



DNVPS LINE SAMPLER

(MARPOL ANNEX VI-COMPLIANT)

Improved Version with Pressure Gauge Now Available



DNV Petroleum Services

DNVPS LINE SAMPLER

1 INTRODUCTION

The accuracy of quality analysis and quantity measurement of bunker fuel is a direct function of all the steps involved in proper bunker fuel sampling.

DNV Petroleum Services is a market leader in marine fuel oil management. We provide a comprehensive range of fuel quality tests in our modern and sophisticated laboratories.

DNVPS Line Sampler is one of the products which facilitates consistent accuracy and reliability in bunker fuel sampling.

Our valued customers have been using the DNVPS Line Sampler for many years and are satisfied with its robust design and reliability.

MARPOL 73/78 Annex VI Regulations for the Prevention of Air Pollution, which came into effect on 19th May 2005, requires bunker fuel samples to be taken correctly at the vessel's manifold. This will mean that vessels not equipped with a proper Line Sampler must ensure that they make arrangements to do so.

2 CUSTODY TRANSFER REGULATIONS

Custody transfer is defined as the designated point where product accountability and/or ownership are transferred.

Since January 2002, custody transfer sampling has been the standard procedure for bunkering in the port of Singapore under the local code of practice for bunkering. This means that bunker fuel samples must be taken from the receiving vessel's bunker manifold in Singapore.

The port authorities of various bunkering ports are also studying similar regulations.

3 DNVPS LINE OF SAMPLING PRODUCTS

Standard Model DLS-001

DNVPS is engaged in a continuous process of improving our bunker sampling products. Various types of samplers and accessories are designed to meet the specific needs of the vessels and these can be ordered from DNVPS.

DLS-001 is the most common type of Line Sampler used for sampling.



DLS-001

Angular Line Samplers with 90 degree elbow and 45 degree elbow probes can be fabricated by DNVPS to suit the bunker line requirements of various vessels. These Angular Line Samplers can be fitted at the required angle to the vertical, keeping the cubitainer hanging to collect the fuel sample.

The Angular Line Sampler can also be used with the Enhanced Model DLS-002.



90 Degree Line Sampler

DNVPS LINE SAMPLER

Enhanced Model DLS-002

DLS-002 is an enhanced Line Sampler version giving more flexibility in sampling. It has the following additional items:

- Stainless Steel Pressure Gauge
- Flexible Hose with drain valve
- Ball valve

The liquid filled compound pressure gauge is fitted on the Enhanced Line Sampler with a drain valve and a flexible hose. The pressure gauge indicates the pressure in the bunker manifold and the drain valve can be used to collect a spot sample if required. Care should be taken in draining fuel from the flexible hose to avoid pollution.

The stainless steel ball valve provides positive shut off for safety reasons.



PRESSURE GAUGE ASSEMBLY WITH DRAIN VALVE AND FLEXIBLE HOSE

The Enhanced Line Sampler DLS-002 is supplied with fully assembled ball valve, 'T' Joint, and drain valve. Liquid-filled Pressure Gauge is supplied separately and should be fitted carefully as shown in the figure above, using Teflon thread sealing tape.

The flexible hose should be fitted with the drain valve and properly clamped.



ADDITIONAL ACCESSORIES OF ENHANCED LINE SAMPLER DLS-002

Accessories for the Enhanced Line Sampler DLS-002 include:

- Liquid filled compound Pressure gauge
- Stainless steel 'T' joint
- Stainless steel ball valve
- Drain valve
- Flexible hose with clamp
- Two Stainless steel adapters

If Enhanced Line Sampler DLS-002 is ordered the above accessories would be supplied in addition to the accessories already provided with our standard Line Sampler DLS-001.

These additional accessories can also be fitted on our basic model DLS 001 without any modification and they can be ordered separately by using the DNVPS sampler order form.



DLS 001 ACCESSORIES

The DLS-001 is supplied with a complete line of accessories as follows: Sampler x 1, Probe x 1, Security Cap x 1, Gaskets x 2, Shaking Carton x 1, 10L Cubitainers x 10, Seals & Caps of Cubitainers x 10, Bolts & Nuts according to the size of the sampler.

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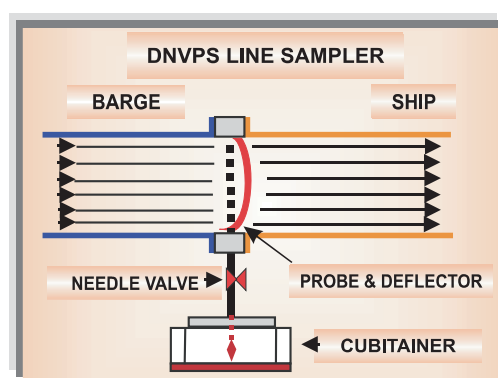
4 TECHNICAL DESCRIPTION

- The DNVPS Line Sampler is a continuous drip sampler which will produce a representative sample of the complete bunker delivery. The sampler assembly is manufactured from 304 grade stainless steel.
- Both tamper-proof and weather-proof, it is designed to fit within the PCD of flanges to ANSI, DIN, and JIS national pipe flange standards. Please refer to Table No. 1 for pipe size references.
- Custom-made samplers can be ordered if the vessel's bunker manifold flange sizes are different from the standard sizes.
- The DNVPS Line Sampler is lightweight and very easy to install.
- Please see Table No. 1 for approximate weight reference.
- Gaskets are included and made of material suitable for high temperature and high pressure.
- All sizes are available ex-factory Singapore.
- Direction of Flow: The Line Sampler is a uni-directional sampler i.e. a representative sample can be collected when it is installed with the perforated probe facing the direction of bunker flow. All samplers have an ARROW mark engraved on the sampler flange circumference. It is recommended to match the bunker flow direction with this ARROW while connecting the sampler and bunker hoses.

5 HOW IT WORKS?

Sampling is carried out by the continuous drip method throughout the duration of the bunkering. A Needle Valve on the sampler is provided to control the drip rate during the sampling. The anti-tamper security cap is used to seal the needle valve. This is to prevent unauthorised closure or adjustment of the needle valve.

The sample is collected in a disposable 10-litre or 5-litre cubitainer which is screwed onto the sampler and threaded with the seal. This prevents wilful contamination of the sample. The enclosed watertight system of the cubitainer prevents sample contamination from rainwater, dust and cargo such as bauxite, grain etc. On completion of sampling, the seal is broken in the presence of all the parties involved. The cubitainer is capped and thoroughly shaken to ensure homogeneity of the sample.



The DNVPS Line Sampler's sample extraction mechanism is a fast "capture" action with less disturbance to streamlines. The large deflector area of the extraction device ensures better quality representation of the product in the pipeline.

There are occasions when sample drawing with the Line Sampler may be affected by vacuum. Usually this occurs where the larger size of the ship manifold with high free board is connected to a smaller barge supply line. This vacuum problem can be dealt with by fitting a 'reducer pipe' at the ship manifold or by carefully throttling the ship manifold bunker valve.



REDUCER FITTED TO THE SHIP MANIFOLD

DNVPS LINE SAMPLER

6 INSTALLATION

1. Carefully connect the Line Sampler to the bunker manifold, keeping the ARROW mark on top and following the bunker flow direction [Ref Fig. No. 1]. Use the two fully threaded bolts and new gasket to secure the sampler to the bunker manifold through the two threaded holes in the flange. Make sure the drain holes of the sampling probe are not obstructed.

2. Connect the bunker hose using the new gasket and half threaded bolts. Tighten the bolts as per the torque requirement and bolt size.

3. Remove the safety cap from the drain probe and connect a clean cubitainer to the probe by carefully matching the threads and turning it in the anti-clockwise direction.

4. A tell-tale hole [Ref. Fig. No. 2] is provided on the cubitainer connector [metal cap], which also acts as an air vent. Make sure it is not blocked as otherwise the cubitainer may be filled with air during the initial start of bunkering.

5. Align the sealing hole on the cubitainer with the line sampler security cap and use a strip seal to tauten it [Ref. Fig. No. 3].

6. A stainless steel needle valve is located on the lower end of the drip sampler. This needle valve is used to adjust the rate of drip according to the bunker flow rate [Ref. Fig. No. 4].

7. Commence pumping of bunker and adjust the needle valve of the Line Sampler until desired drip rate is achieved. Barge Master and vessel's Chief Engineer should be invited to witness the adjusted drip-rate and sealing process, which is as follows:

i. Cover the adjustment screw of the needle valve with the security cap. Wrap the free-end chain of the security cap around the stem of the needle valve [Ref. Fig. No. 5].



FIG. NO. 1 DLS-001 WITH ARROW MARK TO MATCH FLOW DIRECTION



FIG. NO. 2 TELL TALE HOLE ON METAL CAP



FIG. NO. 3 CUBITAINER AND SEAL



FIG. NO. 4 NEEDLE VALVE AND CHECK NUT



FIG. NO. 5 SEALING OF NEEDLE VALVE

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ii. Insert the cord of the security seal into its locking device and pull hard to make sure that it is taut. [Ref. Fig. No.5].

8. Record the security seal number and have both the Barge Master and vessel's Chief Engineer initial on the document.

9. Any required adjustment on the flow rate of the needle valve which requires breaking of the security seal should be witnessed by the Barge Master and by the vessel's Chief Engineer.

10. Keep an eye on the sampler connection and make sure it doesn't leak. Take all the standard precautions required for bunkering & oil spills etc.

7 COMPLETION OF BUNKERING

1. A bunkering event is considered to be completed when the supplying barge has transferred the stipulated bunker quantity to the receiver vessel.

2. Once the Barge Master and the vessel's Chief Engineer have confirmed that the bunkering process is completed, break the seal of the security cap of the needle valve and shut the needle valve by carefully turning it in the clockwise direction.

3. Unscrew the cubitainer from the drip probe and close it with the cap provided.

4. A drip tray should always be kept under the sampler connections to collect oil drips.

8 MULTIPLE BARGE & GRADE DELIVERIES

1. If a different barge is also scheduled to supply the bunkers then a fresh sample must be taken from the second barge supply. The same logic applies if more barges are involved.

2. If a different grade of fuel oil is also ordered, a fresh sample is to be taken for each grade.

3. A new and clean cubitainer should be used each time a sample is collected.

9 DISTRIBUTION OF SAMPLE

Typically, the content of the cubitainer is sub-divided into three 1litre sample bottles.

Shake the cubitainer thoroughly to ensure complete mixing.

When filling the sample bottles, care should be taken to ensure that the bottles are partially filled in turns, taking three or four passes to complete the filling process to minimise uneven distribution among the sample bottles.

Each sample bottle should be individually labelled and sealed with tamper-evident seals. The serial numbers of these seals should be recorded on the label as well as on the Chief Engineer's form for future reference in case of any dispute.



One bottle of sample is to be sent to the DNVPS laboratory for testing and one given to the supplier's representative. The remaining sample should be safely stored onboard the vessel in case any further testing is required.

The Singapore Standard SS600 for Bunkering requires four samples to be drawn with similar distribution to the involved parties as indicated, but with an additional MARPOL sample to be kept onboard the vessel. A fifth sample shall also be prepared for the bunker surveyor if a bunker quantity survey is carried out during the fuel delivery. The SS600 requirement is compatible with the MARPOL Annex VI regulations, which stipulate that a MARPOL sample must be taken with the delivery of each bunker product.

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10 STORAGE

1. Shut the main bunker manifold valve and carefully remove the Line Sampler from the manifold, taking all the precautions to prevent spills of any oil remaining in the pipes.
2. Lift the Line Sampler and place it by the sides on a wooden plank or hang it in the store with proper lashing.
3. Take utmost care of the probe and cubitainer connector during the fitting and removal of the Line Sampler.



RECOMMENDED STORAGE

11 MAINTENANCE

1. It is necessary to keep the sampling probe in clean condition to avoid sticking of the needle valve and contamination of the sample taken.
2. Most ships have two samplers for sampling distillates [MGO/ MDO] and residues [HFO] separately.
3. If Line Sampler is used for sampling distillates [MGO/ MDO] only, the sampler requires minimal maintenance. Use clean dry working air of 7 to 8 bars to clean and blow the probe before and after every sampling.

However, for sampling HFO, the sampler should be removed from the manifold and washed in an MGO / MDO bath. Use clean dry working air of 7 to 8 bars to clean and blow the sampler probe & needle valve. In cold weather, low pressure steam may be required

to clean the probe. Remember to remove the protective Teflon thread cap, before using pressurised steam or air.

4. If the sampler probe is chocked and cannot be cleaned in situ, dismantling the probe from the sampler flange may be required.
5. After cleaning, use Teflon threading tape and carefully refit the probe, taking care of the fine fitting threads.
6. If the sampler is kept fitted on the bunker manifold, it is advisable to protect it from the weather using a canvas canopy. Always use new gaskets for installing the Line Sampler on the bunker manifold and keep a proper record of the maintenance.
7. Remove, clean and safely store the liquid-filled Pressure Gauge when not in use to avoid any damage or malfunction.

12 SAFETY

1. Make sure no oil spill occurs. Be careful with oil under pressure. Ensure all personnel are aware of the Vessel's bunkering Emergency Response Procedures.
2. During the bunkering process check for leakage from the bunker hose connections and the sampler.
3. Do not attempt to remove the needle valve during the bunkering process.
4. The capacity of the HDPE sample bottles is one (1) Litre. Do not fill these bottles above the filling mark.

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13 DNVPS FQT PROGRAM

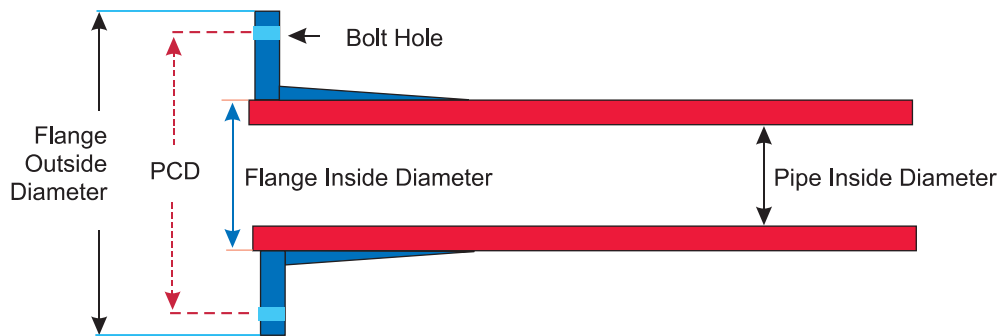
1. Where the vessel is participating in the DNV Fuel Quality Testing (FQT) Program, please follow the Program guidelines.
2. Complete all the necessary information in the Chief Engineer Report Form and other sample documents.
3. Despatch the samples to one of the DNVPS laboratories.

The DNVPS FQT Sampling Kit



- 40 sampling bottles complete with caps
- 10 IATA approved shipping cartons
- 40 security seals
- 10 Ziplog bags
- 2 Chief Engineer's stamps
- 1 Fuel Test Program Instruction Manual
- 1 Set of Fuel System Check carton

14 MEASUREMENT OF VESSEL MANIFOLD BUNKER FLANGE



To ensure the correct size of the sampler, it is necessary that accurate measurement of the bunker flange is taken and forwarded to DNVPS for fabrication. We recommend careful measurements [in mm] of the following:

- Bunker Flange 'OD' Outside Diameter
- Bunker Flange 'ID' Inside Diameter
- Bunker Flange 'PCD' Pitch Circle Diameter
- Diameter of Bolt holes on the bunker flange

Please note the difference between the bunker pipe diameter and 'ID' of the bunker line flange.

15 SAMPLER WEIGHT

The DNVPS Line Sampler stainless steel flange, including attachment bolts and sampling probe, has the following weight (approximate):

Sampler Internal Diameter	Approx. Weight
62.0mm (2.5 inch)	4 kg
90.7mm (3.5 inch)	5 kg
143.8mm (5.75 inch)	9 kg
221.5mm (8.75 inch)	12 kg
276.4mm (11 inch)	17 kg
327.2mm (12.75 inch)	22 kg

Table No.1

Disclaimer: All care has been taken in the design and assembly of the DNVPS Line Sampler. DNVPS will not be held responsible for any mishap and/or pollution caused by misuse or negligence or any unauthorised modification of the DNVPS Line Sampler:

**DET NORSKE VERITAS**

Statement

This is to confirm that DNV Petroleum Services' line samplers and associated equipment as specified below, in document:

- DNVPS Line Sampler (MARPOL Annex VI- Compliant), DNV Petroleum Services March 2005.

comply with the specification of a manual valve-setting continuous-drip sampler and a primary sample container in MEPC.96(47) "GUIDELINES FOR THE SAMPLING OF FUEL OIL FOR DETERMINATION OF COMPLIANCE WITH ANNEX VI OF MARPOL 73/78" as referred to in Annex VI of MARPOL 73/78.

- Line sampler Standard Model DLS-001
- Line sampler Enhanced Model DLS-002
- Cubitainers (5 and 10 litre) capable of tamperproof sealing to the line samplers during bunkering.

The line samplers and associated equipment should be used in accordance with manufacturer's instructions.

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DNV is a global provider of services for managing risk. Established in 1864, DNV is an independent foundation with the objective of safeguarding life, property and the environment. DNV comprises 300 offices in 100 countries, with 9,000 employees.