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|------------------|------------------------|-----------------------------------|--------------------|--------------------|
| <b>Product</b>   | 41812~000~             | MARINE GAS OIL (MGO)              |                    |                    |
| <b>Extension</b> | 12 - 03/29/2017 09:45: |                                   | <b>Origin</b>      |                    |
| <b>Catalogue</b> | 0 - 03/27/2017 14:43:3 | Generated on: 03/30/2017 15:52:43 | <b>Valid since</b> | 03/27/2017 14:43:2 |
|                  |                        |                                   | <b>Valid until</b> |                    |

| <b>Product extension data</b> |   | 41812~000~          |                     |  |
|-------------------------------|---|---------------------|---------------------|--|
| <b>Product</b>                | MARINE GAS OIL (MGO)  | <b>Origin</b>       |                     |  |
| <b>Name</b>                   |   | <b>Product type</b> | HYDROCARBON         |  |
| <b>Revision</b>               | 12 - 03/29/2017 09:45:42  | <b>Page Book</b>    | 52/041/104          |  |
| <b>Valid since</b>            | 03/27/2017 14:43:29   | <b>Mod. user</b>    | Macarena Cadiz      |  |
| <b>Valid until</b>            |   | <b>Mod. date</b>    | 03/29/2017 09:45:42 |  |
| <b>Quality level</b>          | Specification according to European Directive 2016/802/UE and Royal Decree 290/2015.<br>It complies with ISO 8217:2017. ISO-F-DMA grade. In case the certified viscosity at 40°C is greater than 3.000cSt, it also complies with ISO-F-DMZ grade of said standard.<br>It includes national agreements between the involved sectors. |                     |                     |  |

| <b>Specification catalogue data</b> |  | 41812~000~       |                     |  |
|-------------------------------------|--|------------------|---------------------|--|
| <b>Status</b>                       | Publicado - Macarena Cadiz - 03/30/2017 15:19:57 |                  |                     |  |
| <b>Revision</b>                     | 0 - 03/27/2017 14:43:30                          |                  |                     |  |
| <b>Valid since</b>                  | 03/30/2017 15:19:47                              | <b>Mod. user</b> | Macarena Cadiz      |  |
| <b>Valid until</b>                  |  | <b>Mod. date</b> | 03/30/2017 15:19:57 |  |
| <b>Reference</b>                    | GAS OILS BUNKER                                  |                  |                     |  |
| <b>Market</b>                       | Iberian Peninsula National Use                   |                  |                     |  |
| <b>Notes</b>                        |  |                  |                     |  |

| <b>Catalogue specification data</b> |         | 41812~000~  |             |            |            |            |   |      |
|-------------------------------------|---------|---|-------------|------------|------------|------------|---|------|
| C                                   | Test    | Property  | Standard    | Min. limit | Max. limit | Std. limit | P | N    |
|                                     | A044503 | V15 Viscosidad 40°C [mm <sup>2</sup> /s]  | ASTM D 445  | 2.000      | 6.000      |            | C | [0]  |
|                                     | A405207 | R05 Densidad 15°C [kg/l]  | ASTM D 4052 |            | 0.8900     |            | C |      |
|                                     | A473700 | 189 Indice de Cetano  | ASTM D 4737 | 40         |            |            | C |      |
|                                     | A429400 | 061 Sulphur [% (m/m)]   | ASTM D 4294 |            | 0.10       |            | C | [1]  |
|                                     | A009300 | 195 Inflamabilidad P/M [°C]   | ASTM D 93   | 60.0       |            |            | C | [2]  |
|                                     | P057000 | Z89 Sulfuro de Hidrogeno [mg/kg]  | IP 570      |            | 2.00       |            | C | [3]  |
|                                     | A066401 | 237 Numer. de Acido [mg KOH/g]  | ASTM D 664  |            | 0.5        |            | C | [4]  |
|                                     | A227400 | 021 Estabilidad Ox. 16h [g/m <sup>3</sup> ]   | ASTM D 2274 |            | 25         |            | C |      |
|                                     | A453001 | 068 Res.Car.Micro (10%R) [% (m/m)]  | ASTM D 4530 |            | 0.30       |            | C |      |
| C                                   | E230150 | 296 Punto de Nube [°C]  | EN 23015    |            | REPORT     |            | C |      |
| C                                   | P011600 | 254 P.O.F.F. [°C]   | EN 116      |            | REPORT     |            | C |      |
| C                                   | A595000 | 118 Upper Pour Point [°C]   | ASTM D 5950 |            | -6         |            | C | [5]  |
|                                     | V006800 | Z26 Aspect  | VISUAL      |            | C & B      |            | C | [6]  |
|                                     | A048200 | 085 Ashes [% (m/m)]   | ASTM D 482  |            | 0.010      |            | C |      |
|                                     | V021201 | 531 Lubric(wsd 1,4) 60°C [micras]   | ISO-12156-1 |            | 520        |            | C | [7]  |
|                                     | A013003 | C03 Corr.Cu (3h 100°C)  | ASTM D 130  |            | 1          |            | C | [8]  |
|                                     | A150000 | 110 Color ASTM  | ASTM D 1500 | Red        |            |            | C |      |
|                                     | V000403 | Additives   |             |            |            |            |   |      |
|                                     |         | 420 Trazador  |             |            |            |            | C | [9]  |
|                                     |         | 422 Colorante   |             |            |            |            | C | [10] |
|                                     | A038104 | ZA1 Notas. general  | -           |            |            |            | C | [11] |
|                                     | A038105 | ZA2 Met.Lab.Alternativos  | -           |            |            |            | C | [12] |
| <b>(*) Notes</b>                    |         | <p>[0] If the minimum viscosity at 40°C is greater than 3,000mm<sup>2</sup>/s, the distillate also complies with the DMZ Grade.</p> <p>[1] Depending on the geographical market of this product and the date this specification comes into force, the most restrictive of the regulations susceptible of being applied has been taken into account (shown with an *):</p> <ul style="list-style-type: none"> <li>- ISO 8217:2017</li> <li>- Revised Annex VI of MARPOL*</li> <li>- Directive 2016/802/UE*</li> <li>- Royal Decree 290/2015*</li> </ul> <p>National and regional bodies may impose their own emission requirements. Evolution of sulphur content specifications:</p> <ul style="list-style-type: none"> <li>- Use in ECAs: 0,10%</li> <li>- Use outside of ECAs: currently 3,50%; 0,50% in 2020.</li> </ul> <p>[2] Please refer to section 6.4 of ISO 8217:2017 for more information. A FP &gt; 62.5°C is recommended in the</p> |             |            |            |            |   |      |

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manufacturing process to avoid getting values below 60°C in subsequent analysis, due to the tolerance of the method.  
 [3] Given the toxicity of hydrogen sulphide, it is essential that ship-owners, operators and other involved parties keep the appropriate safety standards to protect the crew and personnel that might be exposed to said substance. Refer to Annex D of ISO 8217:2017 for more information.

[4] Should the gasoil come from the distillation of naphthenic crudes, values above the established limit might be accepted at the discretion of the buyer and the supplier. The fuel shall be free of inorganic acids.

[5] Issues with low temperature operability (i.e. deposition of solidified wax in fuel tanks, fuel lines, centrifuges and filters) can occur with distillate fuels. Pour point cannot guarantee operability for all ships in all climates. The purchaser should confirm that the cold flow characteristics (pour point, cloud point, cold filter plugging point) are suitable for the ship's design and intended voyage. Refer to CIMAC guideline 'Flow properties of marine fuels (01/2015)' for more information.

[6] The appearance of a sample shall be assessed by visual inspection in good light, free from glare and shadow, at a sample temperature between 20 °C and 25 °C.

If the sample is dyed and not transparent, this affects the compliance with the requirement for clear and bright appearance. In such circumstances, the water content shall not exceed 200 mg/kg (0,020 mass %), as determined by the Coulometric Karl Fischer titration method in accordance with ISO 12937.

[7] It shall be applied when its sulphur content is below 500mg/Kg.

[8] Internal specification; it will not appear on the external Certificate of Analysis. Specification agreed with the Logistic Department.

[9] Fiscal Tracer additive shall be added: CAS 34432-92-3: 5Kg of said tracer per 1000m3 of gas oil with the following formula: N-ethyl-N(2-(1-isobutoxyetoxy)ethyl)-4-phenylazoaniline.

[10] Red Dyer shall be added: it will cause an absorbency greater than 0,40, measured between 525 and 550 nanometres using 10mm light path cuvettes compared to isooctane.

[11] GENERAL NOTES:

Specifications according to ISO 8217:2017. ISO-F-DMA grade. If the minimum viscosity at 40°C is greater than 3,000mm<sup>2</sup>/s, the distillate also complies with the ISO-F-DMZ Grade. National agreements between the sectors involved have been taken into account. The sampling shall comply with ISO 13739 or its National equivalent.

This document specifies the requirements for fuels for use in marine diesel engines and boilers, prior to conventional onboard treatment (settling, centrifuging, filtration) before use. The specifications for fuels in this document can also be applied to fuels used in stationary diesel engines of the same or similar type as those used for marine purposes.

For the purposes of this document, the term "fuels" is currently used to include the following: a) hydrocarbons from petroleum crude oil, oil sands and shale; b) hydrocarbons from synthetic or renewable sources, similar in composition to petroleum distillate fuels; c) blends of the above with FAME component where permitted.

The fuel as supplied shall be homogeneous and conform to the characteristics and limits given in this specification when tested in accordance with the methods specified. The fuel composition shall consist predominantly of hydrocarbons primarily derived from petroleum sources while it may also contain hydrocarbons from the following: a) synthetic or renewable sources such as HVO, GTL, BTL; b) co-processing of renewable feedstock at refineries with petroleum feedstock.

The fuel shall not include FAME other than a "de minimis" level. In the context of this document, "de minimis" means an amount that does not render the fuel unacceptable for use in marine applications that are not designed or suited to handling fuels containing FAME. Fuel producers and suppliers should ensure that a) there is no deliberate blending of FAME into the fuel, and b) adequate controls are in place so that the resultant fuel, as delivered, does not exceed the "de minimis" which is now taken to be a level of approximately 0.5 volume % FAME. Refer to Annex A of ISO 8217:2017 for more information.

The fuel shall be free from any material at a concentration that causes the fuel to be unacceptable for use in accordance with second paragraph (i.e. material not at a concentration that is harmful to personnel, jeopardizes the safety of the ship, or adversely affects the performance of the machinery). It is not considered practical to require detailed chemical analyses beyond those included in this specification. However, it is required that refineries and supply stations, including tank barges and tankers, have a quality management system suitable for guaranteeing that the product complies with the requirements included in Clause 5 of ISO 8217:2017. Refer to Annex B of ISO 8217:2017 for more information.

Subject to the requirements in two previous paragraphs, additives that improve some aspects of the fuel's characteristics or performance are permitted.

In case of disagreement on the precision and interpretation of the results of the relevant tests, ISO 4259 shall be applied. Refer to CIMAC guideline 'The interpretation of marine fuel analysis test results (02/2016)' for more information.

[12] REFERENCE AND/OR ALTERNATIVE TEST METHODS:

The reference lab method, when available, shall be designated "(R)".

Viscosity at 40°C  
 ISO 3104 (R)



## PRODUCT SPECIFICATION CATALOGUE

|                  |                        |                                   |                    |                    |
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**Density at 15°C**

ISO 3675

ISO 12185

In case of disagreement concerning density, all parties shall agree, prior to additional testing, upon the test method to be used.

**Cetane Index**

ISO 4264

**Sulphur**

ISO 8754 (R)

ISO 14596

**Flash Point**

ISO 2719 Procedure A (R)

**Hydrogen Sulphide**

IP570 Procedure A (R)

IP570 Procedure B

**Oxidation Stability**

ISO 12205 (R)

**Micro Carbon Residue**

ISO 10370 (R)

**Cloud Point**

ISO 3015 (R)

**CFPP**

IP 309

IP 612

**Upper Pour Point**

ISO 3016 (R)

**Ash**

ISO 6245 (R)

C - Control Specification.

C - P. Continuous. W - P. Winter. T - P. Transition. S - P. Summe

\*\*\*\* End of Report \*\*\*\*

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