WATER COOLING COILS

INSTRUCTIONS

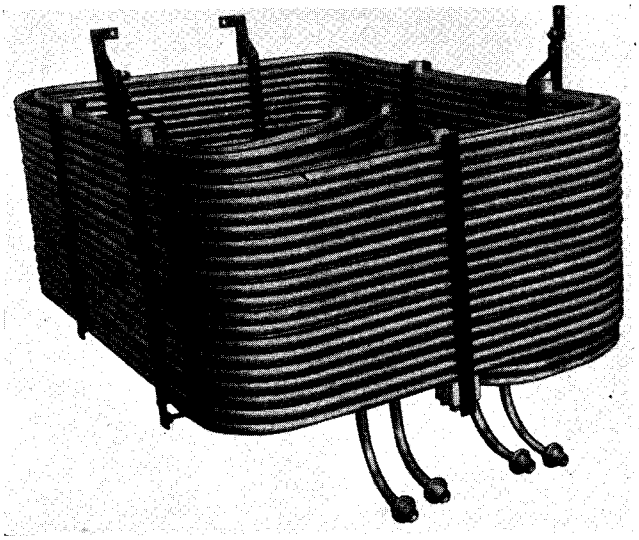

FIG. 1—GRAVITY DRAINED COOLING COIL

Fig. 1 shows a double pitch two tier gravity drained cooling coil.

GENERAL

Water cooling coils of water cooled transformers are coils immersed in the hot oil of the transformer, through which cooling water is circulated.

The cooling coils are made of seamless copper tubing with an inside diameter of 1.171 inches and an outside diameter of 1.315 inches. The end portions of the coils are made of heavier copper tubing, that is, with an inside diameter of 1.063 inches and an outside diameter of 1.315 inches, to permit the threading of the ends. The individual turns of the coil have a form more or less simulating the internal contour of the tank wall and are wound up into single layer vertical columns or tiers. Each tier may be wound of one or more sections in parallel giving the winding a single or a multiple pitch. The number of parallel sections in general is dictated by the desire for a moderate operating water pressure, and by the requirement that there be at least a one percent slope in the coil. The complete cooling coil consists of one or more of these tiers or vertical columns arranged concentrically in the top oil of the transformer. The individual turns of the cooling coil are held in place by a rack which is bolted either to the cover or the wall of the tank. In operation the water is introduced at the bottom of the coils and removed at the top.

Draining

Cooling coils may be placed into two distinct groupings, that is, gravity drained and non-gravity drained.

The non-gravity drained coils have their ends joined to outlets in the cover. In this case when there is an air space above the oil the ends joining the outlets are heavily lagged with heat insulating material above the oil surface to prevent condensation of moisture from the air in the case.

The gravity-drained coils have their outlets in the side of the tank wall. There is a further subdivision of gravity drained coils into large and small gravity drained coils. Large gravity drained coils are of sufficient internal dimensions to permit the transformer to be removed from the tank without disturbing the cooling coil. If the transformer cannot be removed without removing the cooling coil first it is known as a small gravity drained coil or transformer.

Cooling coils of both the gravity and non-gravity drained types may be joined to an open or closed external system. In the open system the pipes carrying the water away from the transformer discharge into a funnel shaped enlargement which has an opening to the atmosphere. In the closed system the water leaving the transformer flows through water flow indicators which are in general air tight.

The condition necessary for securing gravity draining with a gravity drained coil depends upon whether the external system is open or closed. If the system is open it can be secured by the use of a three way cock in the inlet pipes with one passage opening to the atmosphere. With the cock set open to the atmosphere the water will drain from the coils by gravity due to the slope of the coils. If the system is closed, another three way cock is necessary in the outflow pipes to permit the water to drain out.

In general gravity drained coils will drain out when both inflow and outflow pipes are opened to the atmosphere.

Water Cooling Coils—Continued

INSTRUCTIONS—Continued

Outlets

The end pieces of the cooling coils are threaded to fit the outlet coupling in either the cover or the tank wall and the joint is brazed. The coupling assembly is gasketed to make it gas and oil tight and is so designed as to prevent the coil ends and the coupling piece to which it is brazed from twisting and turning during tightening. The coupling piece is internally threaded on the end external to the tank to allow direct attachment to the external water system.

The outlets by which the water enters or leaves the coil are in general grouped on opposite sides of the centerline of either the cover or tank wall and the individual outlets are staggered. When brought out through the wall all the outlets are below the level of the cooling coil.

Water Flow Indicator

The Westinghouse Flow Indicator is generally used to indicate the amount of water flowing in the cooling system. The operation of the flow indicator is based upon the differential pressure created by the flow of water through a Venturi tube. The flow indicators are generally placed in the outflow pipes but may be adapted for reading upward flow and therefore can be placed in the inflow pipes. For further information see Instruction Leaflet for Water Flow Indicator.

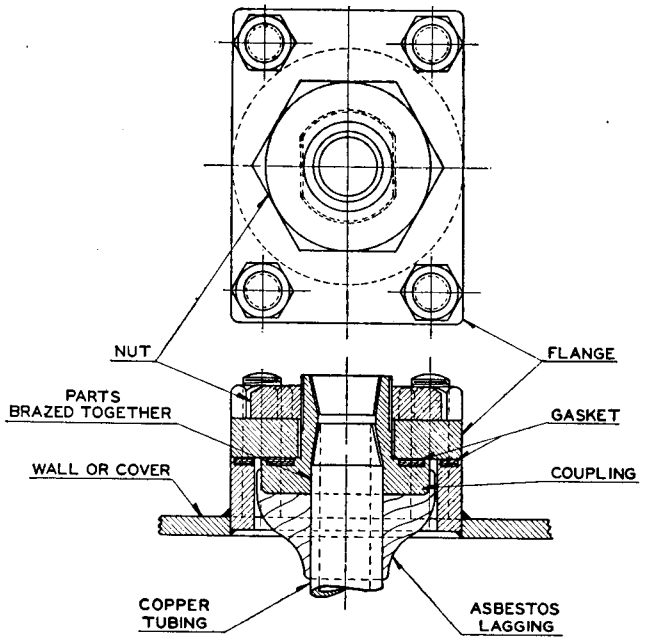

FIG. 2—SECTION THROUGH COOLING COIL OUTLET FLANGE

Fig. 2 shows the various parts of a cooling coil outlet. The asbestos lagging shown around the copper tubing is used only when the cooling coil outlet is located on the cover.

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