

WearCheck Oil Analysis Service

How to Use the WearCheck Service

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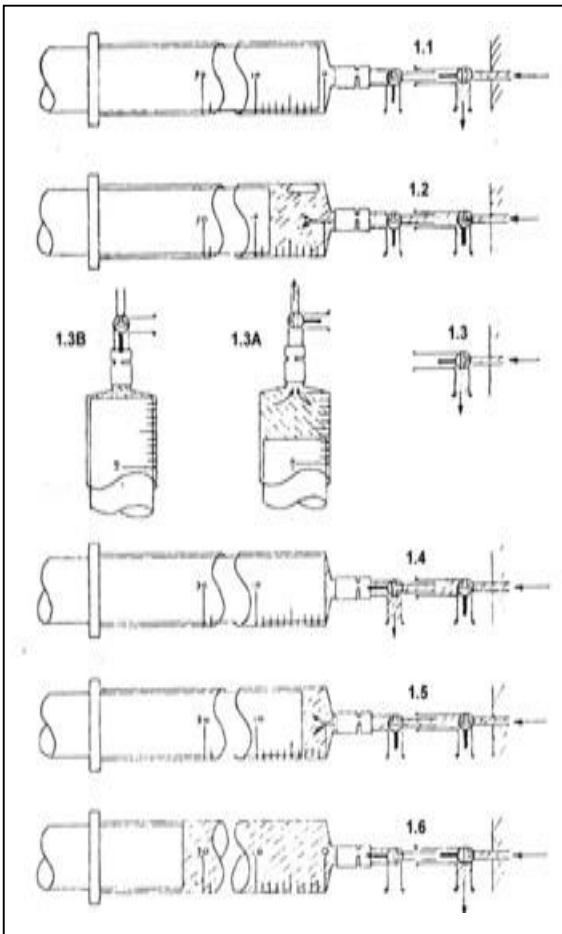


HOW TO SAMPLE TRANSFORMER OILS USING A GLASS SYRINGE

The methods outlined here are all based on the use of a single sampling device that can be used to take either oil or gas samples. The sampling device consists of a precision ground 30cc glass syringe terminated with a Luer-Lok fitting to which is attached a plastic three way valve. This valve, although removable, is to be regarded as an integral part of the sampling device and any subsequent references to the syringe simply the presence of this valve. A second identical valve, which does not stay with the syringe, is used when taking oil samples. This second valve will be referred to as the auxiliary valve.

Before sampling is commenced the syringe must be either flushed with new transformer oil or pumped vigorously several times with the valve open to eliminate any residual fault gas from the previous sample. Syringes should be examined for the absence of dirt and checked to ensure that the pistons slide smoothly.

Auxiliary Fittings - For taking oil samples an adapter must be made which can be fitted to the transformer valve and which will accept the tapered inlet of the auxiliary sampling valve. One possibility, shown in fig. 2 is to epoxy or solder a female Luer nub (cut down from a 15 gauge needle) into a suitably sized hole drilled into the transformer valve plug. Alternatively, a straight 5/32" diameter hole drilled in the transformer valve plug will yield an adequate press fit for the auxiliary valve. Note, however, that a straight hole can produce scoring and deformation of the plastic valves and hence the syringe valve must never be plugged into a straight hole nor should syringe and auxiliary valves be interchanged. (A major function of the auxiliary valve is to protect the syringe valve so that it will stay in good condition for attachment to the laboratory analysis apparatus.)



Oil Sampling

A satisfactory technique for taking bubble-free oil samples is shown in Figs. 1 and 2. The flushing ports of the valves are shown horizontal in Fig. 2 but in practice it is better if they are directed downward to facilitate collection of the waste oil. (NOTE: The handles of the plastic valves point to the closed port leaving the other two ports in open communication.)

The technique described below requires the oil to be under slight positive pressure (0.2 psig or greater). Note that a continuous oil flow is maintained throughout the entire procedure.

- Attach the adapter plug to the transformer valve, then, with its handle in the flush position, plug in the auxiliary valve and allow oil to flush until all trapped air is eliminated. Adjust the oil flow to a suitable rate and then attach the syringe with its valve in the fill position. (Fig. 1.1)
- Turn the auxiliary valve to the fill position and allow about 10cc of oil to enter the syringe (Fig. 1.2). Return the auxiliary valve to its flush position and separate the syringe (Fig. 1.3)
- With the syringe vertical eject any air bubbles (Fig. 1.3A) and then depress the piston to the zero mark and close the syringe valve (Fig. 1.3B).
- The syringe, bubble-free and with its dead volume filled with oil, is then re-attached to the auxiliary sampling valve. The auxiliary valve is then turned to the fill position so that oil now flows from the flushing port of the syringe valve (Fig. 1.4).
- Turn the syringe valve to the fill position and allow oil pressure to push the piston back until the syringe contains approximately 26cc of oil (Fig. 1.5). NOTE: If it can be avoided do not pull the piston manually since this can result in atmospheric leakage and bubble formation. Do not fill the syringe to more than 27cc to ensure an adequate seal along the piston.
- Return the syringe and auxiliary valves to their flush positions, separate the syringe and turn off the transformer valve.

NOTE: Bubbles may form in the syringe subsequent to sampling because of the different temperature and pressure environment but, provided the sample was bubble free initially, this will not affect the subsequent analysis. No attempt should be made to remove such bubbles.

Figure 1 – Sampling procedure for transformer oils. NOTE: the final fill of the syringe should be no more than 26 mls.

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Gas Sampling - With care, somewhat similar procedures can be used for taking gas samples from blanketed transformers but the absence of a visual flow indication can lead to misjudgment of the flow rate resulting in ejection of the syringe piston. The following method is simple and easily controlled. As for oil sampling, it requires the gas to be under a slight positive pressure. The only auxiliary equipment required is a short length of 3/16" LD. thin wall gum rubber tubing and a 22 gauge hypodermic needle (both readily available from lab supply houses or from us - free of charge - on request.) No auxiliary valve is needed.

The needle is attached directly to the syringe valve and the rubber tubing attached to the gas sampling valve of the transformer (it is an easy stretch fit on metal tubing from 1." - 3/8" O.D.) The transformer valve is cracked open to allow a slow flow of gas. The actual rate is not critical but for ease of control and to avoid wasting blanket gas should be kept as low as possible.

With the syringe valve open the needle is inserted at an angle through the wall of the rubber tubing and the syringe held in the normal manner with the thumb resting lightly on the end of the piston. The open end of the rubber tube is held in the other hand and, by lightly capping the end with the index finger, gas will be forced into the syringe causing the plunger to be pushed back. The rate of filling is easily and sensitively controlled by finger pressure on the end of the rubber tube. The syringe is flushed once or twice by alternately filling and emptying the syringe while it is still attached to the rubber tube (the tube is, of course, uncapped during the emptying stroke.) On the final fill the syringe should not be allowed to fill to more than 15cc to ensure an adequate seal along the piston. The tube is then uncapped, the syringe valve closed and the needle withdrawn from the tube.

When sampling from a gas relay there is a danger with the above method in losing all the gas before a sample is obtained. This possibility can be eliminated with the following modification of the method.

Close one end of the rubber tube (either with a clamp or by tying the tube in a knot), attach the closed tube to the gas relay sampling valve and then open the valve. Since the pressure in the relay can never be greatly above atmospheric there is not danger of the rubber tube being blown off. Gas samples can now be withdrawn, without wasting gas, by inserting the needle through the tube wall. NOTE: Since this is a static system it is essential that sufficient gas be discarded (by withdrawing the needle and emptying the syringe) to ensure that the final sample represents gas from the relay and not from the connecting tubing.

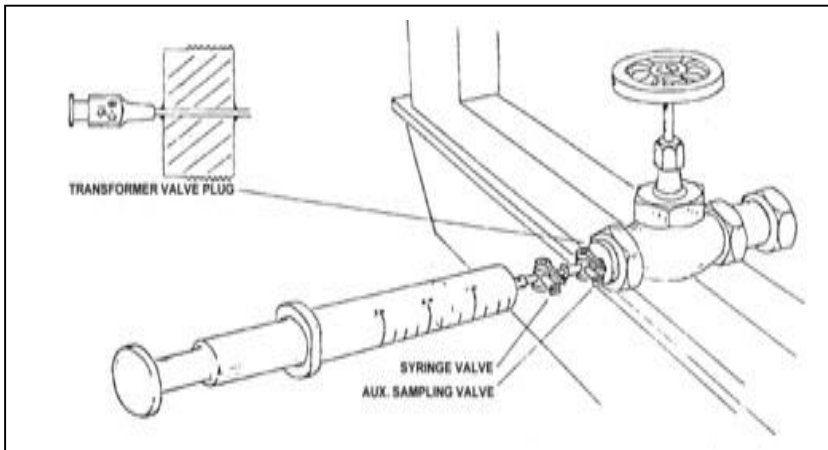


Figure 2 – Sampling syringe used with transformer oil analysis.

Sample Identification - Samples must be identified with the syringe sample QR label from our Sample Information Forms (SIF) found inside the syringe case. The minimum information required includes the transformer serial number (or unit number), power and/or voltage rating and the sample date.

Normally only one sample is required for a complete analysis but we strongly recommend taking duplicate samples in all critical "one-time" situations where resampling at a later date might not be possible or meaningful. These duplicate samples would only be analyzed if data from the first sample were suspect.

Shipping Samples - Syringes should be wiped clean and placed into the foam packing slot within the syringe case as soon as possible after sampling. Unprotected samples must not be allowed to stand around in the light since this can result in further oxidation and breakdown of the oil. Syringes should be placed into a foam slot within the syringe case so that the syringe and stopcock valve are not broken during shipping. Ensure that the upper packing foam is in place and covering all the syringe foam slots before returning the syringe case to the laboratory.

To avoid delay and to prevent deterioration or damage, samples should be sent using a courier service.

Sample packs sent from the U.S. should carry green Customs stickers identifying the contents as "Samples for analysis - no commercial value". This will usually eliminate any delay by Canadian Customs.



THE LEADER IN OIL ANALYSIS

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