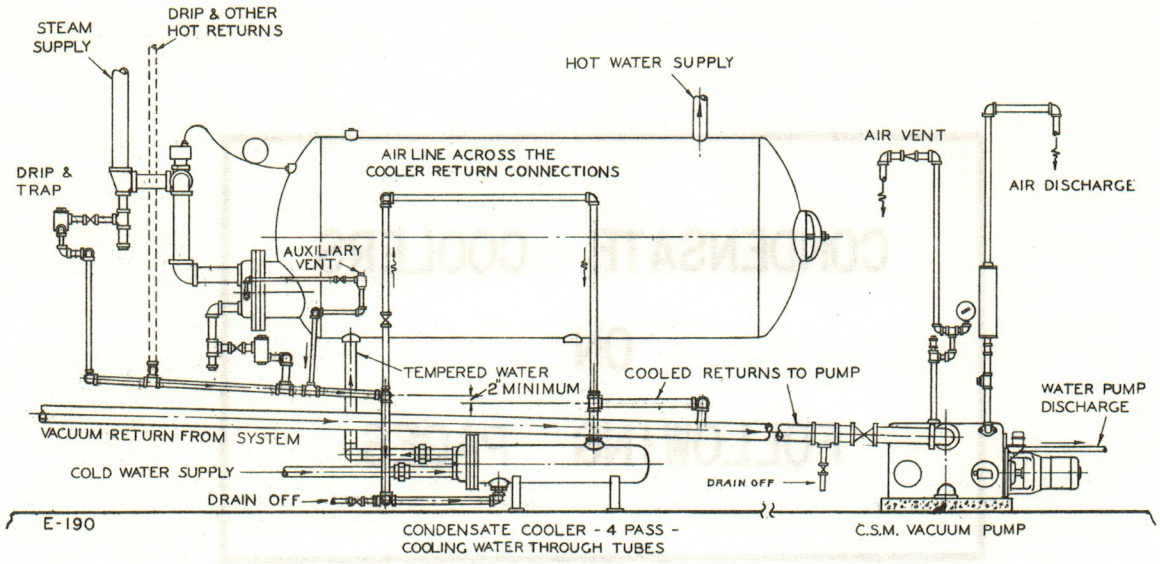
CONDENSATE COOLER

GENERAL APPLICATIONS



STATEMENT OF CONDITIONS

THE USE OF A CONDENSATE COOLER ON A VACUUM HEATING SYSTEM FOR IMPROVED SYSTEM PERFORMANCE AND ECONOMY.

COMMENT

A. A CONDENSATE COOLER MAY BE USED ADVANTAGEOUSLY WITH ALL HOT WATER STORAGE HEATERS AND HOT WATER CONVERTERS. A CHARACTERISTIC OF SUCH HEATERS IS THAT THEY PERIODICALLY DISCHARGE LARGE VOLUMES OF HIGH TEMPERATURE CONDENSATE TO THE RETURN LINES. THE RESULT IS THAT A PORTION OF THE CONDENSATE VAPORIZES UPON ENTERING THE VACUUM RETURN LINE, THUS REDUCING THE VACUUM AND IMPEDING THE NORMAL FLOW OF AIR AND CONDENSATE. WITH A CONDENSATE COOLER HEAT IS TRANSFERRED FROM THE HOT CONDENSATE TO THE COLD WATER SUPPLY AND NORMAL RETURN LINE CONDITIONS ARE PROMPTLY RESTORED.

B. IN ADDITION TO THE GENERAL CASE ABOVE, THERE ARE TWO SPECIAL CASES WHERE A CONDENSATE COOLER FUNCTIONS ALSO AS A HEAT ECONOMIZER. FIRST, WHEN CONDENSATE MUST BE PUMPED THROUGH AN UNDERGROUND RETURN LINE TO A BOILER PLANT LOCATED IN ANOTHER BUILDING. TO MINIMIZE HEAT LOSSES FROM THE UNDERGROUND LINE, IT IS EVIDENT THAT THE CONDENSATE TEMPERATURE SHOULD BE AS LOW AS POSSIBLE. BY USING A CONDENSATE COOLER HEAT IS RECOVERED AND TRANSFERRED FROM THE RETURNS TO THE COLD WATER ENTERING THE HOT WATER HEATER OR CONVERTER.

C. THE SECOND CASE IS WHERE "STREET STEAM" IS PURCHASED FROM A PUBLIC UTILITY OR OTHER OUTSIDE SOURCE. HERE THE CONDENSATE MUST BE WASTED, USUALLY TO THE SEWER. AGAIN, IT IS EVIDENT THAT BEST ECONOMY WILL RESULT WHEN ALL POSSIBLE HEAT IS EXTRACTED FROM THE CONDENSATE BEFORE IT IS RUN TO WASTE. A CONDENSATE COOLER WILL CONTRIBUTE SUBSTANTIALLY TO THIS ECONOMY.

IN SOME LOCATIONS THE USE OF A CONDENSATE COOLER IS MANDATORY BECAUSE REGULATIONS PROHIBIT PUTTING HIGH TEMPERATURE CONDENSATE INTO THE SEWER. CONTRARY TO PREFERRED PRACTICE, MANY INSTALLATIONS HAVE BEEN MADE WITH THE CONDENSATE COOLER LOCATED IN THE DISCHARGE LINE FROM THE VACUUM HEATING PUMP. THE COOLER SHOULD ALWAYS BE INSTALLED SO THAT THE CONDENSATE IS COOLED BEFORE ENTERING THE RECEIVER OF THE VACUUM HEATING PUMP.

CONDENSATE COOLER

GENERAL APPLICATIONS

D. AMONG THE ADVANTAGES TO BE DERIVED FROM THE USE OF A CONDENSATE COOLER IS THAT THE VACUUM HEATING PUMP WILL FUNCTION MORE EFFECTIVELY AND MORE EFFICIENTLY. ELSEWHERE IN THIS BOOKLET IT HAS BEEN POINTED OUT THAT ABNORMALLY HIGH CONDENSATE TEMPERATURE IMPOSES A BURDEN ON THE PUMP. TO COUNTERACT THE HIGH TEMPERATURE THE PUMP MUST OPERATE MORE FREQUENTLY IN ORDER TO REMOVE THE AIR FROM THE SYSTEM AND THEREBY TO MAINTAIN THE REQUIRED VACUUM. IN THE EXTREME CASE, THE CONDENSATE TEMPERATURE MAY BE SO HIGH THAT IT IS NOT POSSIBLE TO MAINTAIN THE PROPER VACUUM. THE CONDENSATE COOLER CORRECTS THESE CONDITIONS BY REDUCING THE TEMPERATURE OF THE CONDENSATE.

SUGGESTED ARRANGEMENT

THE ABOVE SCHEMATIC DRAWING SHOWS A TYPICAL PIPING ARRANGEMENT FOR THE INSTALLATION OF A CONDENSATE COOLER WITH A HOT WATER STORAGE HEATER. A SIMILAR ARRANGEMENT SHOULD BE USED WITH A HOT WATER CONVERTER. NOTE THE FOLLOWING:

1. THE COOLER SHOWN IS OF THE 4 PASS TYPE WITH THE COLD WATER FLOWING THROUGH THE TUBES AND THE CONDENSATE IN THE SHELL. OTHER TYPES MAY BE USED IF PREFERRED.

2. IT WILL GENERALLY BE MOST CONVENIENT TO INSTALL THE COOLER NEAR THE FLOOR, AND IT MUST BE BELOW THE VACUUM RETURN LINE. TO AVOID LIFTING THE CONDENSATE FROM THE COOLER TO THE RETURN LINE, NOTE THAT A WET RETURN MUST BE USED. THE USE OF THE WET RETURN MEANS THAT THE COLD WATER TUBES WILL BE IMMERSED IN CONDENSATE AT ALL TIMES, THUS PERMITTING MAXIMUM HEAT TRANSFER AND MINIMUM CONDENSATE TEMPERATURE.

   COMMENT. THIS IS AN APPLICATION OF THE FAMILIAR "DOOR LOOP" PRINCIPLE. TO COMPLETE THE LOOP IT IS NECESSARY TO INSTALL AN AIR LINE ACROSS THE COOLER CONNECTIONS AS SHOWN ON THE DRAWING. THIS LINE WILL PERIODICALLY CARRY AIR AND VAPOR AT HIGH TEMPERATURE. HOWEVER, THIS TEMPERATURE WILL BE DROPPED WHEN THE AIR AND VAPOR ENTER THE RETURN LINE WHERE THEY COME IN CONTACT WITH COOL CONDENSATE FROM THE SHELL OF THE COOLER.

3. THE HOT WATER GENERATOR MUST BE LOCATED SO THAT ALL CONDENSATE WILL FLOW BY GRAVITY INTO THE COOLER.

4. THE AUXILIARY AIR VENT OPENING FROM THE RETURN CHEST OF THE STORAGE HEATER IS TO BE CONNECTED TO A THERMOSTATIC TRAP.

   COMMENT. THE USE OF THIS AUXILIARY VENT LINE AIDS IN DISTRIBUTING THE STEAM THROUGHOUT THE COIL IN THE HEATER.

5. IF A DOWN FEED RISER IS USED ON THE HOT WATER STORAGE HEATER, IT IS IMPORTANT THAT A THERMOSTATIC DRIP TRAP BE INSTALLED AT THE BASE AS SHOWN. THE DISCHARGE FROM THIS DRIP TRAP IS TO BE CONNECTED TO THE RETURN LINE ON THE UPSTREAM SIDE OF THE CONDENSATE COOLER.

   COMMENT. THE PURPOSE OF THE TRAP AT THE BASE OF THE DOWN FEED RISER IS TO DRAIN THE RISER OF CONDENSATE. OMISSION OF THE TRAP WOULD PERMIT SLUGS OF CONDENSATE TO ENTER THE COIL AND A SERIOUS WATER HAMMER COULD RESULT.