



PYRANOL*

FOR USE IN

TRANSFORMERS, REGULATORS AND REACTORS

Pyranol used in transformers, regulators and reactors as a cooling and insulating liquid, is noninflammable, chemically stable and nonsludging. It has a straw-yellow color.

Three types of Pyranol (known as No. 1488, No. 1467, and No. 1470) have been successively developed for this purpose. Each type has shown an improvement over its predecessor. G-E material D50P18 is used in No.'s. 1467 and 1470 to chemically neutralize any hydrogen chloride gas which may be absorbed in the liquid as a result of arcing. No. 1488 Pyranol may be treated with D50P18 to obtain similar results if desired. Instructions for Conversion of No. 1488 Pyranol to No. 1467 are contained in GEI-21015†. No. 1470 Pyranol has a lower viscosity and pour point than No. 1467.

Under extreme cold conditions some of the D50P18 material may cloud out of solution and float on top of the Pyranol as a milky white crystalline material. This condition is not detrimental and the material will redissolve as soon as the Pyranol temperature rises.

All types are miscible and compatible so that any of the types may be mixed in any desired proportion. It should be noted, however, that if either No. 1488 or No. 1467 is mixed with No. 1470, the improved characteristics of No. 1470 will be sacrificed, depending on the proportions of the mixture.

The nameplate on the apparatus indicates the type of Pyranol which is used. No. 1467 and No. 1470 Pyranol are designated by their numbers. If no number is designated then No. 1488 Pyranol has been used.

Materials that are unaffected by Pyranol

have been selected for use in constructing Pyranol apparatus. No materials should be used in contact with Pyranol except those approved by the General Electric Company.

Pyranol used for filling transformers should have a dielectric strength of 30 kv or higher. Impurities in Pyranol tend to lower the dielectric strength and decrease its noninflammable properties. Subsequent instructions describe precautions that should be taken to exclude these impurities and obtain extended service from the Pyranol.

HANDLING PYRANOL

Pyranol may be handled in the same manner as mineral oil. However, continued exposure may produce local skin irritations. Cleanliness by workmen handling Pyranol constitutes one safeguard against such effects. Ordinary medicinal washes will remove any irritation caused by Pyranol coming in contact with an open cut or skin abrasion. A drop of castor oil will neutralize any irritation caused by contact of liquid Pyranol with the eyes. As with most volatile materials, exposure to concentrated Pyranol vapors in an unventilated room should be avoided.

CAUTION—Hydrogen chloride gas is formed when Pyranol is decomposed by an electrical arc. This gas is an irritant and the inhalation of large quantities can be dangerous and harmful to personnel. The presence of hydrogen chloride gas even in small quantities is readily detectable by its strong odor and irritant action on the nasal membranes. Should anyone be exposed to a quantity of this gas, immediately escort him to fresh air.

Pyranol must be handled in containers, pipes, all-metal hose, etc., that are free from

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†Apply to nearest G-E Apparatus Sales Office for copy.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

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oil, grease, pitch, or other foreign materials. It is desirable that all such equipment used in storing or transporting Pyranol be maintained for exclusive use with Pyranol, as it is extremely difficult to remove all traces of oil or other Pyranol contaminants from equipment of this type. Also, mineral oil is completely miscible in Pyranol and it is practically impossible to separate the two liquids after they have been mixed.

All-metal hose must be used in handling Pyranol since rubber and rubber-lined hoses are dissolved by Pyranol. This is also true of synthetic rubber hoses.

Use naphtha or benzine to remove all traces of Pyranol that are spilled or dripped on the outside of the transformer tank during the filling procedure. This precaution must be taken since Pyranol has a tendency to soften the paint. Examine the external surfaces of the transformer at intervals to see that the paint is unharmed. If places are found where the paint has been attacked, thoroughly clean the surface and repaint with a good grade of durable paint recommended by the General Electric Company.

PERIODIC INSPECTION

After the first few days of operation of the apparatus, test the top and bottom Pyranol for dielectric strength. Repeat this test after six months and after one year of operation. After one year, a periodic sampling and testing schedule should be established. The recommended time between inspections and tests depends on local climatic conditions, the load on the apparatus, and the importance of minimizing service interruptions. Intervals between tests should be one year or greater depending on the above considerations. Accurate records of these tests should be kept. If, at any time, the Pyranol tests below 25 kv at room temperature, use a filter press or Pyranol purifier to restore the dielectric strength to 30 kv or more.

Recognition should be taken of the fact that some of the D50P18 component may be removed by such filtration, particularly if activated earth is employed. Upon completion of the purification, a laboratory test will indicate the necessary amount of D50P18 compound which must be added to the Pyranol, if any.

Maintain the Pyranol at the proper level. On units provided with liquid level gages the 25 C level is indicated on the gage. On smaller units not provided with gages the 25 C level should be up to, or above the lower sampling valve.

SAMPLING AND TESTING PYRANOL

Follow the procedure outlined herewith to obtain consistent results from samples taken for either field or laboratory tests.

SAMPLING FROM APPARATUS

1. Take samples preferably when the temperature of the apparatus is near 25 C. Take samples from outdoor apparatus on a clear day only; and guard against contamination by wind-blown dust, etc.

2. Use small-neck glass bottles as sample containers. A one-quart bottle will hold sufficient Pyranol for complete tests. Sample containers filled with new Pyranol are available from Pittsfield. (See the section on "Pyranol Testing Service").

Empty the container into the apparatus, allow it to drain thoroughly and then immediately refill it with the liquid to be tested. Cleaning the containers, as described below may be disregarded when they are received filled with new Pyranol. However, the subsequent steps should be followed to insure obtaining a sample representative of the original Pyranol.

3. To clean the bottles, rinse with non-leaded, oil-free gasoline; then wash with strong soapsuds, rinse thoroughly with water, and dry in an oven 125 C to 110 C for at least eight hours. After drying the bottles, seal tightly with a glass stopper or a clean cork. Protect the cork by wrapping with clean metal foil.

4. Impurities tending to affect the dielectric strength of Pyranol will, in general, be at the top of the liquid. Therefore, take the sample from the top through the small valve or plug, and allow enough Pyranol to run out so that any moisture or foreign material which may have collected in the drainpipe, valve, or plug will be removed.

5. Draw a sample into the bottle, leaving sufficient air space to allow for possible expansion of the Pyranol. Carefully seal the container to prevent any exposure of the Py-

anol to the atmosphere using the stopper removed from the bottle.

6. After taking the sample, reseal the apparatus; then establish the internal pressure of the apparatus at the proper value according to Table 1, using dry air or nitrogen.

TABLE 1

Pyranol Temperature Degrees C	Approximate Pressure Lb per Sq In.
25	0.0
30	0.5
35	1.0
40	1.5

If the sample is taken when the temperature is lower than 25 C, reseal the apparatus at atmospheric pressure. However, when the temperature reaches 25 C, vent the apparatus to atmospheric pressure to avoid excessive internal pressure at higher temperatures.

SAMPLING FROM DRUMS

Take samples from drums after the Pyranol has remained undisturbed for at least eight hours, and when the Pyranol is at least as warm as the surrounding air. If the drums are outdoors, take samples on a clear day only and guard against wind-blown dust etc. Take a sample from the top of the drum by means of a chemically clean thief. Observe the sampling precautions previously outlined.

2. Clean the glass thieves used for taking the samples, in the same manner as the bottles, and dry, preferably at a temperature not less than 37.8 C (100 F).

TESTING FOR DIELECTRIC STRENGTH

The technique as specified by the American Society for Testing Material in the test method entitled "The Standard Method of Testing Electrical Insulating Oils" is recommended for the testing of Pyranol. The following precautions and modifications must be observed:

1. Set the spacing of the two 1-inch disk electrodes at 0.100 inch.

2. Wipe the test cup and electrodes clean with dry, calendered tissues or clean, dry chamois and rinse thoroughly with clean, non-leaded, oil-free gasoline.

3. Fill the cup with dry gasoline and make a breakdown test under standard conditions of voltage application (3 kv per second rise). If the dielectric strength is not less than 25

kv, the cup is considered suitable for testing purposes. The usual precautions in handling gasoline should be observed.

4. Immediately after the final rinsing with gasoline, rinse the test cup with the Pyranol under investigation and proceed with the test at once.

5. The temperature of the Pyranol, when tested, should be the same as that of the room, which should be between 20 C and 30 C (68 F and 86 F). Under no conditions should the test cup be colder than the Pyranol being tested.

6. After filling the test cup, allow the Pyranol to stand for three minutes before testing, to allow entrained air bubbles to escape.

7. Make one test per filling, fill at least five times and average the results.

Pyranol testing lower than 25 kv should be filtered or replaced. Instructions (GEH-1031) for filtering are available upon request at the nearest Apparatus Sales Office of the General Electric Company.

PYRANOL TESTING SERVICE

For convenience in sampling and testing Pyranol, the General Electric Company will furnish one-quart sample containers filled with clean, dry Pyranol to replace the Pyranol which is removed for samples. These containers may be obtained from an Apparatus Sales Office with an order to cover the expense of testing. When it is desired to return carbonized or highly contaminated Pyranol for reclamation and credit, samples should be submitted to and the transaction handled directly with the Monsanto Chemical Co. St. Louis, Missouri. Reclamation facilities are no longer available in Pittsfield.

All other samples may be sent to the Field Engineer, Power Transformer Engineering, General Electric Company, Pittsfield, Mass. for testing. These samples should be accompanied by a requisition for testing obtained through the nearest G-E Apparatus Sales Office. Recommendations for continued use or treatment will be furnished, in addition to a complete report covering the following tests:

1. Dielectric strength
2. Color
3. Acidity

Reliable tests are dependent on the sample as it reaches the laboratory being exactly

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the same as the Pyranol in the apparatus from which it was taken. Therefore, in obtaining and handling the samples follow the technique outlined under "Sampling from Apparatus."

To assist in furnishing the most useful comments on the results of the tests, requests for this information should:

1. State why the tests are considered desirable.
2. Give the serial number and rating of the apparatus.
3. State whether or not the sample represents the Pyranol originally furnished with the apparatus. If not, tell when the Pyranol was replaced.
4. State the date, temperature and weather conditions at the time the sample was taken

and also whether the apparatus is located indoors or outdoors.

5. Give any other information that might have a bearing on the condition of the Pyranol.

6. State to whom the report should be sent.

AVAILABLE TEST AND FILTERING DEVICES

The General Electric Company manufactures a 35,000-volt, 2-kva test set, Catalog No. 79X336 for testing the dielectric strength of Pyranol. A Pyranol purifier, Catalog No. 79X789, is available for filtering and drying Pyranol. Information concerning these devices may be obtained from the nearest Apparatus Sales Office of the General Electric Company.

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