

Summary Article: **radiator**

From *The Columbia Encyclopedia*

device used to heat an area surrounding it or to cool a fluid circulating within it. The familiar radiators of steam and hot water heating systems in buildings are misnamed, as they operate principally by convection, in which heat is transferred by air currents, rather than by radiation, in which heat is transferred by waves that do not need air (or any other substance) as a medium for their transmission. Typically they are made of cast iron or of steel, aluminum, or copper. They are usually constructed in sections so that several can be joined together to give a sufficient surface area for efficient heat transfer. Heating efficiency is reduced if screens or shelves or even certain kinds of paint cover them. When steam is the heating agent, the radiator acts as a condenser; heat is given off at the rate of about .5 calories per gram of steam for each degree centigrade decrease in temperature and 540 calories for each gram of steam that changes to water (see vaporization). The condensate is returned to the boiler where it is reheated to form steam. In hot water systems there is a continuous circulation of hot water. The heat is given off by the hot water or steam to the inner wall of the radiator, from which it is transmitted to the outer wall by conduction; there it passes off chiefly by convection currents set up by raising the temperature of the air that is in contact with the heated surfaces and to a lesser extent by radiation. Coil radiators consist essentially of long steam pipes; they are used widely in factories, gymnasiums, auditoriums, and halls, being set on the walls or ceilings to conserve floor space. Gas radiators use a gas flame to heat air or water or to generate steam. Electric radiators have an electric resistance unit set in a reflector; heat is generated when an electric current flows through the unit. An appreciable fraction of this heat is transferred from the radiator by radiation. The automobile radiator is a part of the cooling system of the automobile engine. As its operation depends on a flow of air across it, it operates mainly by convection.

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