

	SURFACE VEHICLE STANDARD		SAE J631	REV. SEP2007
	Issued	1949-05		
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			Superseding	J631 SEP1998
Radiator Nomenclature				

RATIONALE

This document has been updated to Word format and corrections have been made to spelling and grammar. Figures 12 and 13 have been added to illustrate typical automotive radiator features. Key illustrations from the original SAE J1949 document have been preserved.

1. SCOPE

This SAE Standard documents standard nomenclature in common use for various types of radiator and radiator core construction, as well as for various radiator-related accessories.

2. REFERENCES

2.1 Applicable Publications

The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J151 Pressure Relief for Cooling System

SAE J164 Radiator Caps and Filler Necks

3. DEFINITIONS—RADIATOR NOMENCLATURE

3.1 Auxiliary Tank

A separate tank in the cooling system provided to perform one or more of the following functions:

- filling,
- coolant reservoir,
- deaeration,

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- d. retention of coolant expelled from the radiator by expansion or after boil, or both, and
- e. visible fluid level indication.

3.2 Baffle

A barrier plate used to direct fluid flow within a tank, as under a filler neck or through an in-tank oil cooler, or to divide a tank into separate chambers, as in a deaeration tank or multi-pass radiator tank. See Figure 1.

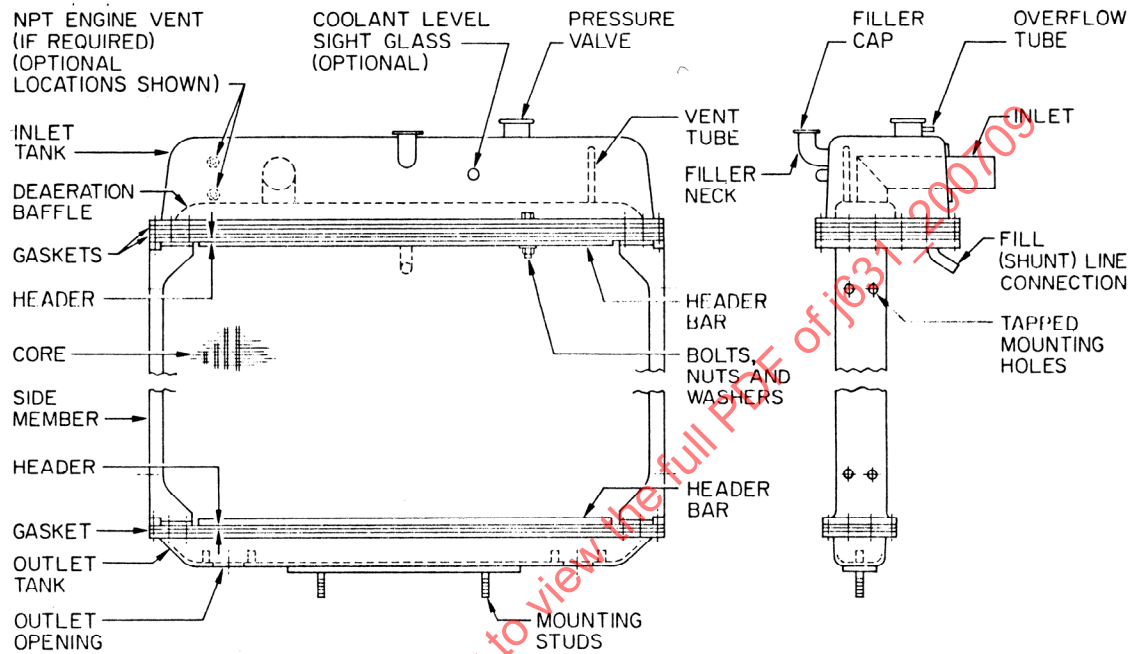


FIGURE 1 - BOLTED TYPE RADIATOR, DRAWN TANKS (TYPICAL DEAERATION SYSTEM SHOWN)

3.3 Bolted Radiator

A radiator whose inlet and outlet tanks are bolted to the headers of the core, usually with an O-ring or gasket seal between tank and header and bolting strips to back up the header. See Figures 1, 2, 3, and 4.

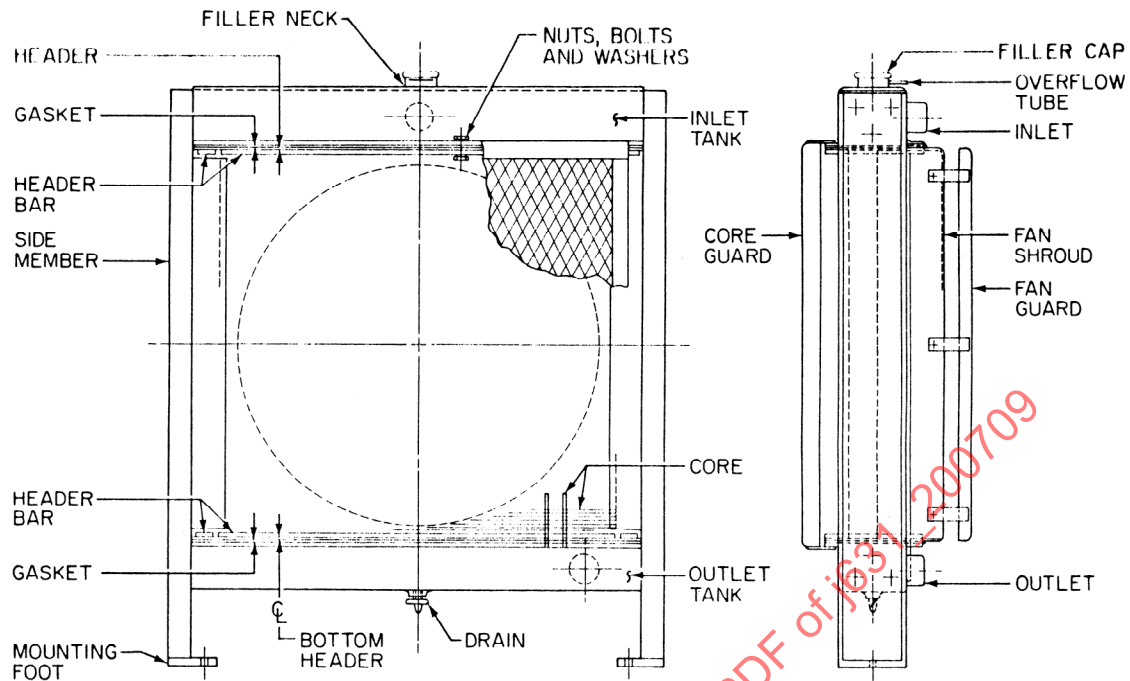


FIGURE 2 - FABRICATED TYPE (ONE-PIECE CORE) RADIATOR

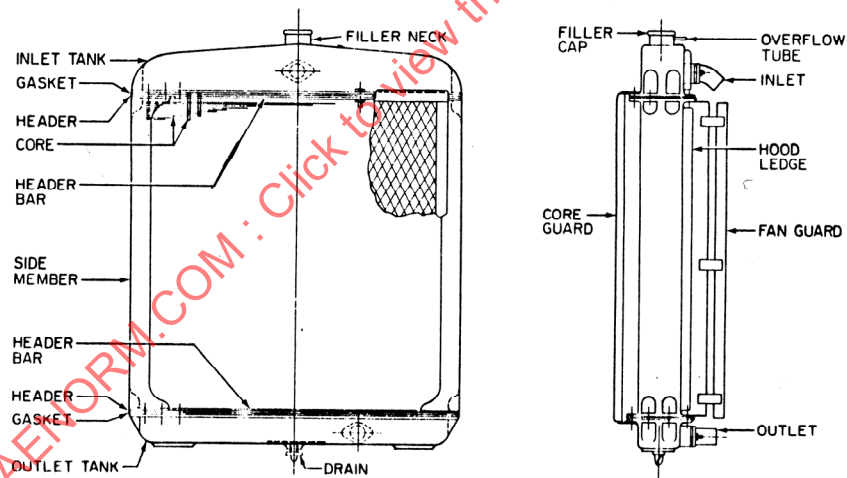


FIGURE 3 - CAST TYPE (ONE-PIECE CORE) RADIATOR

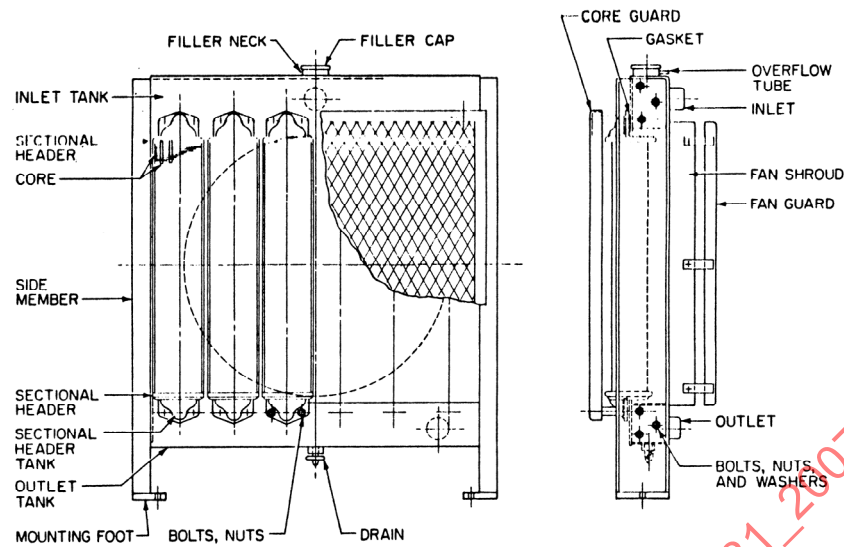


FIGURE 4 - CAST OR FABRICATED TYPE (SECTIONAL CORE) RADIATOR

3.4 Bolting Strip

A strip of metal having a series of holes matching the bolting hole pattern of the tanks and headers of a bolted radiator, and placed on the side of the header opposite to the tank and gasket for the purpose of clamping the joint between the tank and header by means of bolts and nuts. Also called Header Bar. Some radiators with very light gauge tanks have bolting strips on the tank flange as well. See Figures 1, 2, and 3.

3.5 Bottom Tank Oil Cooler

An oil-to-coolant oil cooler mounted in the bottom tank of a radiator, usually to cool transmission or hydraulic system fluid.

3.6 Brazed Radiator

A radiator in which the bond between the fins and tubes and between the tubes and headers, is accomplished by brazing. Includes vacuum brazed aluminum radiators, and controlled atmosphere brazed aluminum and copper/brass radiators.

3.7 Breather Hole

A small hole in the side of a radiator filler neck extension for the purpose of venting the air in the expansion volume of a radiator to the filler neck during engine warm-up.

3.8 Cast Radiator

A radiator having inlet and outlet tanks of cast metal, usually aluminum, sometimes cast iron. See Figure 3.

3.9 Cellular Core

A radiator core having a number of fluid passages made by joining metal ribbons at the edges and grouped to form a cellular structure. Parts of the cellular structure may be of formed or flat ribbon which is not a part of the fluid passages. See Figure 5.

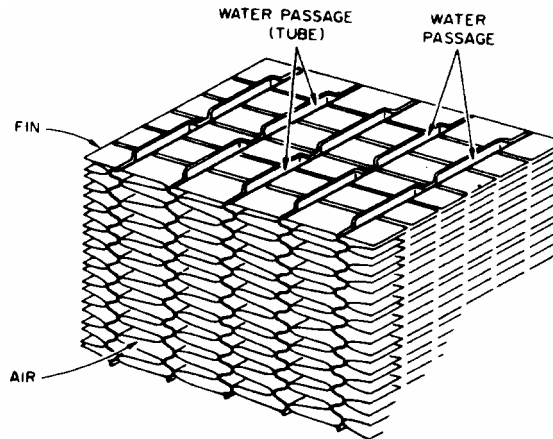


FIGURE 5 - CELLULAR CORE

3.10 Coolant Recovery Tank

A non-pressurized auxiliary radiator tank designed to capture the expansion or after-boil overflow of coolant from the radiator, but not to perform a deaeration function.

3.11 Cooling Package

A group of heat exchangers mounted together in a package, such as a radiator, charge air cooler and air conditioning condenser, along with possibly an air-to-air oil cooler, fuel cooler, etc. The package may also include a fan shroud, recirculation shields, and/or shutters.

3.12 Core Guard

A screen-type device sometimes provided to protect the radiator core from damage due to dirt and debris in the cooling air stream. See Figures 2 and 3.

3.13 Crimping Strip

A metal strip, separate from the header, and usually having tabs, which may be folded or crimped around a (usually plastic) radiator tank flange and a radiator header to clamp the two together with a gasket seal between.

3.14 Cross Flow Radiator

A radiator whose core tubes run horizontally when installed in the cooling system. See Figure 6.

3.15 Deaeration Baffle

A barrier used to separate chambers in a radiator top tank or auxiliary tank to form a deaeration tank. See Figure 1.

3.16 Deaeration Tank

A tank designed to be capable of removing entrained air or combustion gas, or both, from the circulating coolant. The deaeration tank may be integral with the radiator inlet tank or may be mounted remotely.

3.17 Dished Header

A header for a radiator in which the portion of the header through which the core tubes pass is depressed from the portion which makes up the header flanges, as in a dish. Usually used in connection with bolted radiator construction. Allows cores to be connected end-to-end with a gasket but without the use of a filler frame.

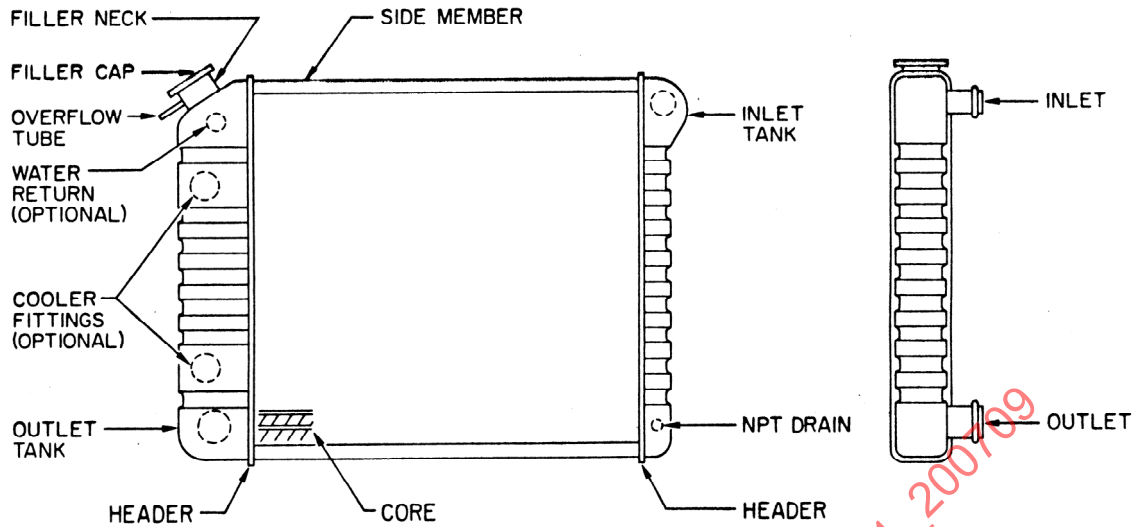


FIGURE 6 - AUTOMOBILE RADIATOR (CROSS FLOW)

3.18 Down Flow Radiator

A radiator whose core tubes run vertically when installed in the cooling system. See Figure 7.

3.19 Expansion Volume

The volume of space in a cooling system (such as in the radiator top tank or auxiliary tank) which allows for the expansion of coolant resulting from temperature rise.

3.20 Fabricated Radiator

A radiator whose inlet and outlet tanks are fabricated, as well as its side members, usually by welding of steel plates or sheets. See Figure 2.

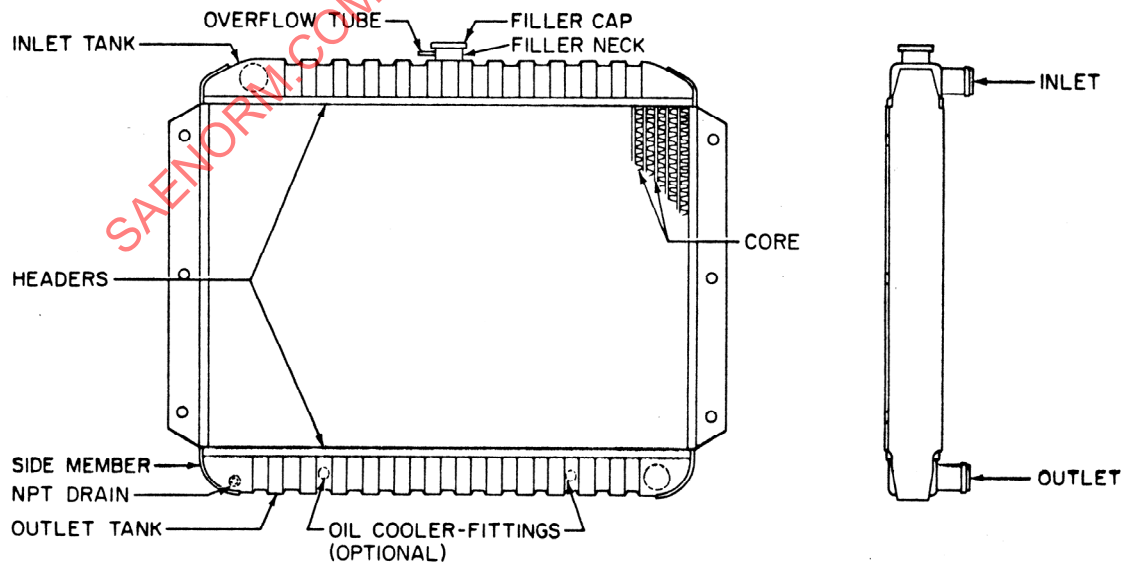


FIGURE 7 - AUTOMOBILE RADIATOR (DOWN FLOW)

3.21 Fan Guard

A formed wire or screen device for the purpose of preventing injury to personnel by moving fan blades. A fan shroud may also provide some fan guarding function. See Figures 2 and 3.

3.22 Fan Shroud

A duct to guide the cooling air between the radiator and the fan, increasing fan efficiency and reducing cooling air recirculation. See Figures 2, 8, and 9.

3.23 Filler Frame

A frame, usually of metal, bolted between the headers of two cores with gaskets for the purpose of joining the cores end to end to make a larger core assembly.

3.24 Filler Neck

The opening into a radiator inlet tank or surge tank through which the cooling system is filled with coolant. Usually formed of drawn sheet metal or molded as part of a plastic tank and designed to accept a cam-lock (bayonet-type) radiator filter cap, but may be a threaded type in some heavy-duty applications. See Figures 1 to 11.

3.25 Filler Neck Extension

A tubular extension of the filler neck, usually extending into the radiator inlet tank or surge tank. The length of the extension and the placement of the breather hole define the expansion volume of the tank.

3.26 Fill Line

A fluid conductor connecting the deaeration tank to the cooling system pump in a cooling system with deaeration capability to allow rapid filling of the system. Also called the pump return connection or the shunt line because it bypasses coolant around the radiator core directly to the pump. See Figure 1.

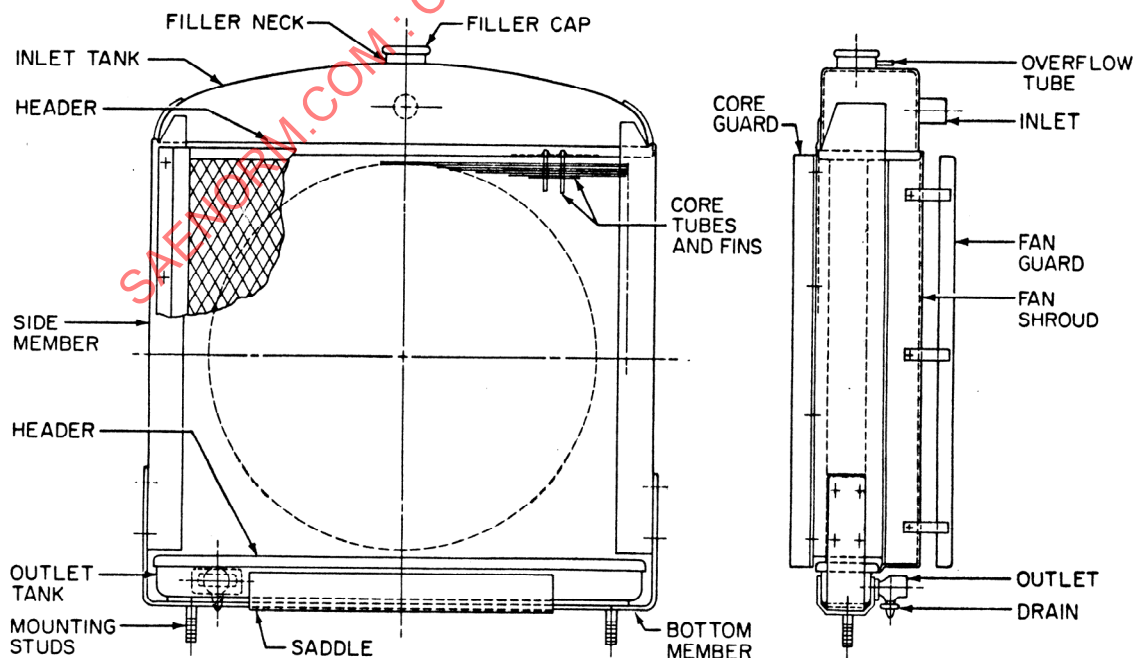


FIGURE 8 - SHEET METAL RADIATOR

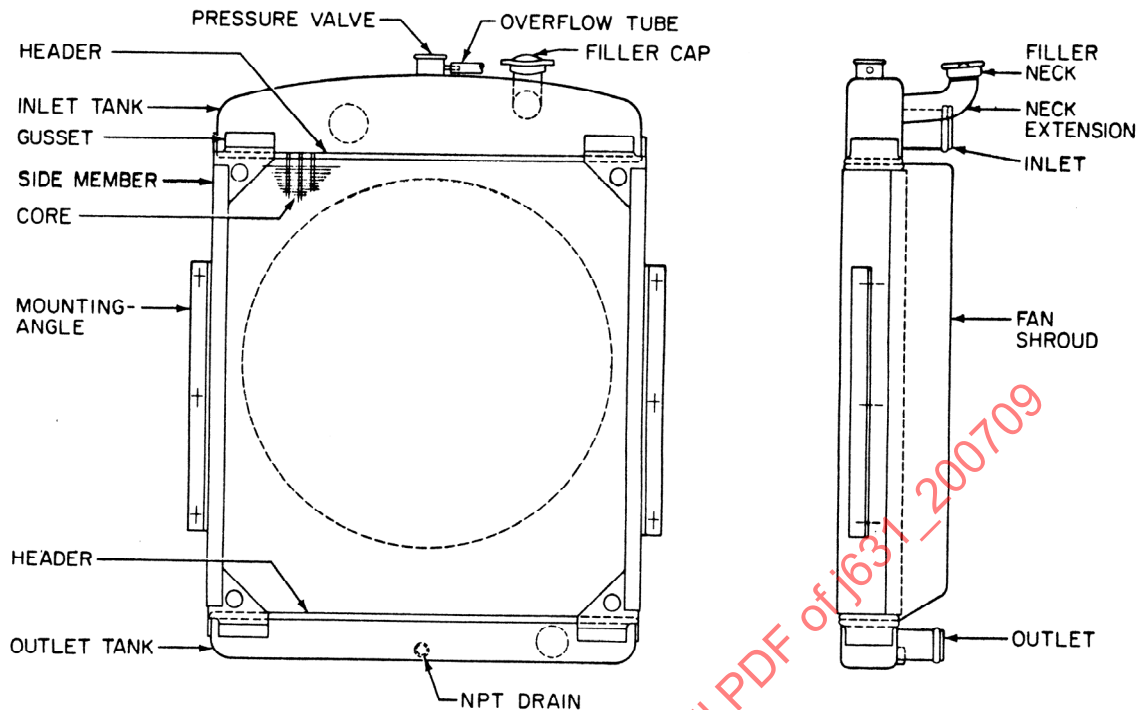


FIGURE 9 - HEAVY-DUTY RADIATOR, SHEET METAL TYPE FILLER FRAME

3.27 Header

A plate to which all of the fluid carrying tubes of the radiator core are connected. There is usually one header at each end of a core. The headers are, in turn, attached to inlet and outlet tanks for the purpose of guiding the fluid to be cooled from the inlet tank through the core tubes to the outlet tank. See Figures 1, 2, 6, 7, 8, and 9.

3.28 Header Bar

See 3.4, Bolting Strip.

3.29 Header Reinforcement

Pieces of metal having holes for core tubes, applied to the header in certain areas to increase the strength of the tube to header joints in those areas. When used, these are applied on the end rows of tubes in a core.

3.30 In-Tank Oil Cooler

An oil-to-coolant oil cooler mounted in a radiator tank, usually the outlet tank. See Figure 6.

3.31 Lock Seam Tube

A radiator core tube made from flat strip by folding the edges together into a locking seam. Usually made of brass with a solder-sealed seam. See Figures 10 and 11.

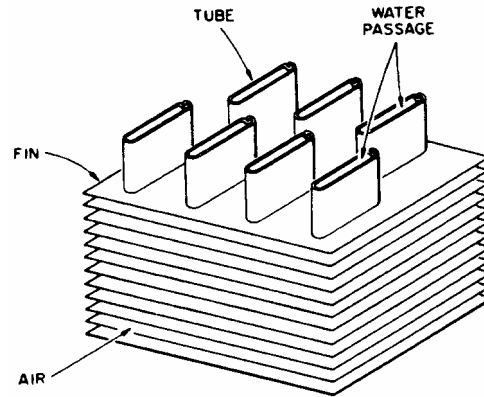


FIGURE 10 - TUBE AND PLATE FIN CORE

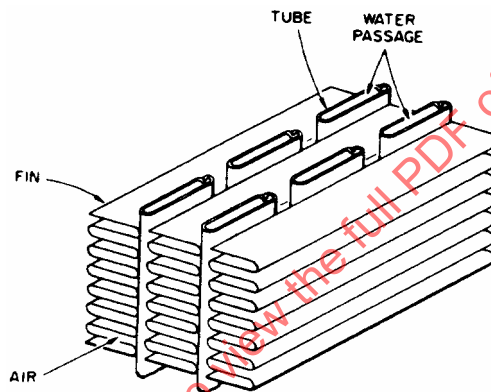
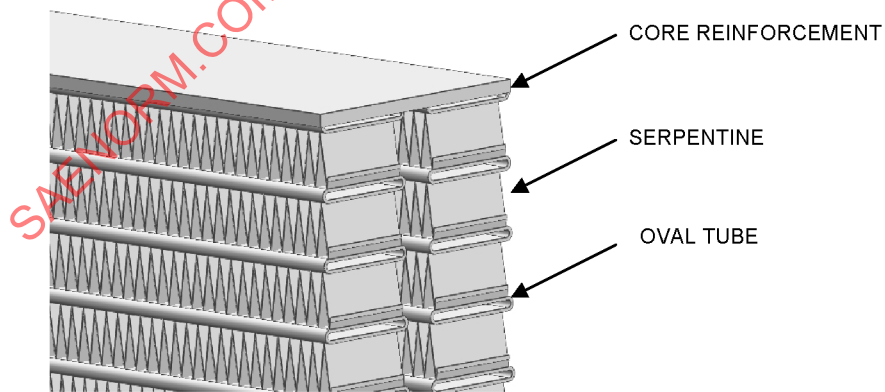
FIGURE 11 - TYPICAL TUBE AND SERPENTINE FIN CORE
(OFTEN REFERRED TO AS TUBE AND CENTER CORE AND CT CORE)

FIGURE 12 - TYPICAL AUTOMOTIVE STYLE TUBE AND SERPENTINE FIN CORE

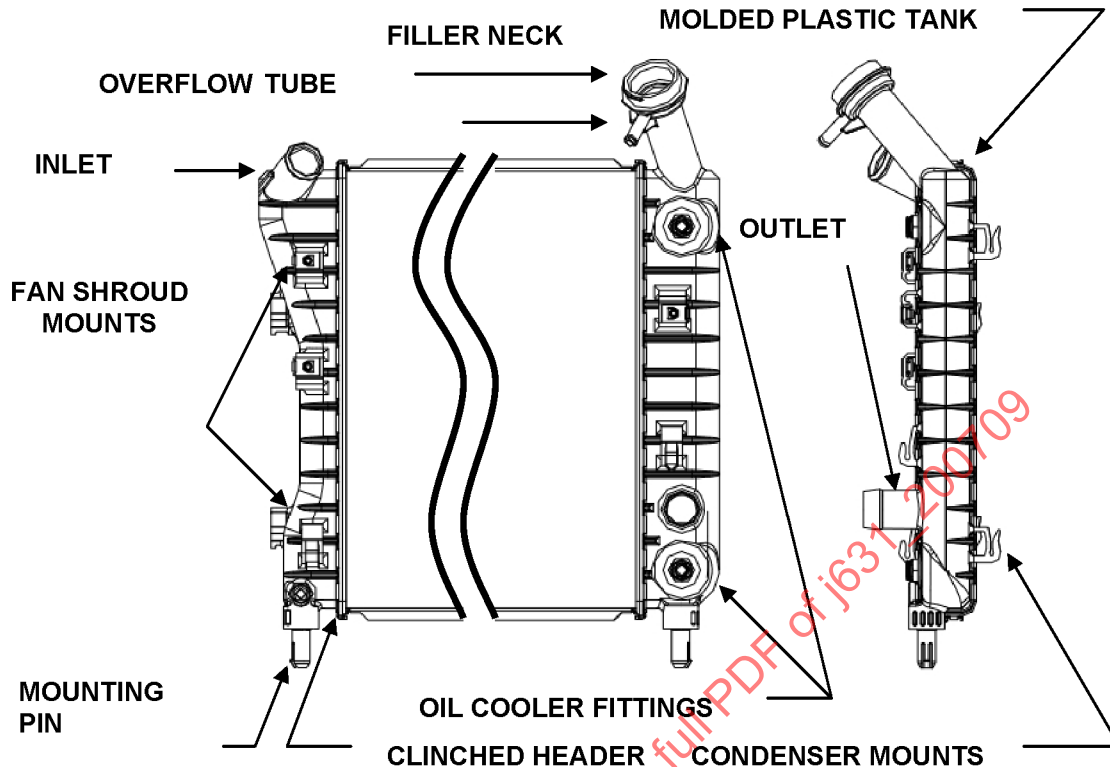


FIGURE 13 - AUTOMOTIVE CROSS FLOW RADIATOR WITH MOLDED PLASTIC TANKS

3.32 Louvered Fin

A radiator core fin having louvers for the purpose of reducing the boundary layer thickness by turbulating the cooling air for improved heat transfer performance.

3.33 Low Flow Radiator

A radiator for use in a Low Flow Cooling System, which under normal conditions operates at a coolant flow through the radiator of significantly less than full engine coolant flow rate, thus increasing the temperature drop of the coolant through the radiator. Usually used to provide low temperature coolant to a liquid cooled charge air cooler.

3.34 Low Flow Cooling (LFC) Valve

A valve used to vent the radiator to the surge tank or deaeration tank of a low flow cooling radiator to allow air (gas) to escape during system fill and start-up, and to allow deaeration, but prevent or minimize coolant bypass during normal operation.

3.35 Multi-Pass Radiator

A radiator configuration in which the core is divided into two or more sections through which the coolant passes, thereby increasing the velocity of the coolant and the distance it travels through the radiator.

3.36 Multiple Core Radiator

A radiator assembly made up of more than one core. These may be set side-by-side and connected to a common header or tank (see 3.50, Sectional Core), or may be set end-to-end and connected to each other.

3.37 Non-Louvered Fin

A radiator fin which may be a flat fin or a serpentine fin, without louvers.

3.38 One-Piece Core Radiator

A radiator having a single core, as opposed to one having more than one core making up a core assembly.

3.39 Packaged Cooling System

See 3.11, Cooling Package.

3.40 Plastic Tank Radiator (PTR)

A radiator whose inlet and outlet tanks are made of plastic, usually glass fiber reinforced Nylon 6-6. Figures 6 and 7 can represent radiators having plastic inlet and/or outlet tanks. Inlet and outlet are integral with the appropriate tank. The filler neck and other parts and/or fittings may also be integrated with the tanks. Tanks are gasketed and secured to the headers, usually by tabs on the header, or by crimping strips, that are crimped onto or over the tank flange. See Figure 13.

3.41 Plate Fin

A continuous flat fin having holes through which the radiator tubes pass. The holes are usually collared to make a soldered or brazed connection to the tubes. See Figure 10. The fins may be ribbed, dimpled, or louvered to improve heat transfer to the cooling air.

3.42 Pump Return Connection, Line

See 3.26, Fill Line. See Figure 1.

3.43 Radiator Cap, Solid

A removable device which closes the cooling system fill opening (filler neck). When installed, it permits no leakage under any cooling system operating condition. It must be used in combination with a radiator pressure relief valve. See "Filler Cap" in Figures 1 and 9.

3.44 Radiator Pressure Cap

A removable device which closes the cooling system fill opening (filler neck) and which incorporates pressure relief and sometimes vacuum relief valves. Refer to SAE J151 and SAE J164. See "Filler Cap" in Figures 2, 3, 4, 6, 7, and 8.

3.45 Radiator Pressure Relief Valve

A device which provides the same features and functions as a radiator pressure cap except that it is not used for system filling. (Some hand tools are required for removal of this valve.) It must be used in combination with a radiator cap, solid. See "Pressure Valve" in Figures 1 and 9.

3.46 Radiator Shutters

See 3.56, Shutters.

3.47 Recirculation Shields

Flexible panels, usually of rubber, metal, and plastic, placed between the radiator or cooling package and the engine compartment walls to prevent bypass of cooling air or recirculation of hot cooling air around the outside of the radiator or cooling package.