

 Title: Oil sampling from a sealed transformer using Trans-Sample coupling		Procedure No: TA 00038
		Authorised by: G Noble
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1. Purpose

This procedure highlights the need to ensure precautions are taken when removing oil from sealed transformers for the purpose of dissolved gas analysis when using the Trans-Sample coupling.

2. Scope

- a. Identifying a sealed transformer
- b. Taking oil sample

3. References

- a. IEC 60567 - Oil-filled electrical equipment – Sampling of gases and of oil for analysis of free and dissolved gases – Guidance
- b. IEC 60599 - Mineral oil-impregnated electrical equipment in service – Guide to the interpretation of dissolved and free gases analysis
- c. IEC 60422 - Mineral insulating oils in electrical equipment – Supervision and maintenance guidance
- d. IEC 60044-1 – Instrument Transformers
- e. AS 1767.1-1999 Insulating liquids - Specification for unused mineral insulating oils for transformers and switchgear
- f. TA 00001 – Job Safety Analysis

4. Definitions /Abbreviations

JSA – Job Safety Analysis

Leur Lock – Medical connector used to attach tubes to devices such as syringes

Oil – Transformer insulating fluid – usually hydrocarbon based

PPE – Personal Protective Equipment

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Syringe – 50ml Glass Veterinarian syringe used for taking oil samples

TS – Trans-Sample Coupling

Check-Tube – Tube designed with a check valve for sampling oil from sealed transformers fitted with the Trans-Sample coupling

TX – Transformer

5. Health & Safety

General caution, health, safety and environmental protection.

This procedure does not purport to address all the safety problems associated with its use. It is the responsibility of the user of the standard to use appropriate health and safety practices and determine the applicability of regulatory limitations prior to use.

The mineral insulating oils which are the subject of this procedure should be handled with due regard to personal hygiene. Direct contact with the eyes may cause irritation. In the case of eye contact, irrigation with copious quantities of clean running water should be carried out and medical advice sought.

No work shall be carried out without first conducting an OHS study of the task in hand and the appropriate check sheets (TA 0001) filled out.

Transaudit Quick Check

Personal Protective Equipment (PPE) Required						
						
Gloves	Face Masks	Eye Protection	Welding Mask	Appropriate Footwear	Hearing Protection	Protective Clothing
☐	☐	☒	☐	☒	☐	☒

This quick check does not replace Job Safety Analysis TA 0001

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6. Environmental

Our commitment is to ensure that the environment is not damaged through any action that we may take now or in the future. Transaudit will provide the means to limit environmental damage through engineering, substitution or removal of and items or procedures that have the potential to impact the environment. Disposal of waste material, hazardous goods or items which have become contaminated will be done through the appropriate means or through a registered waste disposal company.

7. Procedure

Identifying free sealed transformers

- a. Identify if the transformer has a breather, silica gel or other device that allows the transformer to breathe to atmosphere. If no breathing device is found, it shall be considered a sealed transformer.
- b. Remove the dust cap from the Trans-Sample (TS) coupler. If necessary, wipe down and ensure connection area is clean
- c. Place drip tray beneath the valve and TS assembly, open valve on transformer side of TS coupling. Check for leaks. Do not tighten – inform supervisor if leaks exist.
- d. Identify you are using a Check-Tube – this is a male Trans-Sample coupling with a check valve installed and usually without a small ball valve.
- e. Push the top sleeve back to the acceptance point, connect the tube to the TS in one fluid motion. Make sure tube is pointing into a waste collection container.
- f. Allow oil to flow until approx. 3 times the volume of the TX valve and stagnant oil has been flushed. Consider the stub from tank wall, fitting or valve extension as stagnant oil. Close transformer valve. ***If oil does not flow, this indicates the transformer is under vacuum and cannot be sampled using this method. Disconnect hoses, close vales, reinstate transformer to condition found. Contact your supervisor.***
- g. Open new clean sampling bottle ensuring no pollutant enters bottle or contacts inside of lid
- h. Place tube into bottle to the very bottom of the bottle.
- i. Open transformer valve and fill the first bottle¹ in one motion to overflowing². Close transformer valve. Remove tube carefully from bottle. Cap and seal. Note: The caps supplied by transaudit are designed for expansion and contraction of the oil through

¹ If bottle has been previously opened or it is suspected the bottle may be contaminated, and no other new bottles are available, fill the bottle to approx. 1/8th full and use this oil to swish around the bottle to clean. Ensure cap is included in cleaning.

² Oil in flow temperature must be recorded using laser temperature device. If not conducting thermography on TX, also record the TOT as well as Top Tank Temperature

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temperature change. No allowance is required for oil expansion in the bottle other than the small space left after tube is removed.

- j. Repeat the previous step with the second bottle, however this time, using a thermometer to measure the inflow oil temperature at the closest point to the TS and record.
- k. Attach the syringe to the tube using the fitted Leur Lock device and start the oil flow into the waste bucket through the stopcock in the bypass position. This flow should be slow and steady.
- l. Rotate the stopcock away from bypass and allow the oil to enter the syringe. Do not pull the syringe plunger. Watch carefully for bubbles forming around plunger lead edge. Rotate the plunger clockwise and anti-clockwise 360° to ensure seal. Tilt syringe to 60° stopcock up, and allow the syringe to fill at a rate of no faster than 1ml per second.
- m. Overfill the syringe to around 60ml and keeping the syringe tilted, close stopcock to bypass. Disconnect the Leur-Lock and rotate syringe to vertical.
- n. Carefully open stopcock back to sample position making sure the plunger is firmly held and slowly expel any air bubbles in syringe. This is easiest done by using a screwing motion on the plunger. When complete, re-stow and ensure and ensure no direct sunlight reaches the syringe.
- o. Remove the tube from the TS allowing for a little oil to drip out during this process. Do not close the main transformer valve until the tube has been removed to ensure oil integrity of the device at all times.
- p. Clean down area, wash and oil drips with “Brake-Clean” or similar non-corrosive product. Replace dust cap.
- q. If transformer is not on Transaudit database, use the paperwork supplied with bottles and syringe and record requested details. Stick details on bottles, photograph³, replace in protective boxes and expedite to laboratory. If transformer is in transaudit database, capture ID number found near rating plate on Transaudit Sticker, Top oil, oil sample and ambient temperature, Transformer serial number. Photograph prior to packing and send to Transaudit – details on website and warning plate on transformer near TS coupling.

Transaudit recommends new sample tubes on each critical sample, and never using the same tube between OLTC and TX.

³ Photos will allow data to be recovered if oil were to escape from bottle.



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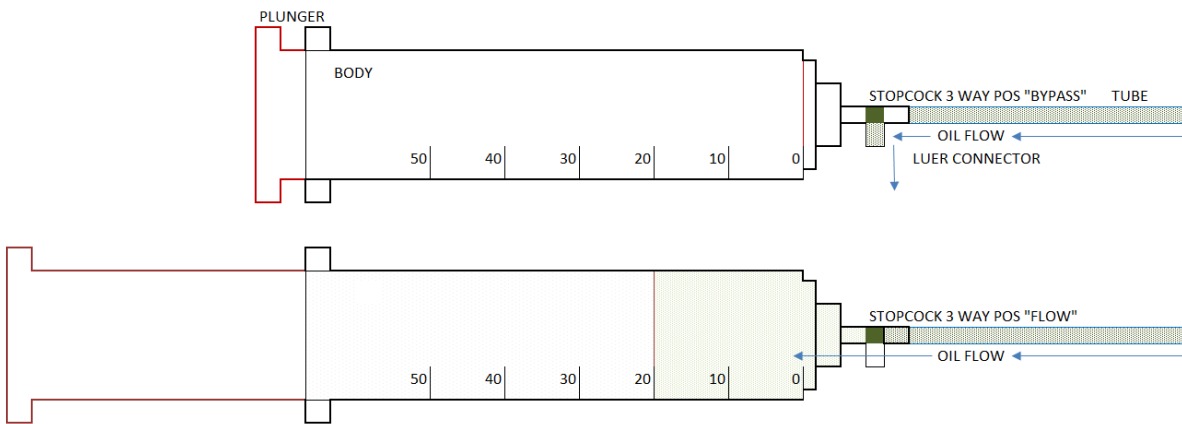


Figure 1. Stopcock positioning