

On board spot sampling & Analysis of MARPOL samples

Enforcement provisions of Sulphur Directive

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- Introduction
- On-board spot sampling
- Analysis of sealed bunker samples
- Final remarks

Decision to undertake sampling

- **Should the observations confirm the ship meets the Directive requirements then the inspection should end**
- **Proof may be needed in order to substantiate any non-compliances found**
- **Cases of on board mixing of marine fuels (HFO/IFOs) from different bunker suppliers**
- **Cases of potential on board contamination of the MGO**
- **Random sampling to comply with any established national sampling frequency**



Sulphur Inspection – MSs Obligations (IA)



- **MSs shall inspect ships' log books and bunker delivery notes in at least 10 % of individual ships calling per year** (Art. 3.2)

From 1/01/2016, also sampling or analysis or both to be conducted on:

- *40 % of inspected ships in MSs fully bordering the SECAs*
- *30 % of inspected ships in MSs partly bordering SECAs*
- *20 % of inspected ships in MSs not bordering SECAs*
- **MSs shall apply a staged approach to sampling and compliance verification** (Art. 5)
 - (a) inspection of ships' log books and bunker delivery notes
 - (b) as appropriate, one **or both** of the following means of sampling and analysis:
 - (i) analysis of the sealed bunker samples on-board ships accompanying the BDN,
 - (ii) on-board spot sampling of marine fuels for on-board combustion followed by analysis

Sampling

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graph TD
    Start([Sampling decision already made]) --> D1{Need to substantiate non-compliances}
    D1 -- No --> D2{On board fuel mixing or possible contamination}
    D1 -- Yes --> D3{Separated fuels?}
    D2 -- No --> D4{National sampling frequency}
    D2 -- Yes --> B1([SECA/port fuel])
    D3 -- No --> B2([SECA/port fuel])
    D3 -- Yes --> B3([Non SECA/port fuel])
    D3 -- Yes --> B4([SECA/port fuel])
    D4 --> D5{Bunkering taking place?}
    D5 -- Yes --> B5([Analysis of fuel while being delivered to the ship])
    D5 -- No --> B6([Analysis of fuel in sealed bunker samples])
    B1 --> B7([On-board spot sampling from fuel oil service system and analysis])
    B2 --> B8([Analysis of fuel in sealed bunker samples])
    B3 --> B9([Analysis of fuel in sealed bunker samples])
    B4 --> B10([Analysis of fuel in sealed bunker samples])
    B5 --> P1[/Sample drawn from the Primary sample/]
    B6 --> P2[/On board retained samples/]
    B7 --> P3[/Sample position/]
    B8 --> P3
    B9 --> P3
    B10 --> P3
    P1 --> C1[Verify tamper proof seal is applied]
    C1 --> C2[Verify label form is applied]
    C2 -- Yes --> L1[ISO 17025 accredited laboratory]
    P2 --> D6{Seal tampered?}
    D6 -- Yes (Non compliance) --> L1
    D6 -- No --> D7{Label in good order?}
    D7 -- No (Non compliance) --> L1
    D7 -- Yes --> R1[/Official Receipt/]
    P3 --> C3[Verify presence of means of flow rate control]
    C3 --> P4[/Primary sample/]
    P3 --> C4[Check]
    C4 --> D8[- Piping diagrams  
- Fuel oil system drawings]
    C4 -- Consult --> C5[/Chief Engineer/]
    P4 --> C6[Consider]
    C6 --> D9[- Safety requirements/]
    P4 --> P5[/Sample drawn from the Primary sample/]
    P5 --> C7[Apply tamper proof seal]
    C7 --> C8[Apply label form]
    C8 --> L2[Sample Label:  
- Date and Port  
- Ship's name/IMO number  
- Seal identification  
- Ship's representative's signatures]
    C8 --> L1
    R1 --> L1
    C8 --> L3[Fuel verification procedure (Appendix VI of MARPOL Annex VI)]
    L3 --> L1
  
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The flowchart details the Fuel Verification Procedure (Appendix VI of MARPOL Annex VI). It begins with a decision on whether a sampling decision has already been made. If not, it checks for the need to substantiate non-compliances. Depending on this, it branches into different sampling methods: National sampling frequency, On-board fuel mixing or possible contamination, or Separated fuels. Each method leads to specific sampling and analysis steps, such as 'Analysis of fuel while being delivered to the ship' or 'On-board spot sampling from fuel oil service system and analysis'. The process then moves to sample handling, including drawing samples, verifying seals, and applying labels. A 'Sample Label' box specifies required information: Date and Port, Ship's name/IMO number, Seal identification, and Ship's representative's signatures. The final step is sending the sample to an ISO 17025 accredited laboratory for analysis, with a reference to the Fuel verification procedure (Appendix VI of MARPOL Annex VI).



On-board spot sampling

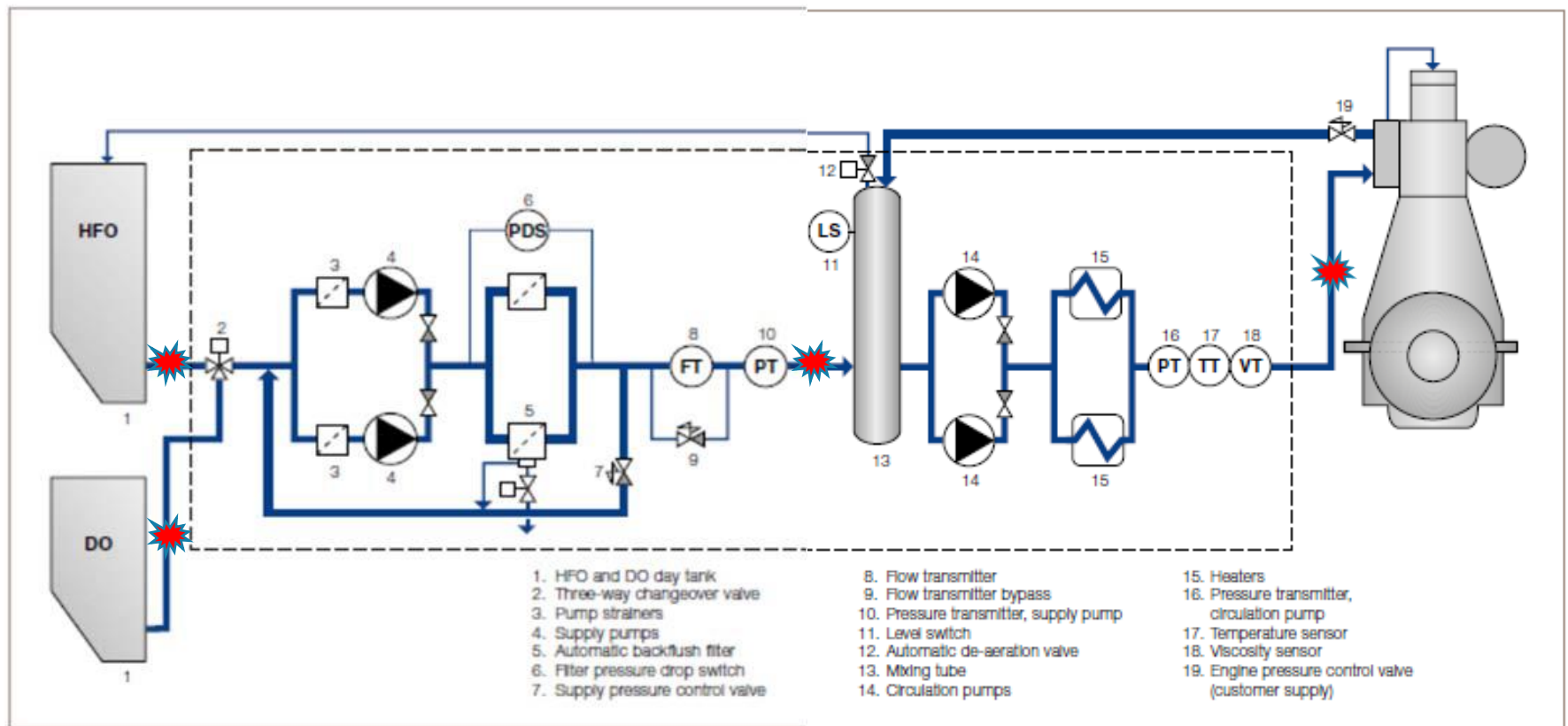
Commission Decision Art. 6



- 1. Sampling point at a location where a valve is fitted for this purpose and approved by Flag/RO.**
- 2. A spot sample at more than one location in the fuel service system may be taken.**
- 3. Alternatively, the fuel sampling point shall be the location where a valve is fitted for this purpose and:**
 - be easily and safely accessible,**
 - take into account different fuel grades being used for the fuel-oil combustion machinery item,**
 - be downstream of the fuel in use from the service tank,**
 - be as close to the fuel inlet of the fuel-oil combustion machinery item as feasible and safely possible taking into account the type of fuels, flow-rate, temperature, and pressure behind the selected sampling point,**
 - be proposed by the ship's representative and accepted by the sulphur inspector.**



Fuel Sampling Point



 Sampling point as close as possible to the fuel user

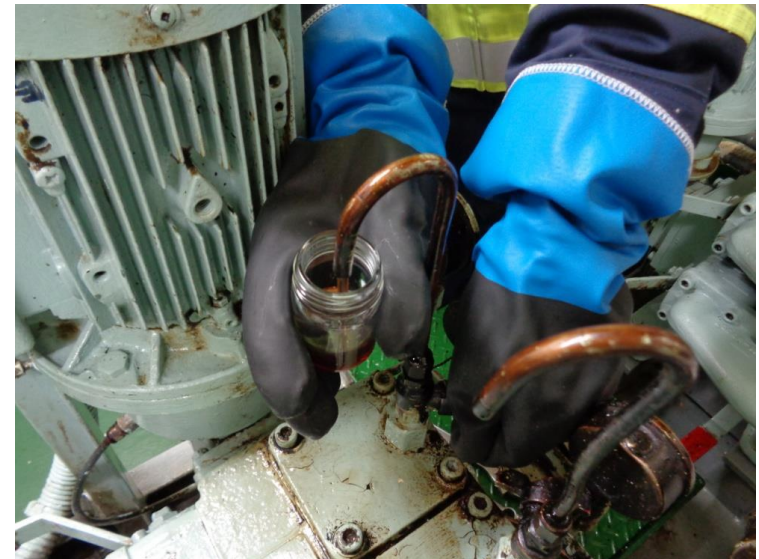
Fuel Sampling Point

Chief engineer may propose sampling point after following remarks:

- Fuel circulating between service tank and engine(s)
- Sample point as close as possible to engine concerned
- Proper flushing of the sampling point to the satisfaction of the chief engineer/inspector
- No long, dead-end pipes (e.g. pressure indicator lines)
- No drains from service- or settling tanks

Possible direct checks concerning sample:

- Visual check of fuel coming from sample point (colour, viscosity)
- Valve settings to be explained by chief engineer
- Check fuel piping
- Viscosity check, low viscosity means thin (gas)oil
- Check temperature of lines
- Fuel circulation pumps may be switched off when in port on MGO
- MGO not per definition low sulphur



Personal protective equipment



- Ear protection
- Protective clothing
- Safety goggles
- Heat + chemical resistant gloves:
EN388, EN374, N407, EN511
- Gas detecting device:
O₂, H₂S, CO



On board testing - Hand held devices

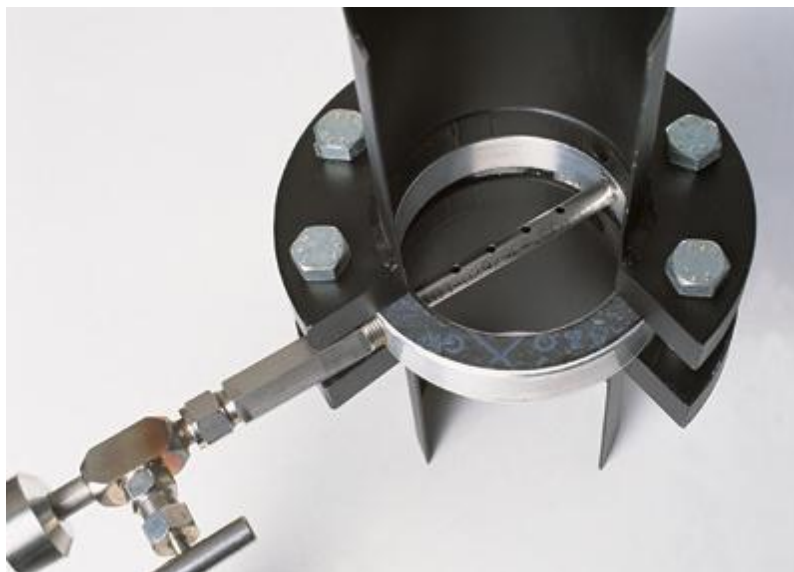




Analysis of sealed bunker samples

Sealed bunker samples

- A representative sample of not less than 400 ml is to be retained as a MARPOL Sample (MARPOL Annex VI, Regulation 18.8.1) required for verifying the sulphur content of the fuel/compliance with MARPOL Annex VI. To be retained until the fuel is substantially consumed, but for not less than 12 months from the time of delivery
- The sample shall be sealed (tamper proof security seal with a unique identity number) and signed by the supplier's representative, and the receiver's representative. (MARPOL Annex VI Regulation 18.8.1)



Sample sealing and labelling



- The sample shall be **sealed with a tamper proof security seal with a unique means of identification** (identity number)
- Sample labels should contain the following:
 - **Name and IMO Number of receiving vessel**
 - Port of location of bunkering operation
 - Date and time of commencement of delivery
 - Name of bunker supplier (bunker tanker / bunker installation)
 - Location at which, and the method by which, the samples was drawn
 - Signatures and names of the supplier's representative and the ship's representative
 - **Details of seal identification number**
 - **Bunker grade**
- The MARPOL sample seal number **may also be recorded on the Bunker Delivery Note**, other seal numbers may also be recorded, or a separate record kept



Sample sealing and labelling

3 Fuel Types (MGO LSMGO HSFO)



Bottle Label Details - matching with seal no.

Ship name / IMO number:

Date and port / berth of inspection:

Position in fuel oil system from where the Primary Sample was drawn:

Time when Primary Sample drawn:

Seal numbers of sample bottles filled from same Primary Sample: Inspector _____,
ship _____

Signatures: Inspector and ship's representative

BDN

333 City St, Suite 2400
Houston, TX 77002 USA
(713) 962-5111 Phone
(713) 977-1275 Fax
BOMIN.COM/EN/EN

Bomin Bunker Delivery Receipt

Name of Vessel British Falcon IMO Number 9297869
 Port of Delivery NOLA Cargo/Truck Reference No. S-7
 Flag _____ Destination _____

Grade	IFO	IFO	MDO	GASOL
Product Name (ISO-6217)	<u>Dub380</u>			<u>Dub</u>
Kin. Viscosity at 50 Deg C, cSt	<u>380</u>			<u>3.0</u>
Density at 15 Deg C, kg/m ³	<u>990</u>			<u>850</u>
Sulfur content, % M/M	<u>3.22</u>			<u>1.0015</u>
Net Weight	<u>4770</u>			<u>2338.19</u>
Netic Tons	<u>750.00</u>			<u>460.00</u>
Temperature, Deg F	<u>120°</u>			<u>60°</u>
Flash Point, Deg F	NOT LESS THAN 140 Deg F			

Remarks:
 Date/Time Barge/Truck loaded: _____ Commenced _____ Finished _____
 Date/Time Delivered: _____ Commenced _____ Finished _____
 Bunker and representative sample(s) received by vessel.
 The vessel is ultimately responsible for the data furnished through this document. The Supplier's right to apply and enforce a custody lien will not be
 affected, waived or impaired by the application of any disclaimer herein.
 Supplier declares that products delivered under this receipt are in conformity with the quality of the MAFPOL 2378 regulations (ISO 9001 and 14001).
FOR THE VESSEL TO USE A FEDERAL EXCISE TAX EXEMPTION CERTIFICATE
 The purchaser hereby certifies that this receipt is intended for the transportation of petroleum or petroleum products for consumption
 or use in commerce of foreign countries. For this purpose, the receipt number on the Federal Excise Tax is delivered in our chain
 of the United States. All tax received will be paid by the vessel in connection with its business or operating in a private or com-
 mercial market.
GAS OIL
 I hereby declare that this receipt is not intended for use as a receipt for taxation.
☒ For use as a receipt for taxation
 Master/Chief Engineer James A. Bernard For Barge/Truck

Sample Distributor/Seal numbers	Vessel	Supplier	Vessel MAFPOL	Supplier MAFPOL
Grade: <u>Dub 380</u>	<u>50095570</u>	<u>50095560</u>	<u>50095588</u>	<u>500955672</u>
Grade: <u>Dub 380</u>	<u>50095514</u>	<u>50095512</u>	<u>50095297</u>	<u>50095594</u>
Grade:				

Master's/Chief Engineer's signed written request:
 The undersigned hereby requests that the following grade and quantity be delivered to:
☒ For use as a receipt for taxation
☐ 12-JAN-2017
 Name of vessel: BRITISH FALCON Date: _____

Grade	IFO	IFO	MDO	GASOL
Kin. Viscosity at 50 Deg C, cSt				
Netic Tons				
Required pumping rate, MT/hour				
Order of discharge				

The vessel is responsible for all loss, damage and destruction. Barge will be held in custody until only if vessel is unable to deliver delivery of the
 full quantity ordered, at receipt in connection with returning the oil to the transporter what be for buyer's account. The vessel is not responsible for
 loading.
Warning
 The vessel is not in charge of bunkering operations. The MAFPOL clear value on board without that giving weight, depending on the permission of the vessel
 owner. Any discrepancy from the vessel's net, such as "tare" or "gross" will be carried out immediately to avoid excessive pressure on the
 delivery, which may cause harm to the vessel. After the bunkering operations, every permission must be taken to avoid excessive pressure on the
 delivery of the vessel. The vessel is not responsible for the loss of cargo or property, etc. Any oil spillage will be automatically in the case responsibility of the vessel owner if not
 a ground. Any indication of contamination should be immediately reported to the vessel's authority by the end of the bunkering facility.
 Please _____

Letter of Protest Form

LETTER OF PROTEST - TEMPLATE

LETTER OF PROTEST DRAUGHTED TO PLACE UNDER COPIES TO:

COPIES TO:

- AUTHORITY IN THE PORT WHERE THE BUSINESS WERE SUPPLIED
- FUEL OIL SUPPLIER
- SHIP'S RECORDS
- OTHERS AS REQUIRED (E.G. SHIP'S HEAD OFFICE)

Note: This may be used in cases of apparent non-compliance with any statutory or pollution control requirements.

PORT: _____ DATE: _____

RELEVANT SHIP NAME: _____ IMO NO: _____

FUEL OIL SUPPLIER: _____

SUPPLIED FUEL OIL GRADE: _____

COUNTRY OF ORIGIN/ALLOCATION: _____

SHIP'S IDENTIFICATION NUMBER: _____

RELEVANT SAMPLE IDENTIFICATION NUMBER: _____

TO: _____ (PLAINT STATE)

In respect of the subject described on behalf of my company:

I hereby register the following 'complaint' which is considered as being non-compliant with relevant Annex II Annex III regulations, or at least the relevant Directive, or other national legislation governing the relevant legislation or specify other:

FURTHER DETAILS WILL BE ADVISED AS REQUESTED

Signature and company name: _____

Signature and ship's name: _____

COPIES TO PORT AUTHORITY _____

COPIES TO SUPPLIER _____

COPY FROM SHIP'S RECORDS _____

COPIES TO SHIP'S HEAD OFFICE _____

COPIES TO OTHERS (AS DETAIL) _____

This LOP should be supported with a copy of evidence documentation such as the BDN or other documents that may have been supplied and which provide further support to the complaint or issue.

Inspector Sample Collection Form

Member State competent authority undertaking the inspection:

Inspector name and designation: _____

Ship name / IMO number: _____

Contact details for inspection service to communicate to the shipowner: _____

Date and port / berth of inspection: _____

Inspector drawn sample(s)

Fuel oil sulphur limit under investigation: _____

Port(s), date(s) of supply, supplier(s) of fuel oil in use at time of inspection: _____

ISO 8217 grade of fuel oil in use at time of inspection: _____

Sulphur content of that fuel from Booklet Delivery Note: _____

Position in fuel oil system from where the Primary Sample was drawn: _____

Sample drawn from DSP: Yes - reference _____ No or from temporary sampling point: Yes / No

Time when Primary Sample drawn: _____

Sample bottle labels completed: Yes / No

Sample bottle duly sealed - seal numbers: Inspector _____, ship _____

Copies obtained of Booklet Delivery Notes of all fuel oils on board at the time of sampling: Yes / No

Copy of Sample Collection Form given to, and taken by, ship's representative: Yes / No

Fuel oil sample with seal number _____ given to, and taken by, ship's representative: Yes / No

Were samples drawn from other sampling points onboard during this inspection - if so give sampling position and corresponding seal numbers: _____

MARPOL Samples

Were any MARPOL Sample(s) taken from the ship as part of this inspection - if so give respective sample label details: No / Yes, details: _____

Receipt provided for each MARPOL Sample and receipt number: Yes / No

MARPOL Sample(s) as received seals and labels in good order and consistent- if not give relevant details: Yes / No, details: _____

For each MARPOL Sample a copy of corresponding Booklet Delivery Note obtained: Yes / No

Copies of any Letters of Protest issued obtained: Yes / No

Preliminary checks



- As per the Guidance in Resolution MEPC.182(59):
 - Samples to be stored outside the accommodation
 - A safe sheltered location
 - At a cool / ambient temperature
 - Not subject to elevated temperatures
 - Not exposed to direct sunlight
 - There should be a record keeping system in place to keep track of the vessel's MARPOL samples
- Check the sample over for signs of damage or tampering
- Check the sealing device (seal and cap) for signs of damage/ tampering
- Check sample label data correspond with supporting documentation such as:
 - Copy of BDN (applicable for MARPOL sample)
 - Copy of Letters of Protest (if applicable) – this determines validity of the samples





Laboratories

Laboratory selection

- The Laboratory - ISO 17025 or an equivalent standard of technical accreditation

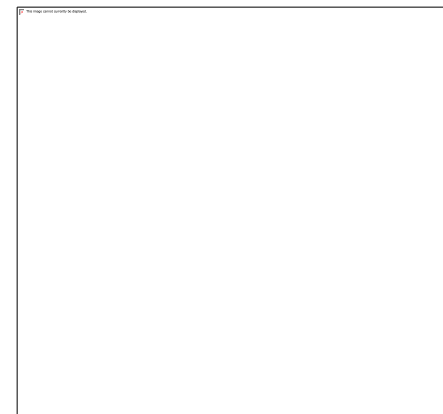
- The purpose for the accreditation is to :

Specify the general requirements for the competence to carry out tests and/or calibrations by testing laboratories.

- The scope of accreditation is above & beyond that of ISO 9001.

It ensures both a quality management system as well auditable technical performance review of testing and calibration by a laboratory.

- Proximity of lab to port - determine turnaround time (test time maximum 1 hour from receipt at laboratory)



Test Method (Article 6.2 Sulphur Directive)

- The reference method for determining the sulphur content shall be ISO method 8754 (2003) or PrEN ISO 14596 (2007).
- In order to determine whether marine fuel delivered to and used on board ships is compliant with the sulphur limits required the fuel verification procedure set out in Appendix VI to Annex VI to MARPOL shall be used.

Fuel Oil Testing Services Limited

Sample information collated from Vessel 's Bunker Data form and sample bottle label.

Fuel Quality Report - SUBMITTED

Sample No. DL170226

Vessel Sample Vessel
Client Sample Vessel Shipping Co. Ltd.
Sub-Client N/A
Act Bunker Date 16/10/2012
Bunker Port CRISTOBAL
Quantity Del. 250.3 M.T.
Grade Ordered RMG380
Bunker Supplier Bunker Supplier Co. Ltd.
Barge Bunker Barge 1
Sample Location SHIP'S BUNKER LINE
Supplier's Specs: Density - @15=989.6

Viscosity - Not Stated
Sulphur - 2.97%

Received at Lab 19/10/2012 at 12:37 Hrs
Courier Ref 9837667932
DHL PAD Used No
Additional Info. 24HR RE-CHECK ANALYSIS PERFORMED
Lintec Sample Seal 659412
Supplier Sample Seal 659441
Vessel Sample Seal 659433
Marpol Sample Seal 196538

TEST	METHOD	UNITS	RESULT	SPEC
DENSITY	ISO 12185	kg/m³@15°	*993.6*	991 MAX
VISCOSITY	ISO 3104	CST@50°C	250.7	380 MAX
VISCOSITY	ISO 3104	CST@100°C	26.8	35 MAX
FLASH POINT	ISO 2719	°C	>70.0	60 MIN
POUR POINT	ISO 3016	°C	<-12	30 MAX
MCRT	ISO 10370	%MASS	14.7	18 MAX
ASH	ISO 6245	%MASS	0.08	0.15 MAX
WATER	ISO 3733	%VOL	0.25	0.5 MAX
SULPHUR	ISO 8754	%MASS	3.28	3.50 MAX
COMPATIBILITY	ASTM 4740	SPOT#	1	2 MAX
VANADIUM	ISO 10478MOD	mg / kg	171	300 MAX
SODIUM	ISO 10478MOD	mg / kg	11	-
ALUMINIUM	ISO 10478	mg / kg	24	-
SILICON	ISO 10478	mg / kg	28	-
AL + SI CALCULATIO	ISO 10478	mg / kg	52	80 MAX
TOTAL SED, POTENTI	ISO 10307-2	g (m/m)	0.02	0.10 MAX
NET CAL VAL	ISO 8217:A	MJ/KG	39.91	-
CCAI	ISO 8217:B	INDEX#	859	-
OPERATIONAL ADVICE				
INJECTION TEMPERAT	@ 10 CST	°C	137	-
INJECTION TEMPERAT	@ 15 CST	°C	121	-
MINIMUM PUMPING TE	@ 1000 CST	°C	28	-
ADDITIONAL METALS				
IRON	ISO 10478MOD	mg / kg	17	-



Laboratory sample process flow



Receipt of Sample

- Check Sample Integrity
- Check Documentation
- Confirm analysis required



Seal Breaking protocol



Sample Preparation



Aliquot (sub sample) preparation



Test Equipment verification

- Analysis process
- Calibration certificate
- Results reporting



Sample resealed



- **Sampling provides evidence of the sulphur content of the actual marine fuel stored and used on board**
- **To decide on the need for sampling (verification of a N/C, possible fuel mixing or contamination, national sampling frequency)**
- **Decide on use of MARPOL sample or spot sampling**
(or both)
- **For reliable results there is a need for a trustworthy selection of the sampling point(s) and collection of a representative sample**
(spot sampling)



Thank you!

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