

# Sampling of Transformer Oil by Syringe as per IEC 60475 Section 4.2.2

## Sampling Equipment Required as per IEC 60475 Section 4.2.2.1

Graduated DGA gas-tight syringes of a size suitable for containing adequate oil sample volume and equipped with a three-way plastic valve made of nylon. The use of syringes with matched piston and barrel is preferred when sampling for DGA in order to allow the piston to flow freely with oil volume variations, and to avoid pressure and vacuum build-up in the syringe and breakage during handling. Plastic syringes should not be used. For plastic three-way valves, a new valve should be used each time an oil sample is taken and not recycled, because it may be contaminated with the previous oil sample and lose its gas tightness when used several times.

**NOTE:** Priming the piston with clean, degassed oil has been found useful to avoid the formation of bubbles along the piston when introducing the oil sample for DGA analysis. The use of a low viscosity water-soluble lubricant has also been found useful for DGA.

**CAUTION:** 1) The oil-compatible plastic tubing used for ampoules should be used only once, not recycled, since it has a memory effect and may contaminate the oil sample when sampling for DGA.

2) Metal bottles should not be soldered, as materials used for soldering may contaminate the oil.

The size of sample required depends on the likely concentration of gas in the sample, the analytical techniques and the sensitivity required. Transport containers (padded carrying cases), designed to hold the syringe firmly in place during transport but which allow the syringe plunger freedom to move and prevent its tip from contacting the container whatever its position during transportation. Cardboard boxes with removable inner cardboard flaps with inside foam packing that hold the barrel in place have been found convenient for that purpose & also appropriate for transportation. When sampling for DGA, the syringe should preferably be transported in the vertical position, piston upwards, to avoid the formation of bubbles in oil.

## Storage & Transportation of Transformer Oil Sample as per IEC 60475 Section 4.3

Some of the dissolved oxygen present in the oil sample may be consumed, and hydrocarbons and carbon oxides formed by oxidation. This reaction is accelerated by exposure to light, therefore sampling devices made of transparent materials i.e. glass syringes should be protected by placing them in the box for transportation i.e. padded carrying case.

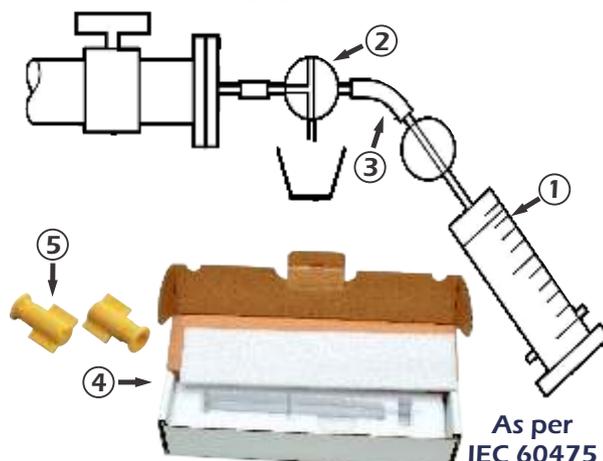
In any case, the analysis should be carried out as soon as possible after sampling to avoid oxidation reactions and gas losses or pick-ups from the sampling devices. Oil syringes should be placed in sealed boxes to fully eliminate the risk of formation of bubbles important DGA Oil samples during transportation in planes, due to reduced pressure and over-saturation of gases in the oil. The syringe plunger should be allowed to move in order to prevent air ingress in case of oil volume variations.

## List of Test as per IEC 60475 section 4.2.1.5

Oil Test	Oil Volume (ml)
Dissolved Gases	25-100
Water	20
Dielectric dissipation factor	200
Particles	100

Oil Test	Oil Volume (ml)
Breakdown Voltage	500-1000
Other Chemicals and physical tests	250
All tests	1000-2000

## TOSIN Kit Consist of



- 1. TRÜTH Glass Syringe : 1ml, 2ml, 5ml, 10ml, 20ml, 30ml, 50ml, 100ml
- 2. TOSIN Nylon stopcock 3 way
- 3. TOSIN Tygon Tube with connector
- 4. TOSIN Padded Carrying Cases
- 5. TOSIN Un-vented Male Plug Cap

## TRÜTH Glass Syringe for Transformer Oil Sampling

Catalog No.	TRÜTH DGA Glass Syringes, Match Number, Metal Luer Lock Tip
09-04-02-02	1ml, Graduation 0.02ml
09-05-02-03	2ml, Graduation 0.05ml
09-08-02-05	5ml, Graduation 0.2ml
09-09-02-05	10ml, Graduation 0.2ml
09-10-02-07	20ml, Graduation 1ml
09-11-02-07	30ml, Graduation 1ml
09-13-02-08	50ml, Graduation 2ml
09-15-02-08	100ml, Graduation 2ml
TOSIN Kit Accessories	
09-25-17-00	TOSIN 3 way Nylon Stopcock
09-25-16-00	TOSIN Tygon Tube With Connector
30-10-00-00	20ml TOSIN Padded Carrying Case
30-11-00-00	30ml TOSIN Padded Carrying Case
30-13-00-00	50ml TOSIN Padded Carrying Case
30-15-00-00	100ml TOSIN Padded Carrying Case
09-25-19-00	TOSIN Un-vented Male Plug Cap

## Labeling of Oil Sample as per IEC 60475 section 4.4

Transformer or other equipment	Sampling
Customer	Sampling date
Location	Sampling point
Identification Number	Sampling person
Manufacturer	Reason of analysis (routine or other)
General Type(transformer (generation or transmission, instrument, industrial), reactor, cable, switchgear, etc.)	Transformer non-energized, off-load energized or on load
Rated MVA	Oil temperature when sampling
Voltage ratio	Humidity : dry - wet - fog - indoors
Type and location of OLTC	
Date of commissioning	
Oil	
Type of Oil (mineral or non-mineral)	Weight (or volume) of Oil
Product name	Date of last Oil treatment

## Sampling procedure as per IEC 60475 Section 4.2.2.2

- a) The electrical equipment is connected as shown in Figure 5a, & its sampling valve (5) opened.
- b) The three-way valve (4) is adjusted (position A) to allow 1 l to 2 l of oil to flow to waste(7)
- c) The three-way valve (4) is then turned (position B) to allow oil to enter the syringe slowly (Figure 5b). The plunger should not be withdrawn but allowed to move back under the pressure of the oil.
- d) The three-way valve (4) is then turned (position C) to allow the oil in the syringe to flow to waste (7) and the plunger pushed to empty the syringe to ensure that all air is expelled from the syringe, it should be approximately vertical, nozzle upwards, as shown in Figure 5c. Confirm that the inner surfaces of the syringe and plunger are completely oiled.
- e) The procedure described in steps c) and d) is then repeated until no gas bubble is present. Then the three-way valve (4) is turned to position B & the syringe filled with oil (Figure 5d).
- f) The three-way valve (2) on the syringe and the sampling valve (5) are then closed.
- g) The three-way valve (4) is turned to position C & the syringe disconnected (Figure 5).
- h) When sampling for DGA, if the oil taken from the electrical equipment is hot, place the syringe in its protective box in the vertical position, standing on the piston and with the syringe tip upwards, until the oil has slowly cooled down, then install the syringe back in to the holding flaps of the protective box for transportation. This will prevent the formation of bubbles in oil.

Label carefully the sample.

**NOTE:1** It is good practice to avoid contamination of the outer surface of the plunger and inner surfaces of the syringe by dust or sand. Such particles can affect the sealing properties of the syringe. This kind of contamination can come from wind-swept dust or from the handling of the syringe.

**NOTE: 2**

In the case of sealed transformers, if a bubble appears in the syringe directly after sampling, it is recommended to resample.

**Key**

- |                                  |                               |
|----------------------------------|-------------------------------|
| a. Flushing Position             | 1. Syringe                    |
| b. Wetting & Flushing of Syringe | 2. Stopcock                   |
| c. Emptying of Syringe           | 3. Flexible Connecting Tubing |
| d. Taking of Sample              | 4. Three Way Valve            |
| e. Disconnecting of Syringe      | 5. Equipment Sampling Valve   |
|                                  | 7. Waste Vessel               |
|                                  | 11. Blank Flange              |

④ Three Way Valve



Figure 5. As Shown in IEC 60475

