

Product Certification Criteria for “Biodegradable Lubricating Oil Version2.2”

Established: January 10, 2004

1. Environmental Background

Oils such as lubricating oil are widely acknowledged as environmental pollutants, being difficult to collect if leaked into the environment due to its liquid form. According to an investigation by the Japan Lubricating Oil Society, it is estimated that of the 2.09 million kiloliters (excluding grease) of lubricating oil sold in 2001, 1.20 million kiloliters is waste oil. Though the survey did not track the amount of lubricating oil leaked into the environment, it is believed that a considerable amount occurred due to use of open types or accidents.

There are “grease” and “the 2 cycle-engine oil” as the typical lubrication oils which are used in the opening system, the 2 cycle-engine which uses the former “2 cycle-engine oil” is light-weight compared with the 4 cycle-engine and has a characteristic that the maintenance and the management are excellent, too.

Therefore, it is used for a motorcycle, a mower and a glass cutter etc. in the land business, it is used for the outboard engine etc. on water. However, as 2 cycle-engine oil is usually mixed with gasoline, and partially emitted into the atmosphere and water as non-fuel oil, it poses a major environmental problem, especially in closed water areas.

The “Ordinance on Appropriate Use of Shiga Prefecture Lake Biwa for Leisure” enforced in April 2003 prohibits pleasure boats equipped with 2 cycle-engines as the propulsion engine (excluding 2 cycle-engines prescribed in the standards). However, the prefectural government permits the use of 2 cycle-engines in the lake until the end of March 2008 at the latest through transitional measures. Additionally, 2 cycle-engines may continue to be used in water areas where their use is not prohibited by such an ordinance. Therefore, the switch to a 2 cycle-engine oil with high biodegradability and little burden on the environment is significant in the reduction of environmental impact.

But also, though the latter “grease”, which is mainly used outdoors, is rarely leaked out in the environment because of its semisolid state at the normal temperature, along with the degradation of the quality (viscosity) by the exposure among long-range, it exerts the influence on the natural environment largely by being mixed with water and soil etc.

2. Applicable Products

The classification of the whole lubrication oil is mentioned in “The petroleum product supply and demand dynamic statistic investigation (Designated statistics No. 51 Jan. 2002 Edition)” and this classification has been adopted because it is general

in the petroleum industry. However, as for the details of “the item (oil species)”, “hydraulic oil”, “2 cycle-engine oil”, “grease” and “other lubrication oil” defined in “the classification of the Japanese standard products” which is published by Management and Coordination Agency in June 1990 along with the above “Designated statistics No. 51” were decided to deal with because of the various classification of each company. Because the necessity to apply lubrication oil using gas is small, sprayer-type lubrication oil was decided to be out of the coverage.

3. Terminology

The biodegradability is divided broadly into two types by the degree of degradation. One is primary biodegradability, which is to lose behavior of the material. The other is ultimate biodegradability, which means that organic substance is resolved by the microbe and mineralized. In other words, carbon and hydrogen, which are the composition elements of the organic substance, resolve into carbon dioxide and water respectively. ($C \rightarrow CO_2$, $H \rightarrow H_2O$) It was decided to consider ultimate biodegradability of the latter in this criteria because it was cited as the major area which was given priority that the “lubrication oil itself” leaked in the environment should not exert an influence on the ecology system.

LC₅₀ (median lethal concentration) is used in the concept which is the same as LD₅₀ (median lethal dose). The smaller the numerical value of LC₅₀ is, the stronger the toxicity is. Similarly, the level of toxicity of EC₅₀ (50% influence concentration) is conversely proportionate to its numerical value. In case of conducting acute toxicity tests by fish using WAF (water accommodated fraction) and WSF (water-soluble fraction), use LL₅₀ value instead of LC₅₀ value. Refer to definition of ASTM D6081.

4. Certification Criteria

4-1. Environmental criteria

For setting up the criteria, environmental impact over the whole life cycle of a product was considered, using Table: Chart for Selecting Environmental Impact at Each Stage of Product Life Cycle. As a result, impact items that are considered to be important to establish criteria for Eco Mark certification were selected in view of environmental impacts over the whole life cycle of the product. For these items, qualitative or quantitative criteria were considered.

Environment impact items considered for the category of “Clothes” are as shown in Table: Chart for Selecting Environmental Impact at Each Stage of Product Life Cycle (X in the table). Out of these items were finally selected as the environmental criteria: B-5, B-6, B-7, B-8, C-1, C-8, D-4, and D-8 (XX in the table). The blank columns in the table show items that were out of the scope of review or that were reviewed in combination with other items. Following is the details of establishing the environment-related criteria.

Table: Chart for Selecting Environmental Impact Items at Each Stage of Product Cycle

Environmental Impact Items	Product Life Stage					
	A. Re-source Extra-ction	B. Manu-Factu-ring	C. Dis-Tribu-tion	D. Use and Consump-tion	E. Dis-posa-l	F. Re-cyclin-g
1. Resource Consumption	X	X	XX	X	X	X
2. Discharge of greenhouse gases			X		X	
3. Discharge of the ozone layer depleting substances				X		
4. Destruction of ecosystems	X			XX	X	
5. Discharge of atmospheric pollutants		XX			X	
6. Discharge of water pollutants		XX		X	X	
7 Discharge/disposal of wastes		XX			X	
8. Use/discharge of hazardous materials		XX	XX	XX	X	X
9. Other environmental impacts				X		

A. Resource Extraction Stage

A-1 (Resource consumption)

The following points were reviewed under this item:

- (1) Resources which can be sustainably produced such as animal and plant oil or synthetic ester produced from animals and plants shall make up more than a uniform percentage of the raw material.
- (2) Recycled material shall be used.

Point (1) was considered in this product category because some biodegradable lubricating oil products use plant oil or synthetic ester produced from plants and animals as the base oil. However, the inclusion of this point in the criteria was considered difficult for those resources which can be sustainably produced due to the lack of information on the required percentage to ensure biodegradability. In addition, biodegradable lubricating oil made of synthetic ester produced from oil chemical products or PAG (polyalkylene glycol) are presently widely available. Therefore this item was not selected as a criterion.

For (2), since the material recycling of lubricating oil is currently not carried out, there were comments that this item should be included in the criteria as a strategy to promote recycling. However, considering that quality problems may occur in the mixing of recycled mineral oil with biodegradable lubricating oil and that sizeable costs are incurred in the separation of additives, this item was eventually not selected as a criterion.

A-4 (Destruction of Eco Systems)

The following points were reviewed under this item:

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| (1) Exotic animal and plant species shall not be used as a raw material
(2) Gene-recombinant products shall not be used as a raw material |
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For (1), since most plant oil raw materials are imported, it is not realistic to prohibit the use of exotic species. Consequently, this item was not selected as a criterion.

For (2), it is not possible to survey whether imported plant oil raw materials are gene-recombinant products. In addition, since no methods exist for evaluating the influence of genetically engineered products on the ecosystem, this item was not selected as a criterion.

B. Manufacturing Stage

B-1 (Resource consumption)

The following point was reviewed under this item:

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| (1) Resources and energies such as sub-raw materials and water resources shall not be consumed as much as possible when manufacturing. |
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For (1), the raw material for the base oil of lubricating oils made of petrochemical products is manufactured together with other oil products in plants as a co-product. This makes it difficult to evaluate the consumption of resources and energy in the manufacturing stage. For this reason, this item was not selected as a criterion.

B-5 (Exhaust of air pollutants)

The following point was reviewed under this item:

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| (1) Air pollutants shall not be exhausted when manufacturing. |
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Because Air Pollution Control Law should be conformed to when manufacturing, this point was selected as the item to establish criteria.

B-6 (Discharge of Water Contaminants)

The following point was reviewed under this item:

(1) Water contaminants shall not be discharged when manufacturing.

Because Water Pollution Control Law should be conformed to when manufacturing, this point was selected as the item to establish criteria.

B-7 (Discharge/disposal of wastes)

The following point was reviewed under this item:

(1) Low discharge of wastes during manufacturing

Considering the need for observance of laws on the disposal and cleaning of wastes during manufacturing, this item was selected as a criterion.

B-8 (Use and Discharge of Hazardous Materials)

The following points were reviewed under this item:

- (1) Observance of the PRTR law on the supply of MSDS, etc.
- (2) Observance of related environmental laws and pollution control agreements.
- (3) No harmful substances shall be used during manufacturing.

Regarding (1)-(2), generally the above laws are obviously observed, but because it was deemed better to verify these laws in Eco Mark certification, this item was selected as a criterion.

Regarding (3), EDTA and nonylphenol surfactants were again reviewed in continuation from Version 1.0. In certain EDTAs, their derivatives can be used as antioxidants, and poly (oxyethylene) = alkylphenol ethoxylates such as nonylphenyl ether, etc. can be added to lubricants as non-ionic surfactants for anti-emulsifying agents.

EDTAs have adverse effects on human health by causing respiratory disorders, etc. Difficult to break down, they tend to accumulate in the environment, and are therefore prohibited from use by criteria for paper, detergents in overseas eco labels such as the German Blue Angel. It was thus decided that the use of EDTAs should be prohibited as in the Version 1.0.

On the other hand, alkylphenol ethoxylates are known to break down in the environment, and generate alkylphenol. Alkylphenols whose number of carbon atoms attached to the alkyl group are 5 to 9, including nonylphenol, were listed as substances suspected of having endocrine disrupting effects in Ministry of the Environment's "Strategic Programs on Environmental Endocrine Disruptors SPEED '98". Alkylphenol ethoxylates whose number of carbon atoms attached to the alkyl group are 5 to 9 are considered to break down in the environment into these alkylphenols listed. In particular, poly (oxyethylene)=nonylphenyl ether is the most frequently used surfactants amongst alkylphenol ethoxylates, and breaks down when discharged into water areas, producing nonylphenol. This nonylphenol is listed as a

substance suspected of having endocrine disrupting effects in the “Strategic Programs on Environmental Endocrine Disruptors SPEED ’98” and has been studied since 2000 as a substance requiring prior risk assessment. The Nordic Swan also prohibits the use of alkylphenol ethoxylates in criteria for lubricants. For these reasons, in addition to nonylphenol surfactants, it has been decided that alkylphenol ethoxylates whose number of carbon atoms attached to the alkyl group are 5 to 9 will be prohibited from use as a more comprehensive attempt. Since October 2003, the Ministry of the Environment has considered revisions of the “Strategic Programs on Environmental Endocrine Disruptors SPEED ’98”. If new findings are acquired in the future, this criteria shall be reviewed.

For other harmful substances, substances designated as Class 1 chemical substances of the PRTR Law are used as components in certain lubricants. Currently, though it is technically difficult to prohibit use of all these substances, in the future, switch to substances with equivalent functions but lower environment burden is desirable. It was therefore decided that in the use of these substances as components, it shall be reported that they are designated Class 1 chemical substances of the PRTR Law. The PRTR Law that prescribes products containing less than 1% of the concerned chemical substances (less than 0.1% for the designated Class 1 chemical substances) shall not be subject to MSDS. However, substances comprised of 1% or more in base oils and additives shall be reported regardless of the content rate in products. Implementation of toxic tests for D-4 was also reviewed.

C. Distribution Stage

C-1 (Resource Consumption)

The following points were reviewed under this item:

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| <ol style="list-style-type: none">(1) Containers and packaging shall give consideration to resource consumption.(2) The packaging shall be able to be used repeatedly.(3) Outer casings shall be made of recycled material. |
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For (1) and (2), most lubricating oil containers in Japan are made of steel and recycled. In addition, since plastic is widely used in bellows containers for grease and import containers, their inclusion in this product category was accepted. However, since plastic containers are difficult to recycle due to the adhesion of oil and other problems, their use should be limited to one time. In consideration of resource consumption, though promoting the use of recycled materials for these containers is essential, it should be difficult to establish standards for them taking into account quality requirements on durability, etc. and the current situation of plastic containers using recycled materials available on the market. In addition, given that plastic containers are repeatedly used for lubricating oils bottled from larger containers, this item was not selected as a criterion.

For (3), outer casings are rarely used, and those used are usually made of recycled materials, therefore this item was not selected as a criterion.

C-2 (Discharge of greenhouse gases)

The following point was reviewed under this item:

(1) Joint delivery and modal shift shall be implemented.

Since (1) is obviously implemented by manufacturers, no special criterion was deemed necessary.

C-8 (Use/discharge of hazardous materials)

The following point was reviewed under this item:

(1) Use of hazardous materials for containers and packaging shall be controlled, and discharge shall be minimum.

For (1), since plastic containers are often subject to thermal recycling or incineration, there is a need to take into account the discharge of hazardous materials in incineration. Consequently, this item was selected as a criterion.

D. Use and Consumption Stage

D-1 (Resource consumption)

The following point was reviewed under this item:

(1) The product shall be designed for a long life cycle in order to ensure a long consumption cycle.

Point (1) was considered difficult to establish as a criterion due to the difficulty in defining long life-cycle, and the absence of objective test methods. Thus it was not selected as a criterion.

D-2 (Discharge of greenhouse gases)

The following points were reviewed under this item:

(1) The fossil fuel consumption shall be less than that of the other products which have an identical function.
(2) The criteria about the discharge of greenhouse gases in the burning shall be furnished.

Regarding (1) and (2), these points were not selected as the items to establish criteria because it is difficult to establish a criterion about consumption of energy and fossil fuel, the discharge of greenhouse gases and make the manufacturer guarantee it when burned.

D-3 (Discharge of the ozone layer depleting substances)

The following point was reviewed under this item:

(1) No discharge of chlorofluorocarbon compounds

For (1), the use of fluorine additives was reviewed. However, considering that use reduces biodegradability and fluorine additives can only be used for lubricating oils for special purposes that require high performance, this item would never be added to biodegradable lubricating oil. Thus it was decided that no special criteria are needed for this item.

D-4 (Destruction of eco systems)

The following point was reviewed under this item:

(1) By having low toxicity on the ecosystem and biodegradability, it shall not affect the ecosystem during use and leakage.

As for (1), it was decided to adopt a biodegradability examination and a toxicity examination to the index which evaluates an ecology influence.

The OECD301B and 301C adopted as biodegradable tests in Version 1.0 are intended to determine products which are readily biodegrade based on rigid test conditions. According to the definition of OECD, products which pass these tests are considered to be readily biodegradable, and are thought to decompose promptly in actual aerobic water environments.

It has been pointed out that reproducibility is poor when these tests are implemented on lubricating oils with poor dispersal in water, and the switch to inherent biodegradability tests such as OECD302 B or C, which is based on more moderate test conditions or extension of the test duration, were reviewed. However, due to the need to consider the speed of dispersal into water and biodegradability when impact on aquatic organisms are taken into account, tests to determine products which are readily biodegradable such as OECD301C were again adopted in Version2.0. Since the principle of these tests is the same as OECD301C, OECD301F and ASTM D6731 were also adopted.

The pass level was set at 60%, in accordance with the following criteria: criteria on hydraulic oil ISO15380 (lubricating oil, industrial lubricating oil (industrial oil), and related products (Class L) –H series (hydraulic systems)-categories HETG, HEPG, HEES, and HEPR) and OECD. Though OECD301B prescribes the 10-d window measurement, final biodegradation (within 28 days) was adequate here, and as with Version 1.0, it was not adopted in Version 2.0.

For toxicity, the fish acute toxicity tests were adopted following Version 1.0 in accordance with the JIS K0102”, JIS K 0420-71 serues, and OECD203. In addition, the test results shown by LL₅₀ value which were obtained from the tests using WAF and WSF have been adopted after the partial revision in September 8, 2005. Lubricating oil and grease are multi-component mixture and water-insoluble substances. The traditional method in Japan to conduct examination for water-insoluble substances was to use emulsion dispersant for dispersing them into

water. However, by following examples from other countries, it has been popular in recent years in Japan to use the method to conduct examination below water solubility without using emulsion dispersant except substances such as agrichemicals to be discharged into environment with emulsion dispersant. Especially in the US, the test method to use WAF and WSF prepared in accordance with ASTM D6081 is common for water-insoluble chemical substances including lubricating oil. This concept has been adopted in OECD. The test method on the above is to conduct exposure by getting the fraction which is dispersed or soluble in water out of the multi-component water-insoluble substances. However, it is difficult to specify and measure the concentration of the substances in the fraction, since the component in the fraction is not single substance and very small amount of the component element is dispersed or soluble. Therefore, the method using loading rate of test substances to show the result instead of using concentration has been adopted, and LL₅₀ value is derived from the loading rate. The test method using dispersant to disperse test substances into water, and the test method using WAF and WSF; these two methods on the above are difficult to compare to each other and cannot be judged which method is suitable for the test of lubricating oil. However, both methods, considered to be valid evaluation method, are adopted in this revision.

Furthermore, the need to observe the impact on lower organisms in the ecosystem was pointed out, and considering that the test for determination of the inhibition of the mobility of Daphnia by chemicals and multiplication is prescribed in the Eco Operating Oil Standard ISO15380, its adoption was reviewed. As a national policy, the basic environment plan established in December 2000 focuses on giving consideration to the ecosystem through the preservation of the water environment and countermeasures for chemical substances, and promotes toxicity evaluation tests of present chemical substances for types of seaweed, daphnia, and fish to obtain basic data. In the partially revised Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances issued in May 2003, the influence of chemical substances on animals and plants was also prescribed.

Due to these reasons, fishery acute toxicity tests were added to Version 2.0, and test for determination of the inhibition of the mobility of Daphnia by chemicals and multiplication was also considered for adoption. Considering that there exist no cases of daphnia toxicity tests implemented on oils at this point in the country, test methods are currently being reviewed according to the above law. However, owing to such reasons as the need to determine the outcome of this review, and the time required for developing substitute products cannot be forecast as yet, it was decided that the daphnia mobility inhibition test shall not apply as of this point. Regarding the starting time of application, it shall continue to be reviewed while observing the trends of the above law.

Accurate evaluation of toxicity may not be possible with this test because lubricating oil has a large physical inhibition impact on daphnia. Tests using liquid extracts of only soluble components were therefore approved. The test time was set at 48 hours in accordance with the ISO15380 criteria.

D-6 (Discharge of water contaminants)

The following points were reviewed under this item:

- (1) Water contaminants shall not be discharged.
- (2) When slipped in the environment during use, influence to water quality shall be scarcely exerted.

As for (1)-(2), they were decided to consider in D-4.

D-8 (Use and discharge of hazardous materials)

The following points were reviewed under this item:

- (1) Low discharge of dioxins by burning during use (no chlorinated additive shall be contained)
- (2) Low generation of polycyclic aromatic hydrocarbons (PAHs)
- (3) MSDS shall be provided
- (4) Cautions to users shall be labeled

For (1), since chlorinated lubricating oils may discharge dioxins when burnt after use, etc. efforts are currently being made to avoid industrial use. In the criteria on cutting fluid JIS K2241-01, products using chlorinated additives were excluded in the December 2000 revision. However, these products are still available on the market, and for the purpose of promoting the anti-chlorination trends, the prohibition of chlorinated additives was selected as a criterion.

Point (2) was reviewed from the viewpoint of whether it is carcinogenic. Vegetable oil, synthetic esters and PAG used as the base oil of biodegradable lubricating oil, are thought to contain no PAH. However due to the future possibility that the base oil of biodegradable lubricating oils may be made of mineral oil, this item was selected as a criterion. In the EU Directive 94/69/EC (laws, regulations, and administrative standards on classification, packaging, and labeling of hazardous substances, corresponding protocols for 21st technical adaptation in directive 67/548/EEC), compounds containing the three condensed aromatic rings or more; aromatic hydrocarbons, sulfurs, and nitrogen compounds were defined as PCAs (polycyclic aromatic) requiring the establishment of laws on determining whether oil products are carcinogenic from the amount of DMSO (dimethyl sulphoxide) extracted by the IP346 method, a method of measuring PCAs, and prescribes that oil products containing less than 3% mass of DMSO shall not be considered as cancerous substances. Moreover, in OSHA HCS, hazard warning criteria were set down based on the severity of the petroleum processing, and petroleum products not corresponding to these criteria were considered carcinogenic. In Japan, no laws or regulations on carcinogenic properties exist. In the petroleum industry, since voluntary efforts have been made by the Petroleum Association of Japan and other organizations to ensure compliance with the hazard warning criteria of OSHA HCS and the EU Directive, this item was selected as a criterion.

For (3), the provision of MSDS is required in the transfer and sales of commercial

lubricating oil based on the PRTR law, but not in sales to general consumers. However, since MSDS should be provided when requested by consumers, this item was selected as a criterion.

For (4), most petroleum products already conform to the PL (Product Liability) Law, and corresponding warnings are labeled on containers or products. These are labeled under the responsibility of manufacturers and sales distributors, and widely used as a means of calling users to practice caution in use and disposal. However, since environmental influence cannot be completely denied for biodegradable lubricating oil depending on use, it was argued that users must be further reminded of the need for appropriate disposal. The addition of cautions on the handling and disposal of biodegradable lubricating oil to warning labels was therefore selected as a criterion.

For grease contained in bellows containers, due to the difficulty in labeling each container, those manufacturers shipping products in outer casings shall be asked to label on the outer casings.

D-9 (Other environmental impacts)

The following points were reviewed under this item:

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| <ol style="list-style-type: none">(1) Products shall not be intended for 2 cycle-engine use.(2) Products shall not be for leisure purposes. |
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For (1)-(2), because 2 cycle-engines discharge unburnt fuel and oil due to their structure, use in closed water areas can incur enormous impact on aquatic organisms. The “Ordinance on Appropriate Use of Shiga Prefecture Lake Biwa for Leisure” issued in October 2002 prohibits pleasure boats equipped with 2 cycle-engines as the propulsion engine from cruising water areas. There were opinions that it would be inappropriate to label the Eco Mark on products for the 2 cycle-engine, considering the need to promote a transfer to the 4 cycle-engine, which has less environmental burden in terms of discharge of volatile organic compounds, etc. However, excluding 2 cycle-engines oils from the Eco Mark products does not mean that 2 cycle-engines would not be used; on the contrary, the absence of guidelines may lead to increased environmental burden, and no objective data that 4 cycle-engines have lower environmental burden than 2 cycle-engines exist. Therefore, it was decided that the inclusion of 2 cycle-engines would remain in Version2.0.

E. Disposal Stage

E-1 (Resource consumption)

The following point was reviewed under this item:

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| <ol style="list-style-type: none">(1) The system of waste oil collecting and processing shall be furnished. |
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For the recovery, processing, and recycling of waste oil, efforts are being by the

whole industry for appropriate disposal, separation of chlorinated and non-chlorinated lubricating oil by outsourcing to members of the National Oil Recycling Joint Union. In addition, since information to promote user awareness is also distributed through pamphlets, etc., no special criteria were considered required for this item.

E-2 (Discharge of greenhouse gases)

The following point was reviewed under this item:

(1) The criteria about the discharge of greenhouse gases in the incineration disposal shall be furnished.

For (1), since outsourcing to appropriate businesses is being promoted, and disposal at incineration sites is strictly controlled by the Air Pollution Control Law, etc no special criteria were considered required for this item.

E-4 (Destruction of eco systems)

The following points were reviewed under this item:

(1) Disposed in form with low risk of leakage to soil and hydrosphere
(2) Minimum influence in the event of illegal disposal

As for (1), they were decided to consider in E-1, E-2.

As for (2), they were decided to consider in D-4.

E-5 (Exhaust of air pollutants)

The following point was reviewed under this item:

(1) Air pollutants shall not be exhausted when incinerated.

As for (1), they were decided to consider in D-4.

E-6 (Discharge of water contaminants)

The following point was reviewed under this item:

(1) Minimum influence in the event of illegal disposal

As for (1), they were decided to consider in D-4.

E-7 (Discharge and disposal of wastes)

The following points were reviewed under this item:

(1) Recovery system is available.
(2) Disposal shall cause minimum burden to the environment.

As for (1)(2), they were decided to consider in E-1, E-2.

E-8 (Use and discharge of hazardous materials)

The following points were reviewed under this item:

- (1) No discharge of hazardous materials
- (2) Related environmental laws and pollution control agreements shall be observed.

For (1), though dioxins may be generated in incineration, it was decided in D-8 that this item shall be incorporated as a criterion to prohibit the use of chlorinated additives. For products already available on the market, as reviewed in E-1 and E-2, separation of chlorinated and non-chlorinated products shall be promoted by the industry.

As for (2), they were decided to consider in B-8.

F. Recycling stage

F-1 (Resource consumption)

The following points were reviewed under this item:

- (1) Waste oil recovery and recycling systems shall be made available.
- (2) Efficient recycling method shall be developed.

As for (1) (2), they were decided to consider in E-1.

F-8 (Use and discharge of hazardous materials)

The following point was reviewed under this item:

- (1) Non-generation of dioxins

For (1), since lubricating oil is mainly recycled by thermal recycling, dioxins may be generated during recycling. The prohibition of chlorinated additives was therefore selected as a criterion in D-8. For products already available on the market, as reviewed in E-1 and E-2, separation of chlorinated and non-chlorinated products shall be promoted by the industry.

4-2 Quality criteria

(1) When domestic standards were set (e.g. JIS), it was decided to follow the standards in order to secure the minimum quality level according to ISO 14024. Also, when domestic standards were not set, it was decided to secure the quality equal to the similar standard to promote the spread of the Eco Mark products.

(2) Automobile standard "lubrication oil for 2 cycle gasoline engine, JASO M345-93" of 2 cycle-engine oil was revised in March 2003. According to the modified JASO M345: 2002, the former FA was discontinued, with the three grades FB, FC, and FD

remaining. The FC grade after modification is equivalent to the former quality criteria. As with the Version1.0, quality grade of the products in this category should be limited to those above FC in the aim to reduce environmental burden by exhaust smoke performance. Although Version1.0 adopted NMA TC-W, TC-WII, and TC-W3, it was decided that Version2.0 will adopt only the latest standard, TC-W3.

5. Others

(1) On display in the lower column of Eco Mark

In Version1.0, only “biodegradable oil” and “biodegradable grease” were displayed. In Version2.0, it was decided that the test method used and test results shall be indicated taking into consideration the significance in providing accurate and quantitative information to users.

According to the definition of OECD, the test method adopted in this product category considers products to be easily biodegradable if they biodegrade by 60% or more within 28 days. For this reason, it was decided that the second line shall indicate “biodegradability of 60% or more in 28 days”, and not individual values obtained from tests. Since most consumers are not familiar with test methods and results, it was decided that the first line shall indicate “environmentally biodegradable oil”.