×	×	×	×
10W			■					×			×	×	×
10W30			×	■		×	×	×	×	×	×	×	×
10W40			×	×	■	×	×	×	×	×	×	×	×
15W40			×			■		×	×	×	×	×	×
15W50			×			×	■	×	×	×	×	×	×
20W								■			×	×	×
20W40								×	■	×	×	×	×
20W50								×	×	■	×	×	×
30								×			■	×	×
40								×			×	■	×
50								×			×	×	■

×: Read-across allowed

Table F Base oil inter change guideline for ASTM D 5967, Mack T-8A and T-8E

Base Oil in Original Prescription	Base Oil After Replacement								
	Group I		Group II		Group III		Group IV		Group V
Group I	–		–		–		–		T-8A or T-8E
Group II	–		–		–		–		T-8A or T-8E
Group III	≤10%	–	≤10%	–	≤10%	–	≤10%	–	T-8A or T-8E
	> 10%	T-8A or T-8E	> 10%	T-8A or T-8E	> 10%	T-8A or T-8E	> 10%	T-8A or T-8E	
Group IV	≤10%	–	≤10%	–	≤10%	–	- (*1)		T-8A or T-8E
	> 10%	T-8A or T-8E	> 10%	T-8A or T-8E	> 10%	T-8A or T-8E			
Group V	T-8A or T-8E		T-8A or T-8E		T-8A or T-8E		T-8A or T-8E		T-8A or T-8E

NOTE: 43. Not Required provided the interchange Group IV meets the original manufacturer's specifications in all physical and chemical properties

Table G Viscosity-Grade read across guideline for ASTM D5967, Mack T-8A and T-8E

Oil Tested	Grade Allowable for Read-across								
	10W-	10W--30	10W--40	15W--40	15W--50	20W	20W-50	30	40
10W-	■								
10W--30		■		X			X		
10W--40			■						
15W--40		X	X	■	X		X		
15W--50					■				
20W						■			
20W-50		X		X			■		
30	X	X		X		X	X	■	X
40									■

×: Read-across allowed

APPENDIX 6

Examples of Assigned Oil Codes, On-file Items, and Reporting/Notification Requirements for Change in Prescription

Details of oil code assignments, on-file items and reporting requirements for change in prescription are indicated in Items 5.6 and 5.11 of the Standard Application Manual. For the purpose of reference, concrete examples are shown in the following table. (Case 1: Reference)

	Description	Reporter notification	Date of report or notification	Date of issuance of on-file notice (Reference on-file)	Product		Submitter (Seller, etc.)			Manufacturer		Viscosity		Prescription								Example of oil code	Test required/not required	
					Product name	Marketplace	Company name	Code	Country	Company name	Country	Grade of viscosity	VGRA	Base oil group	BOI	Main additive name	Minor change in main additive prescription	VII name	Change in VII prescription	PPD defoamer name	Change in PPD defoamer prescription		ASTM/CEC	JASO
1	Reference on-file product	To be reported	2001/6/1	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC001	Required	Required
2	Change of product name	To be reported	2002/6/1	2001/6/8	BBB	U	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC002	Not required	Not required
3	Change of submitter (seller, etc.), code	To be reported	2003/6/2	2001/6/8	AAA	Japan	A	XYZ	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081XYZ001	Not required	Not required
4	Change of submitter (seller, etc.), company name, code	To be notified	2003/6/2	2001/6/8	AAA	Japan	B	XYZ	Japan	C	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081XYZ001	Not required	Not required
5	Change of submitter (seller, etc.), company name.	No action required	2002/2/5	2001/6/8	AAA	Japan	B	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC001	Not required	Not required
6	Change of address of submitter (seller, etc.)	To be notified	2002/2/5	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC001	Not required	Not required
7	Change of marketplace	No action required		2001/6/8	AAA	V	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC001	Not required	Not required
8	Change in viscosity in case 1, within VGRA range	To be reported	2001/7/5	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W40	Allowed	III	None	ad	None	pm	None	pp	None	D081ABC010	Not required	Not required

<Terminology> VGRA : Viscosity Grade Read-across , BOI : Base oil interchange , VII : Viscosity Index Improver , PPD : Pour point depressant

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(cont'd)

	Description	Reporter notification	Date of report or notification	Date of issuance of on-file notice (Reference on-file)	Product		Submitter (Seller, etc.)			Manufacturer		Viscosity		Prescription								Example of oil code	Test required/not required	
					Product name	Marketplace	Company name	Code	Country	Company name	Country	Grade of viscosity	VGRA	Base oil group	BOI	Main additive name	Minor change in main additive prescription	VII name	Change in VII prescription	PPD defoamer name	Change in PPD defoamer prescription		ASTM/CEC	JASO
1	Reference on-file product	To be reported	2001/6/1	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC001	Required	Required
9	Change in viscosity in case 1, out of VGRA range	To be reported	2002/1/25	2002/2/5	AAA	Japan	A	ABC	Japan	A	Japan	5W30	Not allowed	III	None	ad	None	pm	None	pp	None	D081ABC101	Required	Required
10	Change in base oil in case 1, BOI test not required	To be notified	2001/9/3	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	I	Provided	ad	None	pm	None	pp	None	D081ABC001	Not required	Not required
11	Change in base oil in case 1, BOI test required	To be notified	2001/9/3	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	VI	Provided	ad	None	pm	None	pp	None	D081ABC001	Relevant test required	Relevant test required
12	Minor change in main additive prescription in case 1, level 1	To be notified	2001/9/3	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	Provided	pm	None	pp	None	D081ABC001	Not required	Not required
13	Minor change in main additive prescription in case 1, level 2	To be notified	2001/9/3	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	Provided	pm	None	pp	None	D081ABC001	Relevant test required	Relevant test required
14	Change in main additive prescription in case 1	To be reported	2002/1/25	2002/2/5	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	D	Not allowed	pm	None	pp	None	D081ABC003	Required	Required
15	Minor change in VII in case 1 (within range specified in guidelines)	To be notified	2001/9/3	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	Provided	pp	None	D081ABC001	Not required	Not required
16	Change in VII in case 1 (out of range specified in guidelines)	To be reported	2002/1/25	2002/2/5	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	OC	Not allowed	pp	None	D081ABC004	Required	Required
17	Change in PPD/ defoamer prescription in case 1	To be notified	2001/9/3	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	FI	Provided	D081ABC001	Not required	Not required

<Terminology> VGRA : Viscosity Grade Read-across , BOI : Base oil interchange , VII : Viscosity Index Improver , PPD : Pour point depressant

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(cont'd)

	Description	Reporter notification	Date of report or notification	Date of issuance of on-file notice (Reference on-file)	Product		Submitter (Seller, etc.)			Manufacturer		Viscosity		Prescription								Example of oil code	Test required/not required	
					Product name	Marketplace	Company name	Code	Country	Company name	Country	Grade of viscosity	VGRA	Base oil group	BOI	Main additive name	Minor change in main additive prescription	VII name	Change in VII prescription	PPD defoamer name	Change in PPD defoamer prescription		ASTM/CEC	JASO
1	Reference on-file product	To be reported	2001/6/1	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC001	Required	Required
18	Change in base oil by another submitter based on the on-file of case 1 (JASO BOI test notification)	To be reported	2002/3/1	2001/6/8	CCC	U	B	DEF	U	BB	U	10W30	None	I	Provided	ad	None	pm	None	pp	None	D001DEF001	Relevant test required	Not required
19	Change in base oil by another submitter based on the on-file of case 1 (BOI test required)	To be reported	2002/4/1	2001/6/8	DDD	A	C	GHI	A	CC	U	10W30	None	I	Provided	ad	None	pm	None	pp	None	D111GHI001	Relevant test required	Relevant test required
20	Minor change in main additive prescription, level 1, or change in base oil, by another submitter based on the on-file of case 1 (JASO BOI test notification)	To be reported	2002/4/3	2001/6/8	EEE	Japan	D	JKL	Japan	DD	Japan	10W30	None	III	Provided	ad	Provided	pm	None	pp	None	D081JKL001	Relevant test required	Not required
21	Minor change in main additive prescription, level 2, or change in base oil, by another submitter based on the on-file of case 1 (JASO BOI test notification)	To be reported	2002/4/4	2001/6/8	FFF	Japan	E	MNP	Japan	EE	Japan	10W30	None	III	Provided	ad	Provided	pm	None	pp	None	D081MNP001	Relevant test required	Relevant test required
22	Minor change in VII (within the range specified in the guidelines), or change in base oil, by another submitter based on the on-file of case 1 (JASO BOI test notification)	To be reported	2002/5/7	2001/6/8	GGG	Japan	F	QRS	Japan	FF	Japan	10W30	None	III	Provided	ad	None	pm	Provided	pp	None	D081QRS201	Relevant test required	Not required

<Terminology> VGRA : Viscosity Grade Read-across , BOI : Base oil interchange , VII : Viscosity Index Improver , PPD : Pour point depressant

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(cont'd)

	Description	Reporter notification	Date of report or notification	Date of issuance of on-file notice (Reference on-file)	Product		Submitter (Seller, etc.)			Manufacturer		Viscosity		Prescription								Example of oil code	Test required/not required	
					Product name	Marketplace	Company name	Code	Country	Company name	Country	Grade of viscosity	VGRA	Base oil group	BOI	Main additive name	Minor change in main additive prescription	VII name	Change in VII prescription	PPD defoamer name	Change in PPD defoamer prescription		ASTM/CEC	JASO
1	Reference on-file product	To be reported	2001/6/1	2001/6/8	AAA	Japan	A	ABC	Japan	A	Japan	10W30	None	III	None	ad	None	pm	None	pp	None	D081ABC001	Required	Required
23	VGRA by the submitter of case 17 based on case 17	To be reported	2002/4/3	2001/6/8	DDD	A	C	GHI	A	CC	U	15W40	None	I	None	ad	None	pm	None	pp	None	D111GHI002	Not required	Not required
24	BOI by the submitter of case 17 based on case 21	To be notified	2001/11/1	2001/6/8	DDD	A	C	GHI	A	CC	U	15W40	None	II	Provided	ad	None	pm	None	pp	None	D111GHI002	Relevant test required	Not required
25	Minor change in main additive prescription, level 1, by the submitter of case 17 based on case 21	To be notified	2001/11/1	2001/6/8	DDD	A	C	GHI	A	CC	U	15W40	None	I	None	ad	None	pm	None	pp	None	D111GHI002	Not required	Not required
26	Minor change in main additive prescription, level 2, by the submitter of case 17 based on case 21	To be notified	2001/11/1	2001/6/8	DDD	A	C	GHI	A	CC	U	15W40	None	I	None	ad	Provided	pm	None	pp	None	D111GHI002	Relevant test required	Relevant test required
27	Minor change in VII (within the range specified in the guidelines) by the submitter of case 17 based on case 21	To be notified	2001/11/1	2001/6/8	DDD	A	C	GHI	A	CC	U	15W40	None	I	None	ad	None	pm	Provided	pp	None	D111GHI002	Not required	Not required
28	Change in ppd/defoamer prescription by the submitter of case 17 based on case 21	To be notified	2001/11/1	2001/6/8	DDD	A	C	GHI	A	CC	U	15W40	None	I	None	ad	None	pm	None	pp	Provided	D111GHI002	Not required	Not required

<Terminology> VGRA : Viscosity Grade Read-across , BOI : Base oil interchange , VII : Viscosity Index Improver , PPD : Pour point depressant

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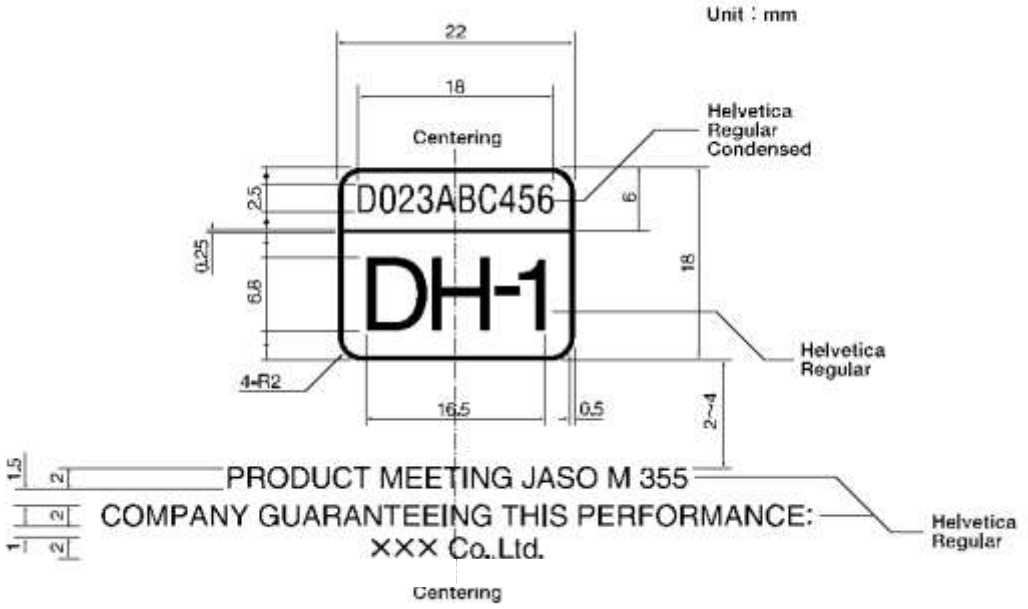
APPENDIX 7

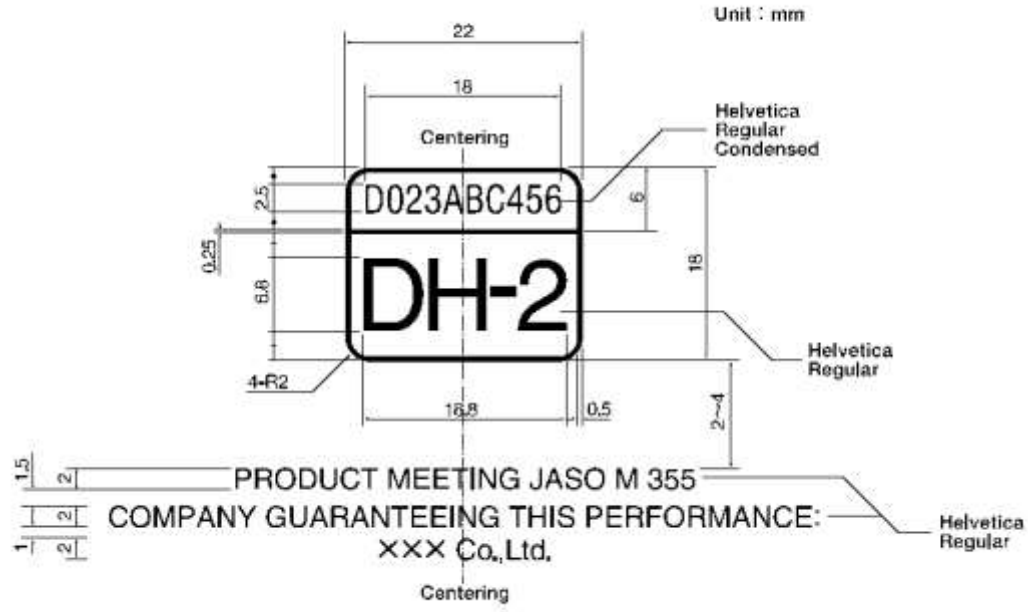
Oil Code and Performance Classification Marking Label

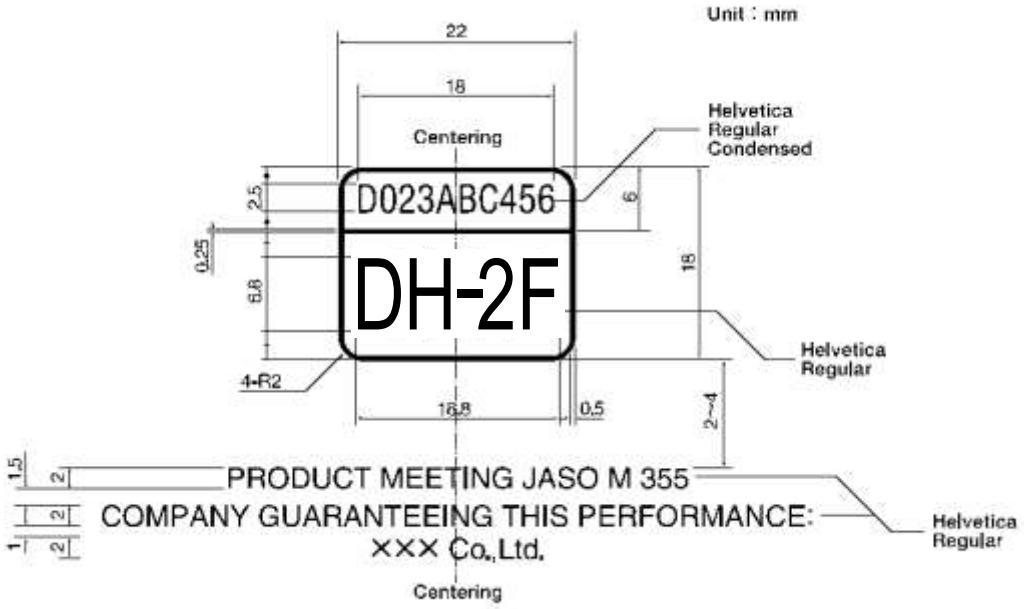
For providing an oil code and a performance classification indication on a container of an on-file product, it is required to follow the marking example indicated below.

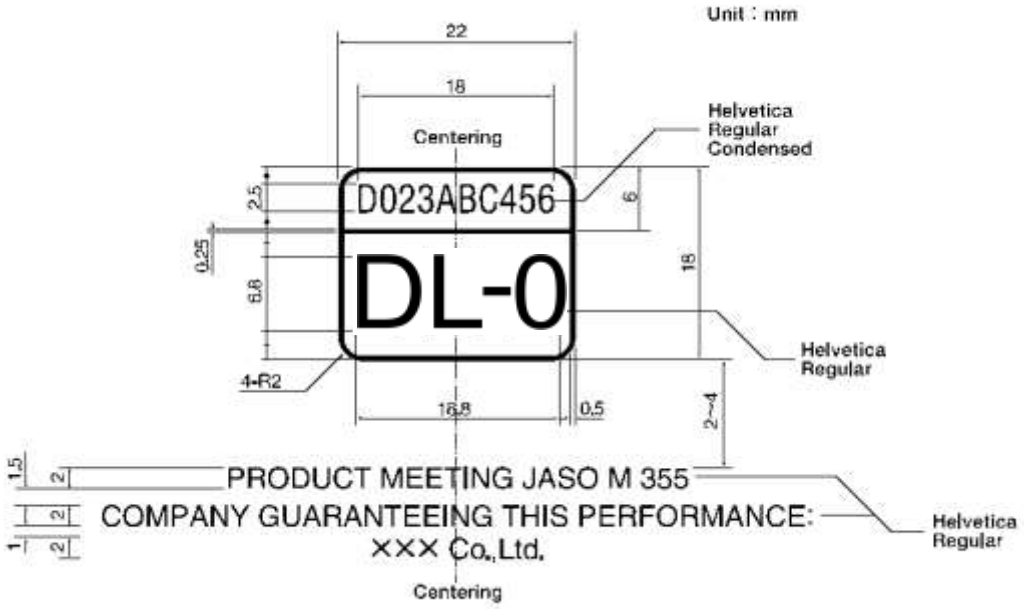
1. Example of Marking Label

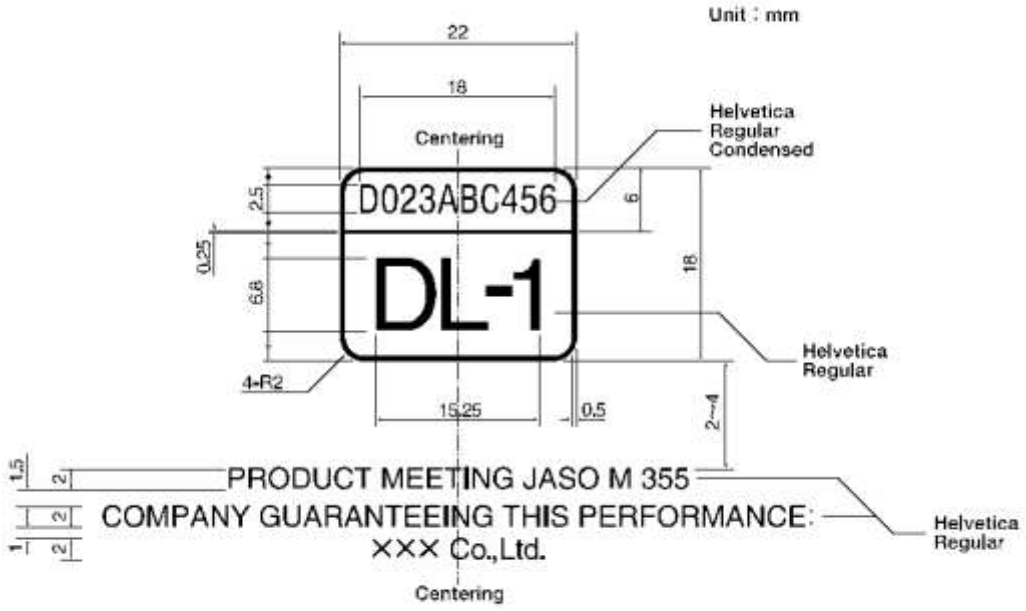
1.1 Dimensions and Fonts

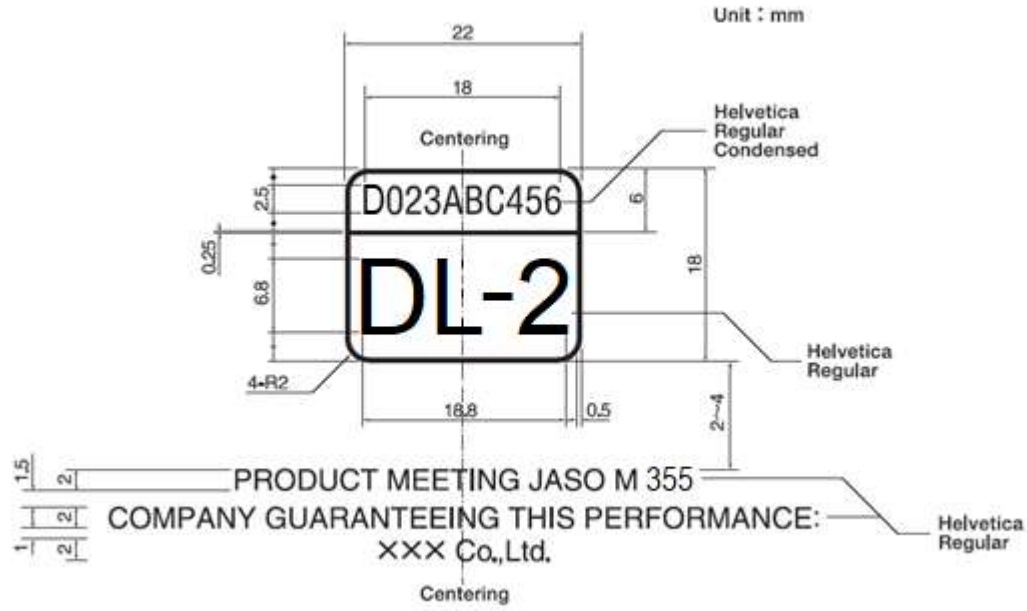





Unit : mm
22
18
Centering
Helvetica
Regular
Condensed
D023ABC456
DH-2F
2.5
0.25
6.8
6
18
4-R2
16.8
0.5
2~4
Helvetica
Regular
1.5
2
2
2
1
2
PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING THIS PERFORMANCE:
××× Co.,Ltd.
Helvetica
Regular
Centering


Unit : mm
22
18
Centering
Helvetica
Regular
Condensed
D023ABC456
DL-0
2.5
0.25
6.8
6
18
4-R2
16.8
0.5
2~4
Helvetica
Regular
1.5
2
2
2
1
2
PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING THIS PERFORMANCE:
××× Co.,Ltd.
Helvetica
Regular
Centering





1.2 Notes

(1) In the above figure, “D023ABC456” indicates an oil code.
The Helvetica regular condensed font or the Arial narrow font shall be used. The characters shall be entered so that their size can be fit in the specified dimensional frame.

(2) “DH-1” in the above figure shall be indicated using the Helvetica regular font or the Arial font. The characters shall be entered so that their size can be fit in the specified dimensional frame.

(3) For the alphanumeric characters of “PRODUCT MEETING JASO M 355” under the figure, the Helvetica regular font or the Arial font shall be used. In the character size corresponding to the

specified dimensions, “PRODUCT MEETING JASO M 355” shall be entered on one line. In the same manner, for the alphanumeric characters of “COMPANY GUARANTEEING THIS DH-1 PERFORMANCE: Company name” the Helvetica regular font or the Arial font shall be used. In the character size corresponding to the specified dimensions, “COMPANY GUARANTEEING THIS PERFORMANCE: Company name” shall be entered on two or three lines.

(4) The color of the characters and frame lines shall be contrastive to the background color.

2. Marking Method

(1) The minimum dimensions are indicated in the above example of marking label. An analogous form may be enlarged according to the size of the container used.

(2) The marking label may be attached at an arbitrary position on the container used.

3 Marking Label Samples

Figure dimension not enlarged

Figure dimension not enlarged 1.5times

Figure dimension not enlarged 2times

Figure dimension not enlarged

Figure dimension not enlarged 1.5times

Figure dimension not enlarged 2times

Figure dimension not enlarged

Figure dimension not enlarged 1.5times

Figure dimension not enlarged 2times

Figure dimension not enlarged

Figure dimension not enlarged 1.5times

Figure dimension not enlarged 2times

Figure dimension not enlarged

Figure dimension not enlarged 1.5times

Figure dimension not enlarged 2times

Figure dimension not enlarged

Figure dimension not enlarged 1.5times

Figure dimension not enlarged 2times

4. Marking samples when registering the oil for DH-2 and DL-0 using the same oil code

PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING
THIS PERFORMANCE:
XXX Co.,Ltd

PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING
THIS PERFORMANCE:
XXX Co.,Ltd

Figure dimension not enlarged

PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING
THIS PERFORMANCE:
XXX Co.,Ltd

PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING
THIS PERFORMANCE:
XXX Co.,Ltd

Figure dimension not enlarged 1.5times

PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING
THIS PERFORMANCE:
XXX Co.,Ltd

PRODUCT MEETING JASO M 355
COMPANY GUARANTEEING
THIS PERFORMANCE:
XXX Co.,Ltd

Figure dimension not enlarged 2times

Appendix 8

Entry samples when registering the oil for DH-2 and DL-0 using the same oil code

Form 1: Front sheet of reporting

Diesel Engine Oil Reporting

Date registration (year, month, day): year, month, day		
Registrant (Company)	Company seal	**Contact address**
Person in charge of registration Name Seal Department/Section, Title Signature		Name Department/Section Address Tel Fax

Registered Oil	
Intra-company designation or code number	
Product name	
Classification	□DH-1 √□DH-2 □DH-2F √□DL-0 □DL-1 □DL-2
Viscosity grade	
Oil code	

Form 2: Entry samples of bench test results (all the corresponding classifications must meet the criteria)

Form 2: Bench test results □DH-1 ☑DH-2 □DH-2F ☑DL-0 □DL-1 □DL-2 (NOTE4)

Items		Test Method	Unit	Measured Value					
			Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
Density (15 °C)		☐ JIS K 2249-1:2011 ☐ JIS K 2249-2:2011.	g/cm^3		0.880		0.880		
			Criteria	Reported					
Flash point	COC	JIS K 2265-4-2007	°C		228		228		
			Criteria	Reported					
Kinematic viscosity (40 °C)		JIS K 2283-2000 5.	mm^2/s		75.26		75.26		
			Criteria	Reported					
Kinematic viscosity (100 °C)		JIS K 2283-2000 5.	mm^2/s		11.14		11.14		
			Criteria	SAE J300					
Viscosity index		JIS K 2283-2000 6.			138		138		
			Criteria	Reported					
CCS viscosity		JIS K 2010-1993 Attachment A	mPa·s		5,309		5,309		
			Criteria	SAE J300					
MRV viscosity		JPI-5S-42-2004	mPa·s		19,117		19,117		
			Criteria	SAE J300					
High-temperature high-shear-stability viscosity(150 °C)		JPI-5S-36-2003	mPa·s		3.08		3.08		
			Criteria	SAE J300					
Ash sulfate		JIS K 2272-1998 5.	mass%		1.07		1.07		
			Criteria	Reported	1.0±0.1		1.6 Max	0.6 Max	0.7 Min. 0.8 Max.
Residual carbon		☐ JIS K 2270-1:2009 ☐ JIS K 2270-2:2009	mass%		1.02		1.02		
			Criteria	Reported					
Acid number		JIS K 2501-2003 7.	mgKOH/g		1.94		1.94		
			Criteria	Reported					
Base number	$HClO_4$	☑ JIS K 2501-2003 9. ☐ ASTM D 2896	mgKOH/g		8.05		8.05		
			Criteria	Reported			8.0 Min	Reported	
	HCl or TriSolvent	☐ JIS K2501-2003 8. ☐ ASTM D 4739	mgKOH/g						
			Criteria	10.0 Min					
	HCl	JIS K 2501-2003 8.	mgKOH/g		5.96		5.96		
			Criteria		5.5 Min		Reported		
Volatility	NOACK	JPI-5S-41-2004	mass %		12.0		12.0		
			Criteria		18.0 Max		15 Max		
Color		JIS K 2580-2003 6.			3.0		3.0		
			Criteria	Reported					
Element analysis value	Ca	JPI-5S-38-2003	mass%		0.25		0.25		
			Criteria	Reported					
	Mg	JPI-5S-38-2003	mass%		0.001		0.001		
			Criteria	Reproted					
	Zn	JPI-5S-38-2003	mass%		0.11		0.11		
			Criteria	Reported					
	P	JPI-5S-38-2003	mass%		0.10		0.10		
			Criteria	Reported	0.12 Max		Reported	0.10 Max	
	B	JPI-5S-38-2003	mass%		0.026		0.026		
			Criteria	Reported					
	N	☐ JIS K 2609-1998 3. ☑ JIS K 2609-1998 4. ☐ JIS K 2609-1998 5.	mass%		0. 12		0. 12		
			Criteria	Reported					
	S	☐ JIS K 2541-7-2003 ☑ JPI-5S-38-2003	mass%		0.40		0.40		
			Criteria	Reported	0.5 Max		Reported	0.5 Max	
	Cl	☑ JPI 5S-64-2002 ☐ ASTM D6443	Mass ppm		80				
			Criteria		150 Max			150 Max	
	Other element (NOTE7)	[ ]	mass%						
			Criteria	Reported					

Form 2: Bench test results continuation

□DH-1 √DH-2 □DH-2F √DL-0 □DL-1 □DL-2 (NOTE4)

Items		Test Method	Unit	Measured Value					
			Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
Infrared absorption spectrum	in use of 0.1 mm fixed cell								
			Criteria	IR chart attached,A4					
Anti-foaming	Sequence I	JIS K 2518-2003	ml		0/0		0/0		
			Criteria	10/0 Max. (Foaming/Stability)					
	Sequence II		ml		10/0		10/0		
			Criteria	50/0 Max. (Foaming/Stability)					
	Sequence III		ml		0/0		0/0		
			Criteria	10/0 Max. (Foaming/Stability)					
High-temperature anti-foaming	Sequence IV	ASTM D 6082	ml				10/0		
			Criteria				100/0 Max. (Foaming/Stability)		
Shear Stability	Kinetic Viscosity of Oil after Test @100 °C mm^2/s	ASTM D6278	mm^2/s		10.08		10.08		
			Criteria	SAE J300 (NOTE8)				XW_30 8.6 Min XW_20 SAE J300 (NOTE8)	
Hot Surface Deposit Control	Hot Tube Test @ 280 °C	JPI-5S-55 99	Merit Rating		9.0		9.0		
			Criteria	7.0 Min					
Anti corrosion	Cu	ASTM D 6594	ppm		11		11		
			Criteria	20 Max.					
	Pb	ASTM D 6594	ppm		3		3		
			Criteria	120 Max	100 Max		120 Max		
	Sn	ASTM D 6594	ppm		1		1		
			Criteria	50 Max					
	Discoloration of Copper Coupon after test @135 °C	ASTM D130			1a		1a		
			Criteria	3 Max					

Form 2: Bench test results continuation

□DH-1 ☑DH-2 □DH-2F ☑DL-0 □DL-1 □DL-2 (NOTE4)

Items			Test Method	Unit	Measured Value					
				Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
☑Oil Elastomer Compatibility (NOTE9-1)										
NBR	Hardness Change		ASTM D7216 ☑Before adjustment □After adjustment (NOTE9-1)	Point		-1		-1		
				Criteria	-5～+7 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%		-2		-2		
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%		-2		-2		
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Volume Rate of Change			%		+1		+1		
				Criteria	-3～+5 ( ) Attach Test report.					
ACM	Hardness Change			Point		+2		+2		
				Criteria	-5～+8 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%		0		0		
				Criteria	-15～+18 ( ) Attach Test report.					
	Elongation Rate of Change			%		-21		-21		
				Criteria	-35～+10 ( ) Attach Test report.					
	Volume Rate of Change			%		+1		+1		
				Criteria	-3～+5 ( ) Attach Test report.					
FKM	Hardness Change			Point		-1		-1		
				Criteria	-5～+7 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%		-2		-2		
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%		-1		-1		
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Volume Rate of Change			%		+1		+1		
				Criteria	-2～+5( ) Attach Test report.					
VMQ	Hardness Change			Point		0		0		
				Criteria	-**TMC1006**～+5 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%		-22		-22		
				Criteria	-45～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%		-11		-11		
				Criteria	-30～+20 ( ) Attach Test report.					
	Volume Rate of Change			%		-1		-1		
				Criteria	-3～+ **TMC1006** ( ) Attach Test report.					
MAC	Hardness Change			Point		+1		+1		
				Criteria	- **TMC1006**～+5 ( ) Attach Test report.					
	Tensile Strength Rate of Change			%		+3		+3		
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Elongation Rate of Change			%		-1		-1		
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
	Volume Rate of Change			%		0		0		
				Criteria	-3～+**TMC1006** ( ) Attach Test report.					

Form 2: Bench test results continuation

□DH-1 ☑DH-2 □DH-2F ☑DL-0 □DL-1 □DL-2 (NOTE4)

Items			Test Method	Unit	Measured Value					
				Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
☐Oil Elastomer Compatibility (NOTE9-2)										
RE1	Hardness Change		CEC L-039-96	Point						
				Criteria	-1～+5					
	Tensile Strength Rate of Change			%						
				Criteria	-40～+10					
	Elongation Rate of Change			%						
				Criteria	-50～+10					
	Volume Rate of Change			%						
				Criteria	-1～+5					
RE2 ☐ New ☐ Old (NOTE10)	Hardness Change			Point						
				Criteria	-5～+8 (-5～+5)					
	Tensile Strength Rate of Change			%						
				Criteria	-15～+18 (-15～+10)					
	Elongation Rate of Change			%						
				Criteria	-35～+10 (-35～+10)					
	Volume Rate of Change			%						
				Criteria	-7～+5 (-5～+5)					
RE3 ☐ New ☐ Old (NOTE10)	Hardness Change			Point						
				Criteria	-22～+1,DH-2,DH-2F/-25～+1 (-25～+1)					
	Tensile Strength Rate of Change			%						
				Criteria	-30～+10,DH-2,DH-2F/-45～+10 (-45～+10)					
	Elongation Rate of Change			%						
				Criteria	-20～+10,DH-2,DH-2F/-20～+10 (-20～+10)					
	Volume Rate of Change			%						
				Criteria	-1～+22,DH-2,DH-2F-1～+30 (-1～+30)					
RE4	Hardness Change			Point						
				Criteria	-5～+5					
	Tensile Strength Rate of Change			%						
				Criteria	-20～+10					
	Elongation Rate of Change			%						
				Criteria	-50～+10					
	Volume Rate of Change			%						
				Criteria	-5～+5					
DBL-AEM	Hardness Change			Point						
				Criteria	-5～+10					
	Tensile Strength Rate of Change			%						
				Criteria	-35～					
	Elongation Rate of Change			%						
				Criteria	-50～					
	Volume Rate of Change			%						
				Criteria	-5～+15					

NOTE: 4. Check all the applicable check boxes.

5. The latest version of new SAE viscosity classification shall be applied to the viscosity criteria.

6 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

7 "Other element" refers to any other element of which content is 0.01 mass% or more, except for C, H, and O.

8 The kinematic viscosity (100 °C) after the shear stability test shall conform to the SAE viscosity classification (SAE J 300). This is not required for single-grade oils.

9 The oil elastomer compatibility test shall be performed according to one of the following methods:

(1) API CJ-4 Standard (ASTM D7216; 14 days; 5 elastomer materials, NBR (100℃), ACM (150℃), FKM (150℃), VMQ (150℃), MAC (150℃))

For the criteria, both the original one before adjustment and the adjusted one are acceptable. Please note that the submitter shall show which one is applied indicating the check in each box. And if used the adjusted one, please describe the adjusted one in the brackets.

Please note both test results of the two test oils if used base oil interchange. As specified in Appendix 5 Table. A, base oil interchange is allowed when the saturates and sulfur content of the base oil of onfiled oil fall within the range of the saturates and sulfur content of the two test oils which satisfy the requirement of oil elastomer compatibility test and the DI packeage is unchanged.

(2) RE1, RE2, RE3, RE4 and Daimler AG Standard AEM: D 8948/200.1 (150℃)

10 As to the test elastomer materials, RE2 and RE3, in the oil elastomer compatibility test, the material and criteria have been changed. Both the new criteria of the new elastomer materials, RE2-99 and RE3-04, and the old criteria, in parentheses, of the old elastomer are shown in the Table. Indicate whether the new or old elastomer materials have been used by checking the New or Old check box. Apply the new criteria to the new elastomer, RE2-99 and RE3-04; apply the old criteria to the old elastomer.

* Entry example of base oil interchange.

Form 2: Bench test results continuation

□DH-1 ☑DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE4)

Items			Test Method	Unit / Criteria	Measured Value DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
☑Oil Elastomer Compatibility (NOTE9-1)										
	NBR	Hardness Change	ASTM D7216 ☑Before adjustment □After adjustment (NOTE9-1)	Point		-1, +2				
				Criteria	-5～+7 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%		-2, +3				
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%		-5, -7				
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Volume Rate of Change		%		+1, +1				
				Criteria	-3～+5 ( ) Attach Test report.					
	ACM	Hardness Change		Point		+2, +7				
				Criteria	-5～+8 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%		0, -2				
				Criteria	-15～+18 ( ) Attach Test report.					
		Elongation Rate of Change		%		-21, -19				
				Criteria	-35～+10 ( ) Attach Test report.					
		Volume Rate of Change		%		+1, +2				
				Criteria	-3～+5 ( ) Attach Test report.					
	FKM	Hardness Change		Point		-1, 0				
				Criteria	-5～+7 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%		-2, -6				
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%		-1, -3				
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Volume Rate of Change		%		+1, 0				
				Criteria	-2～+5( ) Attach Test report.					
	VMQ	Hardness Change		Point		0, +3				
				Criteria	-**TMC1006**～+5 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%		-22, -18				
				Criteria	-45～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%		-11, -16				
				Criteria	-30～+20 ( ) Attach Test report.					
		Volume Rate of Change		%		-1, 0				
				Criteria	-3～+ **TMC1006** ( ) Attach Test report.					
	MAC	Hardness Change		Point		+1, +2				
				Criteria	- **TMC1006**～+5 ( ) Attach Test report.					
		Tensile Strength Rate of Change		%		+3, +1				
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Elongation Rate of Change		%		-1, -4				
				Criteria	-**TMC1006**～+10 ( ) Attach Test report.					
		Volume Rate of Change		%		0, +2				
				Criteria	-3～+**TMC1006** ( ) Attach Test report.					

Form 2: Bench test results continuation

□DH-1 ☑DH-2 □DH-2F □DL-0 □DL-1 □DL-2 (NOTE4)

Items			Test Method	Unit	Measured Value					
				Criteria	DH-1-21	DH-2-21	DH-2F-21	DL-0-21	DL-1-21	DL-2-21
☐Oil Elastomer Compatibility (NOTE9-2)										
RE1	Hardness Change		CEC L-039-96	Point						
				Criteria	-1～+5					
	Tensile Strength Rate of Change			%						
				Criteria	-40～+10					
	Elongation Rate of Change			%						
				Criteria	-50～+10					
	Volume Rate of Change			%						
				Criteria	-1～+5					
RE2 ☐ New ☐ Old (NOTE10)	Hardness Change			Point						
				Criteria	-5～+8 (-5～+5)					
	Tensile Strength Rate of Change			%						
				Criteria	-15～+18 (-15～+10)					
	Elongation Rate of Change			%						
				Criteria	-35～+10 (-35～+10)					
	Volume Rate of Change			%						
				Criteria	-7～+5 (-5～+5)					
RE3 ☐ New ☐ Old (NOTE10)	Hardness Change			Point						
				Criteria	-22～+1,DH-2,DH-2F/-25～+1 (-25～+1)					
	Tensile Strength Rate of Change			%						
				Criteria	-30～+10,DH-2,DH-2F/-45～+10 (-45～+10)					
	Elongation Rate of Change			%						
				Criteria	-20～+10,DH-2,DH-2F/-20～+10 (-20～+10)					
	Volume Rate of Change			%						
				Criteria	-1～+22,DH-2,DH-2F-1～+30 (-1～+30)					
RE4	Hardness Change			Point						
				Criteria	-5～+5					
	Tensile Strength Rate of Change			%						
				Criteria	-20～+10					
	Elongation Rate of Change			%						
				Criteria	-50～+10					
	Volume Rate of Change			%						
				Criteria	-5～+5					
DBL-AEM	Hardness Change			Point						
				Criteria	-5～+10					
	Tensile Strength Rate of Change			%						
				Criteria	-35～					
	Elongation Rate of Change			%						
				Criteria	-50～					
	Volume Rate of Change			%						
				Criteria	-5～+15					

NOTE: 4. Check all the applicable check boxes.

5. The latest version of new SAE viscosity classification shall be applied to the viscosity criteria.

6 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

7 "Other element" refers to any other element of which content is 0.01 mass% or more, except for C, H, and O.

8 The kinematic viscosity (100 °C) after the shear stability test shall conform to the SAE viscosity classification (SAE J 300). This is not required for single-grade oils.

9 The oil elastomer compatibility test shall be performed according to one of the following methods:

(1) API CJ-4 Standard (ASTM D7216; 14 days; 5 elastomer materials, NBR (100℃), ACM (150℃), FKM (150℃), VMQ (150℃), MAC (150℃))

For the criteria, both the original one before adjustment and the adjusted one are acceptable. Please note that the submitter shall show which one is applied indicating the check in each box. And if used the adjusted one, please describe the adjusted one in the brackets.

Please note both test results of the two test oils if used base oil interchange. As specified in Appendix 5 Table. A, base oil interchange is allowed when the saturates and sulfur content of the base oil of onfiled oil fall within the range of the saturates and sulfur content of the two test oils which satisfy the requirement of oil elastomer compatibility test and the DI packeage is unchanged.

(2) RE1, RE2, RE3, RE4 and Daimler AG Standard AEM: D 8948/200.1 (150℃)

10 As to the test elastomer materials, RE2 and RE3, in the oil elastomer compatibility test, the material and criteria have been changed. Both the new criteria of the new elastomer materials, RE2-99 and RE3-04, and the old criteria, in parentheses, of the old elastomer are shown in the Table. Indicate whether the new or old elastomer materials have been used by checking the New or Old check box. Apply the new criteria to the new elastomer, RE2-99 and RE3-04; apply the old criteria to the old elastomer.

Form 3: Form entry sample of blending change rule application data

Form 3: Blending change rule application data

Where registered oil is different from oil which has been used to generate engine test result data (where a change is made in oil blending), enter “X” in the following table in the reporting form.

This indication shall be given for a test in which each rule has been applied. For use of each rule, follow the guidelines specified in Appendix 5.

Items	**Detergency test**	**Valve train wear test**	**High-temperature oxidation stability test**	**Soot dispersancy test for diesel engine oil**	**Fuel economy**		**Anti corrosion**	**Oil elastomer compatibility**
					test (DL-1)	**test (DH-2F)**		
Test Method	JASO M 336:2014 (N04C)	JASO M 354:2015 (N04C)	ASTM D6984 (Sequence IIIF) ASTM D7320 (Sequence IIIG) ASTM D8111 (Sequence IIIH) or ASTM D8048 (Volvo T-13)	ASTM D 5967 (T-8A or 8E) or ASTM D7156 (Mack T-11)	CEC L-54-T-96 (M111)	JASO M 362:2017 (N04C)	ASTM D6594	ASTM D7216
Minor change in additive formulation								
Change in base oil								
Read-across for grade of viscosity								

Form 4: Entry samples of engine test result data

Form 4: Engine test result data

Form 4a: Detergency test (JASO M 336 2014, N04C)

Form 4a-a: Test result data of registered oil

□DH-1 ☑DH-2 □DH-2F ☑DL-0 □DL-1 □DL-2 (NOTE 11)

Date of Start of Test					
Date of End of Test					
No.	**Item**	**Evaluation Method**	**Unit of Measure**	**Test Result**	**Specified Value**
1	Piston ring sticking	JPI-5S-15		Free	Free
•Deposit in piston					
2	WTD(Weighted Total Demerit)	JPI-5S-15	Correction demerit evaluation point	393	740 max
3	TGF(Top Groove Fill)		%	47.3	Reported
4	Ring groove First		Merit evaluation point	5.27	Reported
	Ring groove Second		Merit evaluation point	8.10	
	Ring groove Third		Merit evaluation point	9.96	
5	Ring land First		Merit evaluation point	7.13	Reported
	Ring land Second		Merit evaluation point	6.44	
	Ring land Third		Merit evaluation point	9.90	
6	Underside		Merit evaluation point	9.5	Reported
•Analysis of oil					
7	Residual carbon New oil Oil after operation for 200 Hr	□JIS K 2270-1:2009. ☑JIS K 2270-2:2009.	mass%	1.17 5.92	Reported
8	Carbon residue increase (NOTE 12)	□ JIS K 2270-1:2009. ☑ JIS K 2270-2:2009.	mass%	4.75	3.0 min (NOTE13)
9	Base number New Oil Oil after operation for 200 Hr	□ JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only).	mgKOH/g		Reported

NOTE: 11. Check all the applicable check boxes.

12 The carbon residue increase shall be calculated relative to 0 hours.

13 This value is a criterion for the test validity, not a standard value.

14 When one item includes two or more test methods, a measured value according to either one test method may be entered. in this case, the test method that was used shall be indicated (check a corresponding check box).

Form 4a-b: Test results of standard oil (DH-1, DH-2, DH-2F, DL-0, DL-1, DL-2)

Name of Standard Oil Used						
Date of Start of Test						
Date of End of Test						
No.	**Item**		**Evaluation Method**	**Unit of Measure**	**Test Result**	**Criterion for test validity**
1	Piston ring sticking		JPI-5S-15		Free	Free
•Deposit in piston						
2	WTD(Weighted Total Demerit)		JPI-5S-15	Correction demerit evaluation point	706	600-810 (NOTE15)
3	TGF(Top Groove Fill)			%	43.9	Reported
4	Ring groove	First		Merit evaluation point	5.52	Reported
		Second		Merit evaluation point	6.27	
		Third		Merit evaluation point	9.88	
5	Ring land	First		Merit evaluation point	8.35	Reported
		Second		Merit evaluation point	4.12	
		Third		Merit evaluation point	9.77	
6	Underside			Merit evaluation point	9.2	Reported
•Analysis of oil						
7	Residual carbon New oil Oil after operation for 200 Hr		□JIS K 2270-1:2009. ☑JIS K 2270-2:2009.	mass%	1.24 6.56	Reported
8	Carbon residue increase		□ JIS K 2270-1:2009 ☑JIS K 2270-2:2009	mass%	5.32	3.0 min
9	Base number New Oil Oil after operation for 200 Hr		☑JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only).	mgKOH/g	6.78 2.27	Reported

NOTE: 15. The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.

16 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

17 Refer to the 4.2 JASO Engine test(M336, M354 and M362) as to the standard oil test

Form 4b: Valve train wear test (JASO M 354:2015, N04C)

Form 4b-a: Test result data of registered oil

□DH-1 ☑DH-2 □DH-2F ☑DL-0 □DL-1 □DL-2 (NOTE 18)

	Date of Start of Test				
	Date of End of Test				
No.	**Item**		**Unit of Measure**	**Test Result**	**Specified Value**
•Degree of wear					
1	Tappet Wear		μm	4.2	11.3 max
•Analysis of oil used					
2	Carbon residue New oil 200Hr	□JIS K 2270-1:2009 ☑JIS K 2270-2:2009	mass%	1.17 5.94	
3	Carbon residue increase (NOTE19)	□JIS K 2270-1:2009 ☑JIS K 2270-2:2009		4.77	3.0 min (NOTE20)
4	Base Number New oil 200Hr	☑JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only)	mgKOH/g		Reported

NOTE: 18. Check all the applicable check boxes.

19 The carbon residue increase shall be calculated relative to 0 hours.

20 This value is a criterion for the test validity, not a standard value.

21 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

Form 4b-b: Test results of standard oil (DH-1, DH-2, DH-2F, DL-0, DL-1, DL-2)

	Name of Standard Oil Used				
	Date of Start of Test				
	Date of End of Test				
No.	**Item**		**Unit of Measure**	**Test Result**	**Acceptance criterion**
•Degree of wear					
1	Tappet wear		μm	10.7	9.3 ~ 15.7 (NOTE22)
•Analysis of oil used					
2	Carbon residue New oil 200Hr	□JIS K 2270-1:2009 ☑JIS K 2270-2:2009	mass%	0.84 7.15	
3	Carbon residue increase	□JIS K 2270-1:2009 ☑JIS K 2270-2:2009		6.31	3.0 min
4	Base Number New oil 200Hr	☑JIS K 2501-2003 8. □ASTM D 4739 (DH-1 only)	mgKOH/g	6.58	Reported

NOTE: 22. The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.

23 When one item includes two or more test methods, a measured value according to either one test method may be entered. In this case, the test method that was used shall be indicated (check the corresponding check box).

24 Refer to the 4.2 JASO Engine test(M336, M354 and M362) as to the standard oil test

Form 4c: High-temperature oxidation stability Test

Form 4c-a: High-temperature oxidation stability Test (ASTM D6984, Sequence IIIF or ASTM D7320, Sequence IIIG, ASTM D8111, Sequence IIIH, ASTM D8048, Volvo T-13), Test results of registered oil (DH-1, DH-2, DH-2F, DL-0) (NOTE 25)

No.	Item	Unit of Measure	Test Result	Specified Value
1	☑Sequence IIIF Kinematic viscosity at 40 °C, rate of increase after 60 Hr(NOTE26) ☐Sequence IIIG Kinematic viscosity at 40 °C, rate of increase after100 Hr(NOTE26) ☐Sequence IIIH -Kinematic viscosity at 40 °C, rate of increase after 60 Hr(NOTE26) ☐Volvo T13 Kinematic viscosity at 40 °C, rate of increase after 300-360 Hr(NOTE26)	%	280	295 max 150 max 249 max ☐1st test, 75 max ☐2nd test, 85 max ☐3rd test, 90 max (NOTE26)

NOTE: 25. Check all the applicable check boxes.

26. Perform Sequence IIIF, Sequence IIIG, Sequence IIIH or Volvo T13 and indicate which test has been carried out by checking the corresponding check box. If Sequence IIIH is performed at 90hr, correct the result at 60hr. For the implementation of the multiple times of Volvo T13, indicate the number of tests performed by checking the corresponding check box in the specified value column.

Form 4c-b: High-temperature oxidation stability Test (ASTM D 6984, Sequence IIIF or ASTM D7320, Sequence IIIG), Test results of registered oil (□DL-1 □DL-2)

No.	Item	Unit of Measure	Test Result	Specified Value
1	☑Sequence IIIF Kinematic viscosity at 40 °C, rate of increase after 80 Hr(NOTE27) ☐Sequence IIIG Kinematic viscosity at 40 °C, rate of increase after100 Hr(NOTE27) ☐Sequence IIIH Kinematic viscosity at 40 °C, rate of increase after 70 Hr(NOTE27) Kinematic viscosity at 40 °C, rate of increase after 90 Hr(NOTE27)	%	250	275 max. 150 max. ☐181 max. ☐150 max.

NOTE: 27 Perform Sequence IIIF, Sequence IIIG or Sequence IIIH and indicate which test has been carried out by checking the corresponding check box. For the implementation of Sequence IIIH, indicate the test time performed by checking the corresponding check box in the specified value column.

Form 4d: Soot Dispersancy Test for Diesel Engine Oils (ASTM D 5967, T-8A and T-8E, and ASTM D7156, T-11), Test result data of registered oil (DH-1, DH-2, DH-2F, DL-0, DL-1, DL-2) (NOTE 28)

No.	Item	Unit of Measure	Test Result	Specified Value
1	☑ Mack T-8A (NOTE 29) Viscosity Increase (100 to 150 Hr) at 100°C	$mm^2/s/hr$	0.08	0.2 max.
	☐ Mack T-8E (NOTE 29) Maximum Relative Viscosity at 4.8% Soot	—		□1st test, 2.1max. □2nd test, 2.2max. □3rd test, 2.3max. (NOTE 29)
	☐ Mack T-11 (NOTE 29) Minimum TGA Soot @4.0mm^2/s increase @100°C	%		□1st test, 3.5min. □2nd test, 3.4min. □3rd test, 3.3min. (NOTE 29)
	Minimum TGA Soot @12.0mm^2/s increase @100°C	%		□1st test, 6.0min. □2nd test, 5.9min. □3rd test, 5.9min. (NOTE 29)
	Minimum TGA Soot @15.0mm^2/s increase @100°C	%		□1st test, 6.7min. □2nd test, 6.6min. □3rd test, 6.5min. (NOTE 29)

NOTE: 28 Check all the applicable check boxes.

29 Perform T-8A, T-8E or T11Sequence IIIF or Sequence IIIG and indicate which test has been carried out by checking the corresponding check box. For the implementation of the multiple times of T-8E or T-11, indicate the number of tests performed by checking the corresponding check box in the specified value column.

Form 4e. Fuel Economy Test (JASO M 362:2017, N04C)

Form 4e-a: Test result data of registered oil (DH-2F)

Date of Start of Test	
Date of End of Test	

No.	Item	Unit of Measure	Test Result		Specified Value
1	Base line oil fuel economy (engine oil temperature 60°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L	Fresh oil		8.0～9.1 (NOTE 30)
			Aged oil		
2	Base line oil fuel economy (engine oil temperature 90°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L	Fresh oil		8.6～9.7 (NOTE 30)
			Aged oil		
3	Variable range for base line oil fuel economy before and after evaluated oils (Variation in fuel economy values calculated for base line oil twice before and after with respect to the average fuel economy value calculated)	%	Fresh oil 60ºC		1.4 max (NOTE 30)
			Fresh oil 90ºC		
			Aged oil 60ºC		
			Aged oil 90ºC		
4	Average fuel economy improvement rate (Fresh oil)	%			3.7 min
5	Sum of average fuel economy improvement rate (Fresh oil + Aged oil)	%			6.8 min

NOTE: 30 This value is a criterion for the test validity, not a standard value. The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.

Form 4e-b: Test results of standard oil (DH-2F)

Name of Base Line oil used	
Name of standard oil used	
Date of Start of Test	
Date of End of Test	

No.	Item	Unit of Measure	Test Result		Acceptance criterion (NOTE 31)
1	Base line oil fuel economy (engine oil temperature 60°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L			8.0～9.1
2	Base line oil fuel economy (engine oil temperature 90°C) (Average fuel economy value calculated for base line oil before and after evaluated oils)	km/L			8.6～9.7
3	Variable range for base line oil fuel economy before and after evaluated oils (Variation in fuel economy values calculated for base line oil twice before and after with respect to the average fuel economy value calculated)	%	Fresh oil 60ºC		1.4 max
			Fresh oil 90ºC		
4	Average fuel economy improvement rate (Fresh oil)	%			3.90～4.97

NOTE: 31 The effective range will be updated periodically; any changes will be notified through the Website, etc. Check the information before submission.

Form 4f: Fuel Economy Test (CEC L-54-T-96, M111), Test result data of registered oil (DL-1, DL-2)

No.	Item	Unit of Measure	Test Result	Specified Value
1	Fuel economy improvement	%		2.5 min