years an internal inspection is made and oil cooler cleaned if necessary.

Oils in service were broadly classified as type A, a non-solvent-refined, non-additive oil; type B, a solvent-refined, non-additive oil; type C, a solvent-refined oxidation-inhibited oil.

Between 1930 and 1938 oil condition was judged by means of monthly oil tests for water, sediment, viscosity and acid number. Service life remaining in oil could not be forecast from these tests. From 1938 to 1944, interfacial tension between oil and water was taken on the monthly oil samples in addition to the above tests. This test disclosed oil changes long before any significant change in color, viscosity, or acid number was noted. A practice of changing oil when the interfacial tension dropped below eighteen resulted in a complete absence of sludging or varnishing. About 1944 changes occurred in turbine oils. Some had antirust additives so that initial interfacial tension was below operating criteria.

Rusting of oil lines occurred with both types B and C oils. No rusting was observed with type A oil although this oil gives a relatively short service life (about 20,000 hrs in turbines with 550-F steam).

Film strength of turbine oils is only of interest in gear lubrication. Some geared turbines in this plant showed gear wear when operating on type B oil. Since changing to type A oil and accepting a short service life, gears gave normal performance. *Presented at the Symposium on Service Experience with Inhibited Turbine Oils. ASTM.*

PANEL HEATING

Present Status of the Panel Heating Art, *by I S Locke, Minneapolis-Honeywell Regulator Co.* Panel heating is here to stay: A recent poll by the Curtis Publishing Co indicated 14% of their readers, who plan to build homes, also plan to use panel heating. After this opening statement on the market status of panel heating the author goes on to define panel heating and discuss methods.

These include: (1) circulating warm water through embedded pipes and coils (2) separately heated plates or panels attached to interior surfaces (3) electric heat through cables embedded in walls or floors (4) electrically-heated wallpaper and tapestry.

Present practice in this country favors floor installations. It seems least costly, especially for residences or large factory installations. To add to the known factors in this field, the American Society of Heating and Ventilating Engineers has set up a steering committee as an adjunct to its Committee on Research. Purpose is to recommend a program of research for panel heating and cooling. The remainder of the paper discusses the various subdivisions of this recommended program. *NDHA Paper.*

To Obtain Complete Text

Material in these briefs comes from one of these sources:

American Society of Testing Materials, Technical committee meeting, Feb. 9, 1948, Washington, D. C. Papers are identified by ASTM. Available at ASTM headquarters, 1916 Race St, Phila 3.

Amer Inst of Electrical Engineers, summer meeting, Mexico City, Mexico, June 21-25, 1948. Papers identified by AIEE and paper No. Available at Amer Inst of Electrical Engineers, 39 W 39th St, New York.

National District Heating Assn, annual meeting, St Louis, Mo., May 17-21, 1948. Papers identified by NDHA. Available in proceedings. NDHA, 827 N Euclid, Pittsburgh 6, Pa.

Midwest Power Conference, annual meeting, Chicago Apr 7-9, 1948. Papers identified by MPC. Available at Illinois Institute of Technology, 3300 Federal St, Chicago 16, Ill.

Steam Heating Control Practice, *by Harry C Kaysing, Hester-Bradley Co.* Prime objects of control for steam heating customers are: (1) Comfort of occupants with reasonable freedom from overheating or underheating (2) Steam economy—making each steam dollar yield a maximum toward comfort (3) Equipment relatively free of service and maintenance (4) Flexibility so the system may be changed at minimum cost to meet changing occupancy requirements. In the author's opinion orifices are essential to meet control objectives above regardless of type control sought.

Intermittent, on-off controls produce unsatisfactory comfort conditions—those referred to as "cold 70". Pulsating or cycling controls substitute for the variable "on" interval of the intermittent control a fixed time interval with a variable "on" period. As an example, a typical pulsating control turns steam on once every hour or so for a length of time depending on demand. Demand is usually held equivalent to outdoor temperature. Continuous-flow controls feed steam continuously through orifices at a pressure differential varied by an outdoor thermostat either with or without supplementary manual modification. *NDHA Paper.*

Comparative Performance of Panel and Convection Systems in Warm Air Heating Research Residence, *by S Konzo and R W Roose, University of Illinois.* A fairly wide range of environmental conditions for human body comfort can be maintained in which varying percentages of radiation, convection, evaporation and conduction are involved.

Theoretically any reduction in radiation transfer of heat from body to surrounding surfaces can be compensated for by an increase in convection transfer. A true radiant-heating system with high-temperature radiation surfaces and fairly large ventilation rates should make possible a marked reduction in ambient-air temperature. Current American practice, however, uses low-temperature panels, and negligible ventilation rates prevail. Accordingly, some doubts exist whether low-temperature panel heating exhibits markedly different characteristics from the common convection type of heating.

Test results showed surprising similar response and performance in both systems. The author carefully stresses that these tests apply only to the experimental residence on the campus of the University of Illinois. *MPC Paper.*

Application of Heat Balance Analysis to Industrial Plants, *by H C Carroll, Commercial Testing and Engineering Co.* A study of improvements in economy or in increased production in a steam-generating system must start from a heat balance. Such a balance reveals wastes from venting to atmosphere or dumping condensate to a sewer.

Mounting fuel costs have called the manufacturer's attention to the power plant. Recent plants are fully instrumented, closely controlled, and built around a sound heat balance.

For existing plants the heat balance shows the relative merit of replacing equipment with new. To collect reliable data for such a balance in old plants is a rather difficult job. The author discusses several methods of arriving at information for this duty. *MPC.*