

產品名稱：船用環保柴油

發行日期：2010/07/01

Marine Environmental Protection Diesel

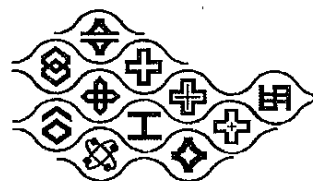
版別：1.0 頁次：1/3

- 一、 產品編號(Product NO.)：DO-GB2
- 二、 主要用途(Usage)：用於中、高速柴油引擎車輛用低硫燃料
- 三、 品質(Quality)：

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|-----|---|-----------------------------|------------------|-------------------|-------------------------|-------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 1. | 十六烷指數 (Cetane Index) | | 48 | | D976 D4737 | 12016 12761 |
| 2. | 密度 (15°C) | g/cm ³ | 如試驗紀錄 | | D1298 D4052 | 12017 14474 |
| 3. | 銅片腐蝕性 (Copper strip corrosion, 50°C, 3hr) | | NO.1 | | D130 | 1219 |
| 4. | 閃點 (Flash point) | °C | 52 | | D93 | 3574 |
| 5. | 動力黏度 (Kinematic Viscosity, 40°C) | mm ² /s (cSt) | 2.0 | 4.5 | D445 | 3390 |
| 6. | 10%蒸餾殘渣之含碳量 (藍氏殘碳量) (Ramsbottom carbon residue on 10% distillation residue) | wt% | | 0.30 | D524 | 3776 |
| 7. | 蒸餾性質 (Distillation) | | | | | |
| | 95 vol% 餾出溫度 (95 vol% Recovered) | °C | | 360 | D86 | 1218 |
| 8. | 灰份 (Ash content) | wt% | | 0.01 | D482 | 3576 |
| 9. | 硫含量 (Sulfur content) | ppmw | | 50 ⁽²⁾ | D2622 D4294 D5453 | 13877 14472 14505 |
| 10. | 多環芳香烴含量 (Polyaromatics content) | wt% | | 11 | | 15079 |
| 11. | 潤滑性，校正磨痕直徑 (1.4 wsd, 60°C) | μm | | 460 | D6079 | 15074 |
| 12. | 脂肪酸甲酯含量 ⁽³⁾⁽⁴⁾ (Fatty Acid Methyl Esters) | vol% | 2 ⁽⁹⁾ | 5 | | 15051 15057 |
| 13. | 水份及沉澱物 ⁽⁵⁾ (Water and sediment) | vol% | | 0.05 | D2709 | 14766 |

本規範如有修改 不另通知客戶

1H0-QCM-02



產品名稱：船用環保柴油

發行日期：2010/07/01

Marine Environmental Protection Diesel

版別：1.0 頁次：2/3

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|-----|--|------------------|------|-----|-----------------------|------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 14. | 水份 ⁽³⁾ (water content) | ppmw | | 200 | D6304 | 4446 |
| 15. | 總污染物 ⁽³⁾ (Particle Matter) | ppmw | | 24 | | 15055 |
| 16. | 流動點 ⁽³⁾⁽⁶⁾ (Pour point) | °C | | -3 | D97 D5949 D5950 | 3484 14506 14667 |
| 17. | 冷濾點 ⁽³⁾⁽⁶⁾ (CFPP) | °C | | -3 | D6371 | 15061 |
| 18. | 氧化穩定性 ⁽³⁾⁽⁷⁾ (Oxidation Stability) | g/m ³ | | 25 | D2274 | 15078 |
| 19. | 外觀 (Appearance) | | 澄清透明 | | 目視 | --- |

註：

- (1).本規範除另定施行日期者外，以 CNS 國家標準公布日期為本規範施行日期。
- (2).基於我國環境保護需求，國內販售之汽柴油尚須符合行政院環保署公告的「車用汽柴油成分及性能管制標準」之最新規定。下表為「車用汽柴油成分及性能管制標準」之車用柴油分級空污費率徵收與成分管制表。

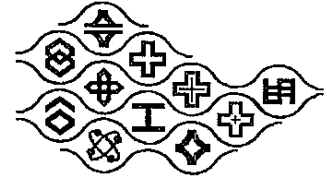
| 項目 | 實施 | | |
|----------------|----------|-------|-------|
| | 96年1月1日起 | | |
| | 一級 | 二級 | 三級 |
| 空污費率(NT\$/L) | 0.030 | 0.075 | 0.200 |
| 硫含量(ppmw), 最大值 | 10 | 30 | 50 |
| 十六烷指數, 最小值 | 48 | | |
| 芳香烴(wt%), 最大值 | 35 | | |

- (3).添加脂肪酸甲酯之車用柴油需進行之試驗項目。
- (4).脂肪酸甲酯(FAME)品質須符合 CNS 15072(生質柴油-脂肪酸甲酯)規定。
- (5).添加脂肪酸甲酯之車用柴油非必需進行之試驗項目。
- (6).另因應氣候所需試驗項目『冷濾點』及『流動點』，已添加脂肪酸甲酯之車用柴油最少需符合其中一項之要求。
- (7).氧化穩定性測試時間需 16 小時，為避免區域示範推廣添加生質柴油階段因檢驗延宕供油時效，於出廠時先抽樣再供後續檢驗，並留存相關檢驗數據供檢核；但於主管機關規定全面推本規範如有修改 不另通知客戶

1H0-QCM-02

台塑石化股份有限公司

產品規範



產品名稱：船用環保柴油

Marine Environmental Protection Diesel

發行日期：2010/07/01

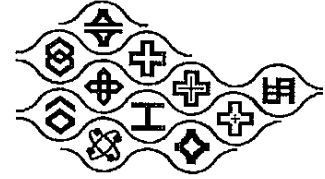
版別：1.0 頁次：3/3

行時期需檢驗合格才可出廠上市。

(8).色度分析值 Report 其試驗方法為 ASTM D1500。

(9).所添加脂肪酸甲酯(FAME)含量需符合我國「石油管理法」最新規定。

PRODUCT SPECIFICATION



Product Name : Marine Environmental Protection Diesel

Issue Date : Jul 01,2010.

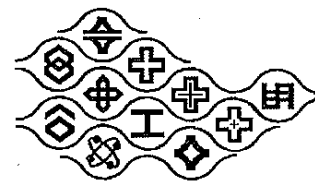
Version : 1.0 頁次 : 1/2

1. Product NO. : DO-GB2
2. Usage : Applicable to middle 、 high speed diesel vehicle engine use
3. Quality :

| No. | Items | Unit | Limitation | | Test Method |
|-----|---|-----------------------------|------------------|-------------------|-------------------------|
| | | | Min. | Max. | ASTM |
| 1. | Cetane Index | | 48 | | D976 D4737 |
| 2. | Density,15°C | g/cm ³ | Report | | D1298 D4052 |
| 3. | Copper strip corrosion , 50°C , 3hr | | NO.1 | | D130 |
| 4. | Flash point | °C | 52 | | D93 |
| 5. | Kinematic viscosity , 40°C | mm ² /s (cSt) | 2.0 | 4.5 | D445 |
| 6. | Ramsbottom carbon residue on 10% distillation residue | wt% | | 0.30 | D524 |
| 7. | Distillation | | | | |
| | 95 vol% Recovered | °C | | 360 | D86 |
| 8. | Ash content | wt% | | 0.01 | D482 |
| 9. | Sulfur content | ppmw | | 50 ⁽²⁾ | D2622 D4294 D5453 |
| 10. | Polyaromatics content | wt% | | 11 | D6591 |
| 11. | Lurbricity (1.4 wsd , 60°C) | μ m | | 460 | D6079 |
| 12. | Fatty Acid Methyl Esters content ⁽³⁾⁽⁴⁾ | vol% | 2 ⁽⁸⁾ | 5 | |
| 13. | Water and sediment ⁽⁵⁾ | vol% | | 0.05 | D2709 |
| 14. | Water content ⁽³⁾ | ppmw | | 200 | D6304 |
| 15. | Particle Matter ⁽³⁾ | ppmw | | 24 | D2276 |
| 16. | Pour point ⁽³⁾⁽⁶⁾ | °C | | -3 | D97 D5949 D5950 |
| | | | | | D6371 |
| 17. | CFPP ⁽³⁾⁽⁶⁾ | °C | | -3 | D6371 |
| 18. | Oxidation stability ⁽³⁾ | g/m ³ | | 25 | D2274 |

Formosa PetroChemical Corporation

PRODUCT SPECIFICATION



Product Name : Marine Environmental Protection Diesel

Issue Date : Jul 01,2010.

Version : 1.0 頁次 : 2/2

| No. | Items | Unit | Limitation | | Test Method |
|-----|------------|------|---|------|-------------|
| | | | Min. | Max. | ASTM |
| 19. | Appearance | | Clear, bright, free from suspended and sediment at room temperature | | visual |

Note :

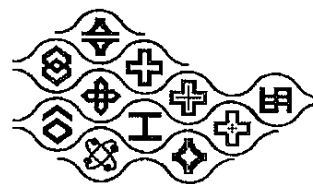
1. The norm implement date accords with CNS National Standard announce date.
2. Gasoline and diesel oil sold in Taiwan need accord to Environmental Protection Administration declaration of 「Gasoline and Diesel components control standard」 regulation. Table is 「Gasoline and Diesel components control standard」.

| Items | Implementation | From January 1, 2007 | | |
|-----------------------------|----------------|----------------------|--------------|-------------|
| | | First grade | Second grade | Third grade |
| Empty corrupt rate (NT\$/L) | | 0.030 | 0.075 | 0.200 |
| Sulfur content(ppmw), Max | | 10 | 30 | 50 |
| Cetane Index, Min | | 48 | | |
| Aromatics content(wt%), Max | | 35 | | |

3. Add FAME into automobile diesel oil must analysis items.
4. FAME quality must accord with 15072 CNS Regulation.
5. Add FAME into automobile diesel oil, it not need ask for analysis items.
6. When automobile diesel oil content FAME, must accord with one of CFPP or PP.
7. Color analysis value as report, standard test method ASTM D1500.
8. FAME content must accord with a new version of 「Petroleum Administration Law」 regulation for Taiwan.

台塑石化股份有限公司

產品規範



產品名稱：外銷船用環保柴油

發行日期：2010/07/01

Export Marine Environmental Protection Diesel

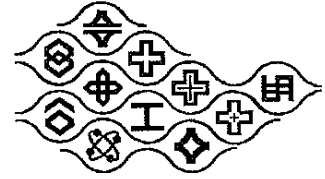
版別：1.0 頁次：1/3

- 一、 產品編號(Product NO.)：DO-EXGB2
- 二、 主要用途(Usage)：用於中、高速柴油引擎車輛用低硫燃料
- 三、 品質(Quality)：

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|-----|---|-----------------------------|------------------|-------------------|-------------------------|-------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 1. | 十六烷指數 (Cetane Index) | | 48 | | D976 D4737 | 12016 12761 |
| 2. | 密度 (15°C) | g/cm ³ | 如試驗紀錄 | | D1298 D4052 | 12017 14474 |
| 3. | 銅片腐蝕性 (Copper strip corrosion, 50°C, 3hr) | | NO.1 | | D130 | 1219 |
| 4. | 閃點 (Flash point) | °C | 52 | | D93 | 3574 |
| 5. | 動力黏度 (Kinematic Viscosity, 40°C) | mm ² /s (cSt) | 2.0 | 4.5 | D445 | 3390 |
| 6. | 10%蒸餾殘渣之含碳量 (藍氏殘碳量) (Ramsbottom carbon residue on 10% distillation residue) | wt% | | 0.30 | D524 | 3776 |
| 7. | 蒸餾性質 (Distillation) | | | | | |
| | 95 vol% 餾出溫度 (95 vol% Recovered) | °C | | 360 | D86 | 1218 |
| 8. | 灰份 (Ash content) | wt% | | 0.01 | D482 | 3576 |
| 9. | 硫含量 (Sulfur content) | ppmw | | 50 ⁽²⁾ | D2622 D4294 D5453 | 13877 14472 14505 |
| 10. | 多環芳香烴含量 (Polyaromatics content) | wt% | | 11 | | 15079 |
| 11. | 潤滑性，校正磨痕直徑 (1.4 wsd, 60°C) | μm | | 460 | D6079 | 15074 |
| 12. | 脂肪酸甲酯含量 ⁽³⁾⁽⁴⁾ (Fatty Acid Methyl Esters) | vol% | 2 ⁽⁹⁾ | 5 | | 15051 15057 |
| 13. | 水份及沉澱物 ⁽⁵⁾ (Water and sediment) | vol% | | 0.05 | D2709 | 14766 |

本規範如有修改 不另通知客戶

1H0-QCM-02



產品名稱：外銷船用環保柴油

發行日期：2010/07/01

Export Marine Environmental Protection Diesel

版別：1.0 頁次：2/3

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|-----|--|------------------|------|-----|-----------------------|------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 14. | 水份 ⁽³⁾ (water content) | ppmw | | 200 | D6304 | 4446 |
| 15. | 總污染物 ⁽³⁾ (Particle Matter) | ppmw | | 24 | | 15055 |
| 16. | 流動點 ⁽³⁾⁽⁶⁾ (Pour point) | °C | | -3 | D97 D5949 D5950 | 3484 14506 14667 |
| 17. | 冷濾點 ⁽³⁾⁽⁶⁾ (CFPP) | °C | | -3 | D6371 | 15061 |
| 18. | 氧化穩定性 ⁽³⁾⁽⁷⁾ (Oxidation Stability) | g/m ³ | | 25 | D2274 | 15078 |
| 19. | 外觀 (Appearance) | | 澄清透明 | | 目視 | --- |

註：

- (1).本規範除另定施行日期者外，以 CNS 國家標準公布日期為本規範施行日期。
- (2).基於我國環境保護需求，國內販售之汽柴油尚須符合行政院環保署公告的「車用汽柴油成分及性能管制標準」之最新規定。下表為「車用汽柴油成分及性能管制標準」之車用柴油分級空污費率徵收與成分管制表。

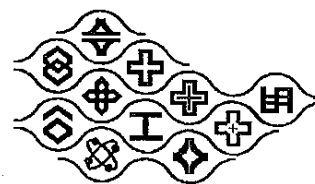
| 項目 | 實施 | | |
|----------------|----------|-------|-------|
| | 96年1月1日起 | | |
| | 一級 | 二級 | 三級 |
| 空污費率(NT\$/L) | 0.030 | 0.075 | 0.200 |
| 硫含量(ppmw), 最大值 | 10 | 30 | 50 |
| 十六烷指數, 最小值 | 48 | | |
| 芳香烴(wt%), 最大值 | 35 | | |

- (3).添加脂肪酸甲酯之車用柴油需進行之試驗項目。
- (4).脂肪酸甲酯(FAME)品質須符合 CNS 15072(生質柴油-脂肪酸甲酯)規定。
- (5).添加脂肪酸甲酯之車用柴油非必需進行之試驗項目。
- (6).另因應氣候所需試驗項目『冷濾點』及『流動點』，已添加脂肪酸甲酯之車用柴油最少需符合其中一項之要求。
- (7).氧化穩定性測試時間需 16 小時，為避免區域示範推廣添加生質柴油階段因檢驗延宕供油時效，於出廠時先抽樣再供後續檢驗，並留存相關檢驗數據供檢核；但於主管機關規定全面推本規範如有修改 不另通知客戶

1H0-QCM-02

台塑石化股份有限公司

產品規範



產品名稱：外銷船用環保柴油

發行日期：2010/07/01

Export Marine Environmental Protection Diesel

版別：1.0 頁次：3/3

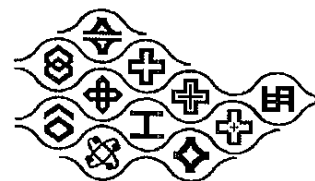
行時期需檢驗合格才可出廠上市。

(8).色度分析值 Report 其試驗方法為 ASTM D1500。

(9).所添加脂肪酸甲酯(FAME)含量需符合我國「石油管理法」最新規定。

PRODUCT SPECIFICATION

Product Name : Export Marine Environmental Protection Diesel



Issue Date : Jul 01,2010.

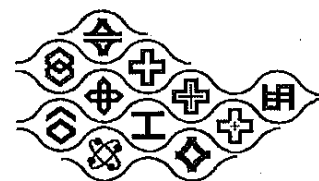
Version : 1.0 頁次 : 1/2

1. Product NO. : DO-EXGB2
2. Usage : Applicable to middle 、 high speed diesel vehicle engine use
3. Quality :

| No. | Items | Unit | Limitation | | Test Method |
|-----|---|-----------------------------|------------------|-------------------|-------------------------|
| | | | Min. | Max. | ASTM |
| 1. | Cetane Index | | 48 | | D976 D4737 |
| 2. | Density,15°C | g/cm ³ | Report | | D1298 D4052 |
| 3. | Copper strip corrosion , 50°C , 3hr | | NO.1 | | D130 |
| 4. | Flash point | °C | 52 | | D93 |
| 5. | Kinematic viscosity , 40°C | mm ² /s (cSt) | 2.0 | 4.5 | D445 |
| 6. | Ramsbottom carbon residue on 10% distillation residue | wt% | | 0.30 | D524 |
| 7. | Distillation | | | | |
| | 95 vol% Recovered | °C | | 360 | D86 |
| 8. | Ash content | wt% | | 0.01 | D482 |
| 9. | Sulfur content | ppmw | | 50 ⁽²⁾ | D2622 D4294 D5453 |
| 10. | Polyaromatics content | wt% | | 11 | D6591 |
| 11. | Lurbricity (1.4 wsd , 60°C) | μ m | | 460 | D6079 |
| 12. | Fatty Acid Methyl Esters content ⁽³⁾⁽⁴⁾ | vol% | 2 ⁽⁸⁾ | 5 | |
| 13. | Water and sediment ⁽⁵⁾ | vol% | | 0.05 | D2709 |
| 14. | Water content ⁽³⁾ | ppmw | | 200 | D6304 |
| 15. | Particle Matter ⁽³⁾ | ppmw | | 24 | D2276 |
| 16. | Pour point ⁽³⁾⁽⁶⁾ | °C | | -3 | D97 D5949 D5950 |
| 17. | CFPP ⁽³⁾⁽⁶⁾ | °C | | -3 | D6371 |
| 18. | Oxidation stability ⁽³⁾ | g/m ³ | | 25 | D2274 |

Formosa PetroChemical Corporation

PRODUCT SPECIFICATION



Product Name : Export Marine Environmental Protection Diesel

Issue Date : Jul 01,2010.

Version : 1.0 頁次 : 2/2

| No. | Items | Unit | Limitation | | Test Method |
|-----|------------|------|---|------|-------------|
| | | | Min. | Max. | ASTM |
| 19. | Appearance | | Clear, bright, free from suspended and sediment at room temperature | | visual |

Note :

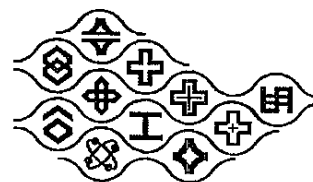
1. The norm implement date accords with CNS National Standard announce date.
2. Gasoline and diesel oil sold in Taiwan need accord to Environmental Protection Administration declaration of 「Gasoline and Diesel components control standard」 regulation. Table is 「Gasoline and Diesel components control standard」.

| Items | Implementation | From January 1, 2007 | | |
|-----------------------------|----------------|----------------------|--------------|-------------|
| | | First grade | Second grade | Third grade |
| Empty corrupt rate (NT\$/L) | | 0.030 | 0.075 | 0.200 |
| Sulfur content(ppmw), Max | | 10 | 30 | 50 |
| Cetane Index, Min | | 48 | | |
| Aromatics content(wt%), Max | | 35 | | |

3. Add FAME into automobile diesel oil must analysis items.
4. FAME quality must accord with 15072 CNS Regulation.
5. Add FAME into automobile diesel oil, it not need ask for analysis items.
6. When automobile diesel oil content FAME, must accord with one of CFPP or PP.
7. Color analysis value as report, standard test method ASTM D1500.
8. FAME content must accord with a new version of 「Petroleum Administration Law」 regulation for Taiwan.

台塑石化股份有限公司

產品規範



產品名稱：船用輕柴油

Marine Gas Oil

發行日期：2008/04/28

版別：1.1 頁次：1/2

- 一、 產品編號(Product NO.)：DO-G
- 二、 主要用途(Usage)：用於中、高速柴油引擎船舶燃料
- 三、 品質(Quality)：

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|------------------------|---|-----------------------------|--------|------|-------------------------|-------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 1. | 十六烷指數 (Cetane Index) | | 48 | | D976 D4737 | 12016 12761 |
| 2. | 銅片腐蝕性 (Copper strip corrosion, 50°C, 3hr) | | NO.1 | | D130 | 1219 |
| 3. | 閃點 (Flash point) | °C | 60 | | D93 | 3574 |
| 4. | 流動點 (Pour point) | °C | | 0 | D97 D5949 D5950 | 3484 14506 14667 |
| 5. | 動力黏度 (Kinematic Viscosity, 40°C) | mm ² /s (cSt) | 1.9 | 4.5 | D445 | 3390 |
| 6. | 10%蒸餾殘渣之含碳量 (藍氏殘碳量) (Ramsbottom carbon residue on 10% distillation residue) | wt% | | 0.10 | D524 | 3776 |
| 7. | 水份及沉澱物 (Water and sediment) | vol% | | 0.05 | D2709 | 14766 |
| 蒸餾性質 (Distillation) | | | | | | |
| 8. | 90 vol% 餾出溫度 (90 vol% Recovered) | °C | | 360 | D86 | 1218 |
| | 終沸點 (End boiling point) | °C | Report | | | |
| 9. | 硫含量 (Sulfur content) | wt% | | 1.0 | D2622 D4294 D5453 | 13877 14472 14505 |
| 10. | 灰份 (Ash content) | wt% | | 0.01 | D482 | 3576 |
| 11. | 外觀 (Appearance) | | 澄清透明 | | 目視 | --- |

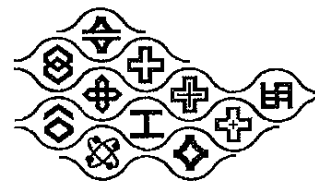
本規範如有修改 不另通知客戶

10-7-1

1H0-QCM-02

台塑石化股份有限公司

產品規範



產品名稱：船用輕柴油

發行日期：2008/04/28

Marine Gas Oil

版別：1.1 頁次：2/2

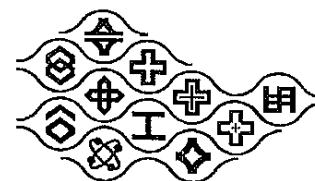
| | | | | | |
|-----|--------------|------|-------|----------------|----------------|
| 12. | 密度 (15°C) | kg/L | 如試驗紀錄 | D1298 D4052 | 12017 14474 |
|-----|--------------|------|-------|----------------|----------------|

註：

1. 潤滑度分析值不得超過 460 μm ，其試驗方法為 ASTM D6079。
2. 色度分析值 Report 其試驗方法為 ASTM D1500。

Formosa PetroChemical Corporation

PRODUCT SPECIFICATION



Product Name : Marine Gas Oil

Issue Date: April 28,2008.

Version:1.1 Page:1/1

1. Product NO. : DO-G
2. Usage : Applicable to middle 、 high speed ship engine use
3. Quality :

| No. | Items | Unit | Limitation | | Test Method |
|-----|--|-----------------------------|---|---------------|-------------------------|
| | | | Min. | Max. | ASTM |
| 1. | Cetane Index | | 48 | | D976 D4737 |
| 2. | Copper strip corrosion , 50°C , 3hr | | NO.1 | | D130 |
| 3. | Flash point | °C | 60 | | D93 |
| 4. | Pour point | °C | | 0 | D97 D5949 D5950 |
| 5. | Kinematic Viscosity , 40°C | mm ² /s (cSt) | 1.9 | 4.5 | D445 |
| 6. | Ramsbottom carbon residue on 10% distillation residue | wt% | | 0.10 | D524 |
| 7. | Water and sediment | vol% | | 0.05 | D2709 |
| 8. | Distillation | | | | |
| | 90 vol% Recovered End boiling point | °C | | 360 Report | D86 |
| 9. | Sulfur content | wt% | | 1.0 | D2622 D4294 D5453 |
| 10. | Ash content | wt% | | 0.01 | D482 |
| 11. | Appearance | | Clear,bright,free from suspended and sediment at room temperature | | visual |
| 12. | Density,15°C | kg/L | Report | | D1298 D4052 |

Note :

1. Lubricity analysis value cannot excess 460 μm,standard test method ASTM D6079 .
2. Color analysis value as Report ,standard test method ASTM D1500 .

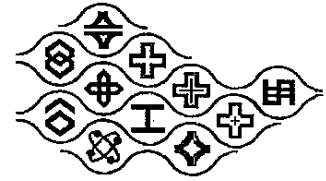
We won't notice customers when the specifications revise

10-7-1

1H0-QCM-02

台塑石化股份有限公司

產品規範



產品名稱：船用燃油-RME25

發行日期：2009/06/08

Marine Fuel Oil-RME25

版別：5.2 頁次：1/1

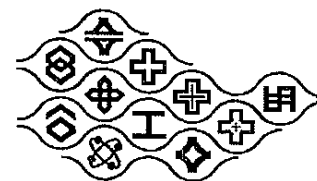
- 一、 產品編號 (Product NO.): RME-25
- 二、 主要用途 (Usage): 用於海運輸船大型柴油主機之燃料
- 三、 品質 (Quality):

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|-----|---|-----------------------------|-------|------|-------------------------|-------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 1. | 密度 (Density, 15°C) | kg/m ³ | | 991 | D1298 D4052 | 12017 14474 |
| 2. | 閃點 (Flash point) | °C | 60 | | D93 | 3574 |
| 3. | 動力黏度 (Kinematic viscosity, 100°C) | mm ² /s (cSt) | 如試驗記錄 | | D445 | 3390 |
| 4. | 動力黏度 (Kinematic viscosity, 50°C) | mm ² /s (cSt) | | 180 | D445 | 3390 |
| 5. | 硫含量 (Sulfur content) | wt% | | 4.5 | D1552 D2622 D4294 | 14471 13877 14472 |
| 6. | 流動點 (Pour point) | °C | | 30 | D97 D5949 D5950 | 3484 14506 14667 |
| 7. | 含水量 (Water content) | vol% | | 1.0 | D95 | 3517 |
| 8. | 殘碳量 (微量法) (Carbon residue, Micro method) | wt% | | 15 | D4530 | 3383 |
| 9. | 灰份 (Ash content) | wt% | | 0.10 | D482 | 3576 |

註：

1. 視客戶需求分析鈮含量以及鋁+矽含量，分析方法：
 鈮含量：ISO14597、ASTM D5708、IP288、CNS 13874
 鋁+矽含量：ASTM D5184、CNS13875

PRODUCT SPECIFICATION



Product Name : Marine Fuel Oil-RME25

Issue Date:Jun.08,2009

Version:5.2 Page:1/1

1. Product NO. : RME25
2. Usage : Applicable to ocean shipping large diesel engine
3. Quality :

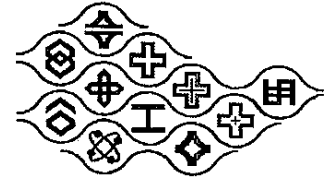
| No. | Items | Unit | Limitation | | Test Method |
|-----|-------------------------------|-----------------------------|------------|------|-------------------------|
| | | | Min. | Max. | ASTM |
| 1. | Density , 15°C | kg/m ³ | | 991 | D1298 D4052 |
| 2. | Flash point | °C | 60 | | D93 |
| 3. | Kinematic viscosity , 100°C | mm ² /s (cSt) | Report | | D445 |
| 4. | Kinematic viscosity , 50°C | mm ² /s (cSt) | | 180 | D445 |
| 5. | Sulfur content | wt% | | 4.5 | D1552 D2622 D4294 |
| 6. | Pour point | °C | | 30 | D97 D5949 D5950 |
| 7. | Water content | vol% | | 1.0 | D95 |
| 8. | Carbon residue , Micro method | wt% | | 15 | D4530 |
| 9. | Ash content | wt% | | 0.10 | D482 |

Note:

1. Analyze Vanadium content and Aluminum plus Silicon content when customer required.
2. Vanadium content analysis by standard test method ISO14597/ASTM D5708/IP288.
3. Aluminum plus Silicon content analysis by standard test method ASTM D5184.

台塑石化股份有限公司

產品規範



產品名稱：船用燃油-RMG35

發行日期：2005/10/18

Marine Fuel Oil-RMG35

版別：5.1 頁次：1/1

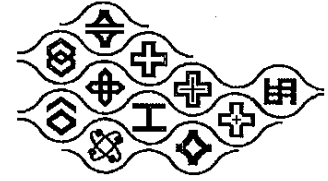
- 一、 產品編號 (Product NO.): RMG-35
- 二、 主要用途 (Usage): 用於海運輸船大型柴油主機之燃料
- 三、 品質 (Quality):

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|-----|---|-----------------------------|-------|------|-------------------------|-------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 1. | 密度 (Density, 15°C) | kg/m ³ | | 991 | D1298 D4052 | 12017 14474 |
| 2. | 閃點 (Flash point) | °C | 60 | | D93 | 3574 |
| 3. | 動力黏度 (Kinematic viscosity, 100°C) | mm ² /s (cSt) | 如試驗記錄 | | D445 | 3390 |
| 4. | 動力黏度 (Kinematic viscosity, 50°C) | mm ² /s (cSt) | | 380 | D445 | 3390 |
| 5. | 硫含量 (Sulfur content) | wt% | | 4.5 | D1552 D2622 D4294 | 14471 13877 14472 |
| 6. | 流動點 (Pour point) | °C | | 30 | D97 D5949 D5950 | 3484 14506 14667 |
| 7. | 含水量 (Water content) | vol% | | 1.0 | D95 | 3517 |
| 8. | 殘碳量 (微量法) (Carbon residue, Micro method) | wt% | | 18 | D4530 | 3383 |
| 9. | 灰份 (Ash content) | wt% | | 0.15 | D482 | 3576 |

註：

1. 視客戶需求分析鈰含量以及鋁+矽含量，分析方法：
 - 鈰含量：ISO14597、ASTM D5708、IP288、CNS 13874
 - 鋁+矽含量：ASTM D5184、CNS13875

PRODUCT SPECIFICATION



Product Name : Marine Fuel Oil-RMG35

Issue Date: Oct.18,2005

Version:5.1 Page:1/1

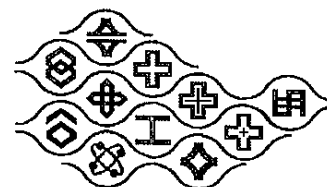
1. Product NO. : RMG35
2. Usage : Applicable to ocean shipping large diesel engine
3. Quality :

| No. | Items | Unit | Limitation | | Test Method |
|-----|-------------------------------|-----------------------------|------------|------|-------------------------|
| | | | Min. | Max. | ASTM |
| 1. | Density , 15°C | kg/m ³ | | 991 | D1298 D4052 |
| 2. | Flash point | °C | 60 | | D93 |
| 3. | Kinematic viscosity , 100°C | mm ² /s (cSt) | Report | | D445 |
| 4. | Kinematic viscosity , 50°C | mm ² /s (cSt) | | 380 | D445 |
| 5. | Sulfur content | wt% | | 4.5 | D1552 D2622 D4294 |
| 6. | Pour point | °C | | 30 | D97 D5949 D5950 |
| 7. | Water content | vol% | | 1.0 | D95 |
| 8. | Carbon residue , Micro method | wt% | | 18 | D4530 |
| 9. | Ash content | wt% | | 0.15 | D482 |

Note:

1. Analyze Vanadium content and Aluminum plus Silicon content when customer required.
2. Vanadium content analysis value is 350 mg/kg max. ,standard test method ISO14597/ASTM D5708/IP288.
3. Aluminum plus Silicon content analysis value is 80 mg/kg max. ,standard test method ASTM D5184.

PRODUCT SPECIFICATION



Product Name : Aviation Jet Fuel for JET A-1

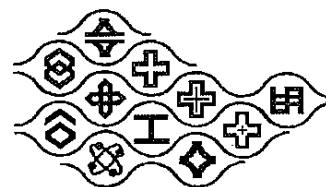
Issue Date: : Jun 16 ,2011.

Version : 5.6 Page : 1/3

1. Product NO. : JF-EXKSW
2. Usage : Applicable to aviation turbine engine
3. Quality :

| No. | Items | Unit | Limitation | | Test Method |
|----------------------|---|-------------------|---|-------|-------------------------|
| | | | Min. | Max. | ASTM |
| 1 | Appearance | | Clear, bright, free from suspended and sediment at room temperature | | D4176 |
| 2 | Density , 15°C | g/cm ³ | 0.775 | 0.840 | D1298 D4052 |
| 3 | Saybolt color | | Report | | D156 D6045 |
| 4 | Flash point ⁽²⁾ | °C | 38 | | D3828 D56 |
| 5 | Distillation | | | | |
| | Initial boiling point | °C | Report | | D86 D2887 |
| | 10 vol% Recovered | °C | | 205 | |
| | 50 vol% Recovered | °C | Report | | |
| | 90 vol% Recovered | °C | Report | | |
| | End boiling point | °C | | 300 | |
| | Residue | vol.% | | 1.5 | |
| Loss | vol.% | | 1.5 | | |
| 6 | Compositions | | | | |
| | Total acidity | mgKOH/g | | 0.015 | D3242 |
| | Aromatic content | vol.% | | 25 | D1319 |
| | Total sulfur content | wt.% | | 0.30 | D2622 D4294 D5453 |
| | Sulfur mercaptan content or Doctor Test | wt.% | | 0.003 | D3227 |
| | | | Negative ⁽³⁾ | | D4952 |
| | Non Hydroprocessed components | vol.% | Report | | |
| | Hydroprocessed components ⁽⁴⁾ | vol.% | Report | | |
| | Severely hydroprocessed components ⁽⁵⁾ | vol.% | Report | | |
| Synthetic components | vol.% | Report | | | |

PRODUCT SPECIFICATION



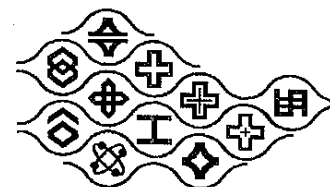
Product Name : Aviation Jet Fuel for JET A-1

Issue Date: : Jun 16 ,2011.

Version : 5.6 Page : 2/3

| No. | Items | Unit | Limitation | | Test Method |
|----------|--|-----------------------------|------------------|------|----------------------------------|
| | | | Min. | Max. | ASTM |
| 7 | Fluidity | | | | |
| | Freezing point | °C | | -47 | D2386 D5972 D7153 D7154 |
| | Viscosity , -20°C | mm ² /s (cSt) | | 8.0 | D445 |
| 8. | Combustion | | | | |
| | Net heat of combustion | MJ/kg | 42.8 | | D3338 D4809 |
| | Smoke point | mm | 25 | | D1322 |
| | or Smoke point and Naphthalene content | mm vol.% | 19 | 3.0 | D1322 D1840 |
| 9. | Copper corrosion , 100°C , 2hr | | NO.1 | | D130 |
| 10. | Stability | | | | |
| | Filter pressure drop , JFTOT , 260°C , 2.5hr | mmHg | | 25 | D3241 |
| | Tube deposit rating | | Less than Code 3 | | visual |
| 11. | Contaminants | | | | |
| | Existent gum | mg/100ml | | 7 | D381 |
| | Particulate content | mg/L | | 1.0 | D5452 |
| 12. | Microseparometer , MSEP | | | | |
| | Without Stadis® 450 With Stadis® 450 | | 85 70 | | D3948 |
| 13. | Conductivity ⁽⁶⁾ | pS/m | 50 | 600 | D2624 |
| 14 | Lubricity , BOCLE , WSD ⁽⁷⁾ | mm | | 0.85 | D5001 |
| 15 | Particulate, at point of manufacture, cumulative channel particle counts | | | | |
| | ≥ 4 μ m(c) | counts/mL | Report | | IP564 IP565 |
| | ≥ 6 μ m(c) | counts/mL | Report | | |
| | ≥ 14 μ m(c) | counts/mL | Report | | |
| | ≥ 21 μ m(c) | counts/mL | Report | | |
| | ≥ 25 μ m(c) | counts/mL | Report | | |
| | ≥ 30 μ m(c) | counts/mL | Report | | |
| ISO Code | | Report | | | |

PRODUCT SPECIFICATION



Product Name : Aviation Jet Fuel for JET A-1

Issue Date: : Jun 16 ,2011.

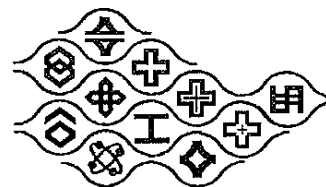
Version : 5.6 Page : 3/3

Note :

1. The quality of aviation fuel meets Aviation Fuel Quality Requirements For Jointly Operated system, AFQRJOS, Issue 25, 2011, ASTM D1655-10, DEF STAN 91-91/7.
2. Subject to a minimum of 40°C, results obtained by method ASTM-D56(Tag) may be accepted.
3. The Doctor Test is an alternative requirement to the sulfur mercaptan content. In the event of conflict between the sulfur mercaptan content and Doctor Test results, the sulfur mercaptan content result shall prevail.
4. The requirement to report the volume % of hydroprocessed components in DEF STAN 91-91/7.
 - 4.1 Blending with hydroprocessed fuel and Synthetic fuel, the addition of antioxidant is mandatory, the lowest dosage is 17mg/L, the highest dosage is 24mg/L.
 - 4.2 Blending with hydroprocessed fuel and Synthetic fuel, the addition of antioxidant is optional, the highest dosage is 24mg/L.
- Approved antioxidant additive are listed in Annex A.2 of DEF STAN 91-91/7.
5. Severely hydroprocessed components are defined as petroleum derived hydrocarbons that have been subjected to hydrogen partial pressure of greater than 7000kPa.
6. Static dissipator additive (Stadis®450) : Concentration of Stadis®450 on maximum doping at the point of manufacture or is limited to 3.0mg/L. Cumulative concentration allowed when re-doping fuel is 5.0mg/L.
7. This requirement comes from DEF STAN 91-91/7. The requirement to determine lubricity applies only to fuels containing more than 95% hydroprocessed material and where at least 20% is severely hydroprocessed and for all fuels containing synthetic components. The limit applies only at the point of manufacture.
8. Approved corrosion inhibitor and lubricity improver additive are listed in Annex A.5 of DEF STAN 91-91/7.
9. Metal Deactivator(N,N-disalicylidene-1,2-propane diamine) : Concentration of N,N-disalicylidene 1,2-propane diamine on maximum doping at the point of manufacture or is limited to 2.0mg/L. Cumulative concentration allowed when re-doping fuel is 5.7mg/L.

Formosa PetroChemical Corporation

PRODUCT SPECIFICATION

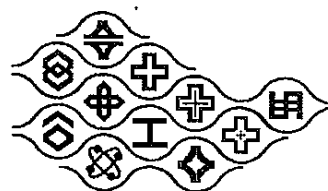


Product Name : Aviation Jet Fuel for JET A-1

Issue Date: : Jun 16 ,2011.

Version : 5.6 Page : 4/3

10. Other product properties : Fatty Acid Methyl Ester test items for reference test , analyze will according to custom's request, the highest content is 5mg/kg.



產品名稱：航空燃油

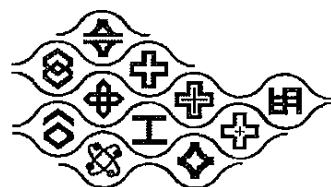
Aviation Jet Fuel for JET A-1

發行日期：2011/06/16

版別：5.6 頁次：1/5

- 一、 產品編號 (Product NO.)：JF-EXKSW
- 二、 主要用途 (Usage)：用於航空燃油 (噴射機燃油)
- 三、 品質 (Quality)：

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|--------------|-------------------------------------|-------------------|-------------------|-------|----------------|----------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 1 | 外觀 (Appearance) | | 室溫下為澄清透明，無懸浮物及沉澱物 | | D4176 | |
| 2 | 密度 (Density, 15°C) | g/cm ³ | 0.775 | 0.840 | D1298 D4052 | 12017 14474 |
| 3 | 賽氏色度 (Saybolt colo) | | 如試驗紀錄 | | D156 D6045 | 1220 |
| 4 | 閃點 ⁽²⁾ (Flash point) | °C | 38 | | D3828 D56 | 14473 13429 |
| 5 | 蒸餾性質 (Distillation) | | | | | |
| | 初沸點 (Initial boiling point) | °C | 如試驗紀錄 | | D86 D2887 | 1218 |
| | 10 vol% 餾出溫度 (10 vol% Recovered) | °C | | 205 | | |
| | 50 vol% 餾出溫度 (50 vol% Recovered) | °C | 如試驗紀錄 | | | |
| | 90 vol% 餾出溫度 (90 vol% Recovered) | °C | 如試驗紀錄 | | | |
| | 終沸點 (Final boiling point) | °C | | 300 | | |
| | 殘餘量 (Residue) | vol% | | 1.5 | | |
| 損失 (Loss) | vol% | | 1.5 | | | |



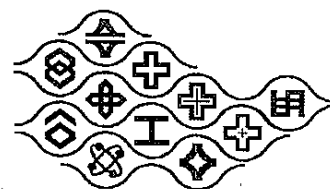
產品名稱：航空燃油

發行日期：2011/06/16

Aviation Jet Fuel for JET A-1

版別：5.6 頁次：2/5

| No. | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|---|---|-----------------------------|-------|---------------------|----------------------------------|-------------------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 6 | 組成分析 (Compositions) | | | | | |
| | 總酸價 (Total acidity) | mgKOH/g | | 0.015 | D3242 | 14469 |
| | 芳香烴含量 (Aromatic content) | vol% | | 25 | D1319 | 3577 |
| | 總硫含量 (Total sulfur content) | wt% | | 0.30 | D2622 D4294 D5453 | 13877 14472 14505 |
| | 硫醇含量 (Sulfur mercaptan content) | wt% | | 0.003 | D3227 | 6191 |
| | 或陶氏試驗 (Doctor test) | | | 陰性反應 ⁽³⁾ | D4952 | 1222 |
| | 未氫化處理成分 ⁽⁴⁾ (Non Hydroprocessed components) | vol% | | 如試驗紀錄 | | |
| | 氫化處理成分 ⁽⁴⁾ (Hydroprocessed components) | vol% | | 如試驗紀錄 | | |
| | 重度氫化處理成分 ⁽⁵⁾ (Severely hydroprocessed components) | vol% | | 如試驗紀錄 | | |
| 合成成分 ⁽⁴⁾ (Synthetic components) | vol% | | 如試驗紀錄 | | | |
| 7 | 流動性 (Fluidity) | | | | | |
| | 凝固點 (Freezing point) | °C | | -47 | D2386 D5972 D7153 D7154 | 13289 14668 |
| | 黏度 (viscosity, -20°C) | mm ² /s (cSt) | | 8.0 | D445 | 3390 |



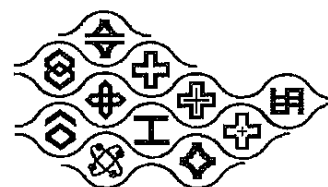
產品名稱：航空燃油

發行日期：2011/06/16

Aviation Jet Fuel for JET A-1

版別：5.6 頁次：3/5

| No | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|----|---|------------|-----------|-----|----------------|----------------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 8 | 燃燒特性 (Combustion) | | | | | |
| | 淨發熱量 (Net heat of combustion) | MJ/kg | 42.8 | | D3338 D4809 | 14475 6359 |
| | 發煙點 (Smoke point) | mm | 25 | | D1322 | 14243 |
| | 或發煙點和 萘含量 (Naphthalene content) | mm vol% | 19 | 3.0 | D1322 D1840 | 14243 14247 |
| 9 | 銅片腐蝕性 (Copper corrosion, 100°C, 2hr) | | NO.1 | | D130 | 1219 |
| 10 | 熱安定性 (Stability) | | | | | |
| | 壓降變化 (Filter pressure drop, JFTOT, 260°C, 2.5hr) | mmHg | | 25 | D3241 | 12617 |
| | 金屬管柱沉積色度 (Tube deposit rating) | | 小於 Code 3 | | 目視 | |
| 11 | 污染物 (Contaminants) | | | | | |
| | 存在膠 (Existent gum) | mg/100ml | | 7 | D381 | 3382 |
| | 微粒子含量 (Particulate content) | mg/L | | 1.0 | D5452 | |
| 12 | 水分離指數 (Microseparometer, rating MSEP) | | | | | |
| | 未加靜電逸散劑 (Without Stadis® 450) | | 85 | | D3948 | 14746 |
| | 加入靜電逸散劑 (With Stadis® 450) | | 70 | | | |



產品規範

產品名稱：航空燃油

發行日期：2011/06/16

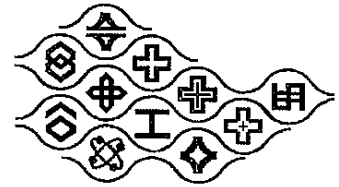
Aviation Jet Fuel for JET A-1

版別：5.6 頁次：4/5

| No | 試驗項目 | 單位 | 管制值 | | 試驗方法 | |
|----|---|-----------|--------|------|----------------|-------|
| | | | 最小值 | 最大值 | ASTM | CNS |
| 13 | 導電度 ⁽⁶⁾ (Electrical conductivity) | pS/m | 50 | 600 | D2624 | 12616 |
| 14 | 潤滑度 ⁽⁷⁾ (Lubricity, BOCLE, WSD) | mm | | 0.85 | D5001 | 14670 |
| 15 | 生產廠,儲運系統微粒子含量 | | | | | |
| | ≥ 4 μm(c) | counts/mL | Report | | IP564 IP565 | |
| | ≥ 6 μm(c) | counts/mL | Report | | IP564 IP565 | |
| | ≥ 14 μm(c) | counts/mL | Report | | IP564 IP565 | |
| | ≥ 21 μm(c) | counts/mL | Report | | IP564 IP565 | |
| | ≥ 25 μm(c) | counts/mL | Report | | IP564 IP565 | |
| | ≥ 30 μm(c) | counts/mL | Report | | IP564 IP565 | |
| | ISO Code | | Report | | IP564 IP565 | |

註：

1. 本航空燃油品質符合國際航空燃油品質聯合作業規範(Aviation Fuel Quality Requirements For Jointly Operated System, AFQRJOS, Issue 25, 2011)、美國材料測試協會 ASTM D1655-10 及英國 DEF STAN 91-91/7 等規範。
2. 若使用 ASTM-D56(Tag)分析方法時，其管制值最小值為 40°C。
3. 陶氏試驗為另一個判定硫醇的方法，以反應與否判定：陰性 (Negative) 表示不反應；陽性 (Positive) 表示有反應。



產品名稱：航空燃油

Aviation Jet Fuel for JET A-1

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4. 紀錄該批次航空燃油摻配時所添加氫化處理之摻配源體積比例，依據 DEF STAN 91-91/7 規範要求，該數據作為判定是否需添加抗氧化劑 (Antioxidant)：
 - 4.1 有摻配氫化處理油&合成油 (Synthetic fuels)，抗氧化劑屬強制性 (Mandatory) 添加，最低有效劑量 17mg/L、最高有效劑量 24mg/L。
 - 4.2 無摻配氫化處理油&合成油 (Synthetic fuels)，抗氧化劑屬選擇性 (Optional) 添加，最高有效劑量 24mg/L。抗氧化劑請參照 DEF STAN 91-91/7 Annex A.2 所認定核許之添加劑。
5. 重度氫化係指氫化製程工場之氫氣壓力高於 7000kPa。
6. 靜電逸散劑：其劑量依 ASTM 規定煉油廠添加至多 3mg/L，其總累積劑量不得超過 5mg/L。
7. 依據 DEF STAN 91-91/7 規範，當航空燃油摻配 95vol% 以上的氫化處理油且其中至少摻配 20vol% 以上的重度氫化處理油或燃油中含有合成油時，需測試航空燃油潤滑度。
8. 腐蝕抑制劑/潤滑促進劑，請參照 DEF STAN 91-91/7 Annex A.5 所認定核許之添加劑。
9. 金屬鈍化劑：其劑量依 ASTM 規定煉油廠添加至多 2mg/L，其總累積劑量不得超過 5.7mg/L。
10. 其他產品性質：脂肪酸甲酯含量試驗項目為參考試驗，依客戶要求再行分析，最高含量 5 mg/kg。