Subject

Use of low sulphur fuels under the EC Directive 2005/33/EC

ClassNK

Technical Information

No. TEC-0797
Date 28 December 2009

To whom it may concern

As already advised in ClassNK Technical Information No. TEC-0687 dated 14 December 2006, ships at berth in ports within the European Union are required to use marine fuels with the sulphur content not exceeding 0.1% m/m as from 1 January 2010, under the EC directive 2005/33/EC.

Some issues on the use of low sulphur fuels for safe operations of machinery have been pointed out. "Design and Operational Issues for Use of Low Sulphur Fuels in Diesel Engines and Boilers" is attached for your reference.
This ClassNK Technical Information provides items to be considered for establishment of measures against the issues, approval and surveys required, and reporting by ClassNK.

1. Items to be considered
   For use of low sulphur fuels, ship owners and ship management companies are requested to consult the relevant manufacturers whether safe operation of the machinery can be maintained when low sulphur fuels are used for the machinery. In addition, in accordance with the manufacturer's recommendation, the following measures are to be taken:
   (1) Development of fuel changeover procedure
   (2) Development of operation manuals for machinery
   (3) Selection of fuel oils and lubricating oils
   (4) Consideration of necessary modifications

   It is effective to conduct a risk assessment referring to the manufacture's recommendations in order to consider the countermeasures to be taken for safe operations of the machinery and the need for modifications. Also please refer to the attached "Design and Operational Issues for Use of Low Sulphur Fuels in Diesel Engines and Boilers" for identification of the risks.

   For your information, INTERTANKO and OCIMF recommend conducting a risk assessment for use of low sulphur fuels, in "Guidance for Hazard Identification" (Refer to http://www.intertanko.com)

(To be continued)

2. Approval and surveys required

In case where modifications are made as a result of the risk assessment or in accordance with the manufacturer's recommendations, plan approval and the relevant surveys are necessary .

(1) Plan Approval

The following drawings and/or documents concerning the modifications are to be submitted to the Machinery Department prior to the modification works.

(i) For modifications or new installations of fuel tanks, piping and/or pumps
"Piping diagram of fuel oil system" (including particulars of the machinery modified, such as pumps, etc.)

(ii) For modifications of boiler combustion control system
"Boiler combustion control system"

(iii) Other drawings and/or documents related to the modifications

(2) Survey

The following surveys related to the modifications are generally required. Please make an application for Occasional Survey to ClassNK site office.

(i) Confirmation of modified installations
(ii) Hydrostatic test or leak test for fuel oil piping
(iii) Hydrostatic test for fuel oil tanks
(iv) Performance test
(v) Confirmation of certificate for newly installed machinery (e.g. fuel pumps)
(vi) Other surveys required depending on the modifications

3. Documents to be retained onboard

The following documents are to be appropriately developed and retained onboard.

(1) Fuel changeover procedure
(2) Operation manuals for related machinery

4. Reporting by ClassNK

Upon completion of surveys with satisfactory results, it shall be reported in the ship's survey record that modifications for use of low sulphur fuels required by the EC directive 2005/33/EC were made and relevant surveys were carried out satisfactorily. A statement of fact with the same description may be issued, if requested.

In case where it is judged that no modification is necessary for use of low sulphur fuels according to manufacturer's views or as a result of risk assessment, a statement may be issued by ClassNK upon application. For applying the statement, manufacturer's views or results of risk assessment are to be submitted.

Also, please be informed that the European Committee issued a commission recommendation (the attachment 2) about handling method for the case where a ship fails to comply with the requirement before 1 January 2010, but has an evidence of implementation plan of the necessary modification works. In such a case, a modification contract with the manufacturer and approved drawings/documents for the modification by the classification society are necessary as the evidence.

(To be continued)

Incidentally, while use of marine gas oil (hereinafter MGO) with the sulphur content not exceeding 0.1% m/m has been required within “EU territories” from 1 January 2008, as informed in ClassNK Technical Information No. TEC-0709 dated 18 September 2007, this requirement regarding MGO is deleted on 1 January 2010 under the directive 2005/33/EC. Therefore, from 1 January 2010, use of low sulphur fuels with the sulphur content not exceeding 0.1% m/m will be required only when ships are “at birth”, irrespective of kind of fuel used. With the application of this amendment, ClassNK Technical Information No. TEC-0709 becomes void.

For any questions about the above, please contact:

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Attachment:
1. Design and Operational Issues for Use of Low Sulphur Fuels in Diesel Engines and Boilers
2. COMMISION RECOMMENDATION of 21.12.2009 on the safe implementation of the use of low sulphur fuel by ships as berth in Community ports

Design and Operational Issues and for Use of Low Sulphur Fuels in Diesel Engines and Boilers

1. Main and Auxiliary Diesel Engines

(1) Fuel oil changeover

In cases where a diesel engine is operated on Heavy Fuel Oil (HFO), the HFO needs to be heated at more than 100ºC. Under the heated condition of the fuel piping system, fuel oil changeover from the HFO to low sulphur fuels (especially in the case of Marine Gas Oil (MGO)) may result in a trouble of the fuel pump and/or vapour lock, etc. due to vaporization of the highly volatile low sulphur fuels in the heated fuel supply piping.

In order to prevent this kind of troubles, it is important to establish an appropriate changeover procedure between HFO and low sulphur fuels from the viewpoint of ISM. In addition, the following measures may be applicable: 1) conducting fuel oil changeover from HFO to MGO under sufficiently cooled condition of the fuel piping system or 2) installing a fuel oil cooler for MGO.

(2) Low flashpoint

SOLAS Regulations prohibit use of fuel oils with a flashpoint of lower than 60 ºC. MGO can be translated into DMX or DMA specified in ISO 8217, and the allowable range of the flashpoint of DMX in the latest ISO standard includes the range of below 60 ºC. In order to prevent bunkering of such fuels with a flashpoint of lower than 60 ºC, it is necessary to confirm in the Bunker Delivery Note (BDN) that the flashpoint of the fuel oils is 60 ºC or above.

(3) Compatibility of cylinder oil with fuel oil

For low-speed main diesel engines, cylinder lubrication is one of the most important items on which much attention should be paid. For use of HFO with sulphur content of more than 1.5%, cylinder oils with a high Base Number (BN) ranged from BN70 to 80 are selected in general. On the other hand, for use of low sulphur fuels with sulphur content of below 1.5%, use of cylinder oils with a lower BN ranged from BN40 to 50 may be recommended by engine manufacturers/oil suppliers.

When using low sulphur fuels, it is important to monitor conditions of the piston rings/cylinder liners. In cases where a sign of abnormal condition is observed on such a component, necessary measures should be taken, consulting the engine manufacturer.

(4) Ignition delay and defective combustion

Today's low sulphur fuels tend to have low viscosity and low carbon residue contents. In the production process of such fuel oils, a large quantity of high aromatic Clarified Oil (CLO) as cutter stock is likely to be used. High aromatic fuel oils tend to have poor ignition and combustion properties, and this may cause combustion problems leading to an abnormal wear of piston rings/cylinder liners.

In cases where a sign of abnormal condition such as high exhaust gas temperature, etc. is observed, the following measures may be effective onboard ships:

- Reducing the engine output
- Lowering the cylinder cooling water temperature
- Temporarily increasing the cylinder oil
- Raising the scavenging air temperature
- Advancing the fuel injection timing
- Enhancing fuel cleaning
- Mixing with normal fuel
- Adding combustion promoter

(5) Low viscosity and low lubricity.
Low lubricity of gas oils is acknowledged as the most problematic issue relating to properties of low sulphur fuels. Examples of troubles caused by the low lubricity of fuel oils include, but not limited to, abnormal wear of plungers/barrels of, or oil leaking from fuel injection pumps of generator diesel engines. In general, fuel oil lubricity is considered to be derived from oil film forming ability due to the oil's viscosity and lubricity of sulphurs in the fuel oil.
Although the viscosity of MGO is extremely lower than that of other kinds of fuel (1.5 cSt at 40 ºC for DMA grade of ISO 8217), such a low viscosity range is not generally taken into account at design stages of equipment with a slide member, such as fuel injection pumps, etc.
In order to prevent troubles caused by low lubricity of fuel oils, installing a fuel oil cooler and/or using additives for improvement of the fuel oil lubricity may be effective.

2. Boilers
Where a boiler has been originally designed to burn only heavy fuel oils or marine diesel oils, various issues are to be considered when using low sulphur fuels for boilers. However, specific countermeasures to be taken for each boiler burning system are different depending on the specifications of boilers. Therefore, it is necessary to consult the relevant manufacturer whether low sulphur fuels can be used with or without modifications, what kind of modification is required, etc., and follow the recommendations for safe operation in using low sulphur fuels.

(1) Fuel oil changeover
Switching operation is to be carried out carefully and slowly according to the maker's instruction, or following troubles may happen:
- Vaporization of low sulphur fuels
- Instability of burning
- Flame failure
- Increasing of risk of explosion in the furnace

In order to avoid such troubles as mentioned above, following countermeasures may be to be taken:
- Changing over / switching operation between fuels are to be taken carefully, after confirmation that fuel oil lines are cold enough
- HFO Cooler may need
- Separated low sulphur fuels line from existing HFO / DO lines may need.
- Burner lance may need modification, in case the burner is steam / air atomizing type.

(2) Low flash point
Same as the para.1(2)

(3) Compatibility of fuel oil
Viscosity of gas oils in accordance with grade DMA of ISO 8217, one of the envisioned fuel oils as low sulphur ones, is 1.5 cSt at 40 C degree. So as same as engines, viscosity of the low sulphur fuels is not so sufficient that FO pump trouble happens, depending on the designed minimum viscosity of FO pump. In case the actual viscosity is kept under the designed minimum viscosity, lubricating properties would be lower. In such case, abnormal friction of bearing parts and decreasing of oil supply may happen. Therefore, installation of FO cooler or/and low sulphur fuels pump may be required.
Also turn down ratio problem shall be considered: in case of using low sulphur fuels, minimum load of boilers would increase and the boilers have a difficulty of ignition. For countermeasure to this problem, burner nozzle modification may be in need.

(4) Flame supervision
On burner plants, some flame scanners cannot detect a burner flame caused by low sulphur fuels, because of difference of flame intensity. So change of a flame scanner may be in need.

(5) Heat value
The calorific value of low sulphur fuels is typically a little higher than that of HFO. The additional heat input to the boiler is, however, considered to have an insignificant influence on the boiler itself. In some cases, it may nevertheless be necessary to re-adjust the air/fuel ratio if the pre-set air amount is beyond the limit and grey smoke is generated.
Especially for steam atomizing burners, change of an adequate swirler may need in order to avoid instability of burning low sulphur fuels.

3. Other machineries
Because of low viscosity and low lubricating ability of low sulphur fuels, other auxiliary machineries of FO lines, such as FO pumps, also may need modification. We recommend that the ship owners or management companies shall contact the manufacturers of the machineries for safe operation in using low sulphur fuels.

- End -

EUROPEAN COMMISSION

Brussels, 21.12.2009
C(2009) 10289 final

COMMISSION RECOMMENDATION

of 21.12.2009

on the safe implementation of the use of low sulphur fuel by ships at berth in Community ports

(Text with EEA relevance)

COMMISSION RECOMMENDATION

of 21.12.2009

on the safe implementation of the use of low sulphur fuel by ships at berth in Community ports

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 292 thereof,

Whereas:

(1) Article 4b of the Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels[1] as amended provides for the maximum sulphur content of marine fuels used by ships at berth in Community ports, including, as of 1 January 2010, the obligations for Member States to ensure that vessels do not use marine fuels with a sulphur content exceeding 0.1% by mass and that marine gas oils are not placed on the market in their territory if the sulphur content of those marine gas oils exceeds 0.1% by mass.

(2) Article 6 of the Directive also provides that Member States shall check by sampling that the sulphur content of marine fuels complies with the relevant provision of article 4b and that sampling commence from the date of entry into force of the requirement.

(3) As indicated in the Commission Communication on notifications of postponements of attainment deadlines and exemptions from the obligation to apply certain limit values pursuant to Article 22 of Directive 2008/50/EC on ambient air quality and cleaner air for Europe[2], concentrations in more than 40% of the zones and agglomerations in the Community currently exceed the daily PM_{10} limit value. Implementation of low sulphur limit on fuel by ships while they are at berth in Community ports is essential to improve ambient air quality, as highlighted in the Communication from the Commission to the European Parliament and the Council on an EU strategy to reduce atmospheric emissions from seagoing ships[3] and the Thematic Strategy on Air Pollution adopted in 2005[4].

(4) Requirements were adopted in October 2008 by the International Maritime Organization (IMO) in the context of the revision of the International Convention for the Prevention of Pollution from Ships (MARPOL Convention), to be implemented

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1 OJ L 121, 11.5.1999, p.13
2 COM(2008) 403.
3 COM(2002) 595.
4 COM(2005) 446.

from 1 January 2015 for ships sailing within Emission Control Areas as defined by article 2 (3e) of Directive 1999/32/EC.

(5) The Commission, considering the safety risks at stake, deems is necessary to issue appropriate guidance to Member States in order to ensure a high level of safety and effective prevention of pollution from ships in the enforcement of the provisions of that Directive throughout the Community.

(6) From 1 January 2010, ships using heavy fuel oil while at sea are to switch to lighter marine fuels such as marine diesel or gas oil when at berth in Community ports as heavy fuel oil with a sufficiently low sulphur content is not generally available.

(7) There may be operational problems and safety risks associated with the use of marine diesel and gas oil in ships that have not been designed to use such fuels or have not undergone the necessary technical adaptation. The Commission has considered the risks associated with the change of fuels and concluded that the main safety risk relates to use in ships' boilers which have not yet been assessed and certified for use with the required type of fuel. While boilers can use heavy fuel oil or distillate fuels, a risk arises because marine diesel and gas oils are less viscous and more volatile and heating of the fuel system, which is required for heavy fuel oil, is not necessary for distillate fuels. The numbers of affected ships and the probability of such occurrences are difficult to assess precisely.

(8) Directive 1999/32/EC allowed sufficient time for the shipping industry to bring about the technical adaptation to a maximum limit of 0.1 % sulphur by mass for marine fuels used by ships at berth in Community ports. Technical solutions to limit the risks are available. However, to date, there are still ships that have not gone through the necessary modifications and very few ships have undergone the necessary verification and certification process.

(9) Technical solutions are available to mitigate potential consequences of switching fuel at berth. Limited demand from the shipping industry has delayed the development of the necessary technical solutions, resulting in subsequent delays in the verification and certification process.

(10) The information available to the Commission underlines that, for these ships that have not undergone the technical modifications, completion of the whole process should not take more than eight months.

(11) There is a need for boiler and engine manufacturers to develop specific recommendations and procedures for the retrofitting of these solutions, while shipowners should develop and implement specific operational procedures and provide appropriate training to crews.

HAS ADOPTED THIS RECOMMENDATION:

1. As part of the Member States enforcement actions against ships which fail to comply with the requirement to use fuels with a maximum permitted sulphur content of 0.1 % while at berth, Member States should request those ships to provide detailed evidence of the steps they are taking to achieve compliance. This should include a contract with a manufacturer and an approved retrofit plan which should be approved

by the ship's classification society or, for ships flying the flag of a Member State, by the organisation having recognition in accordance with Regulation (EC) 391/2009 of the European Parliament and the Council[5]. The retrofit plan should clearly state the date of completion of the adaptation and certification process.

2. Member States may consider the existence of an approved retrofit plan when assessing the degree of penalties to be applied to non-complying ships.

3. Member States should take appropriate measures to raise awareness among owners, operators and seafarers of the safety risk related to fuel changeover in the absence of any necessary technical adaptation to a ship's fuel system and the necessity for training to be provided.

Done at Brussels, 21.12.2009

For the Commission
Antonio Tajani
Vice-President of the Commission

CERTIFIED COPY
For the Secretary - General

Jordi AYET PUIGARNAU
Director of the Registry

[5] JO L 131, 28.5.2009, p.11.