SAE International

SURFACE VEHICLE RECOMMENDED PRACTICE

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(R) Oil Cooler Nomenclature and Glossary

RATIONALE

To provide updated language for clarity and to include the latest technology and manufacturing methods.

1. SCOPE

This SAE Recommended Practice presents general nomenclature and glossary of terms for oil coolers.

1.1 Type of Applications

Oil coolers covered in this document are used for cooling of fluid power equipment, bearings, differentials, transmissions, engines, power steering, aircraft, and stationary systems.

1.2 Types of Unit

The basic types are oil to air and oil to water or other liquids. See Nomenclature (Figure 1 to Figure 8) for examples.

2. REFERENCES

There are no referenced publications specified herein.

3. DEFINITIONS OF OIL COOLER TERMS

3.1 Baffle

A partition which directs flow of fluids across the core. See Figure 2 in Nomenclature.

3.2 Baffle Spacing

Distance between adjacent baffles.

3.3 Bonnet

Collector or manifold on end of shell and tube heat exchanger which directs flow of tube-side fluid.

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3.4 Core

That section of an oil cooler assembly which is comprised of the heat transfer surfaces.

3.5 End Zone

Space between first or last baffle and adjacent tube sheet (or header) of a shell and tube oil cooler.

3.6 Face Area

Area defined by the core width times core height. (Oil to air coolers.)

3.7 Face Velocity

The average velocity of air approaching the core.

NOTE: Volume per unit time divided by face area.

3.8 Fin

Extended Heat Transfer Surface.

See Figure 1, Figure 4, Figure 6A, and Figure 6B in Nomenclature.

NOTE: Shell and tube oil coolers may have fins or other extended surfaces.

3.9 Fixed Bundle Oil Cooler

A shell and tube heat exchanger with the tube bundle permanently installed in the shell. See Figure 3 in Nomenclature.

3.10 Fouling Factor

See Fouling Resistance.

3.11 Fouling Resistance

The resistance to heat transfer resulting from accumulation of foreign material on the heat transfer surfaces of an oil cooler.

3.12 Header

This term has a dual meaning. It is sometimes used synonymously with tube sheet or tank. See Figure 2, Figure 3, Figure 6A, and Figure 6B in Nomenclature.

3.13 Heat Dissipation

The quantity of heat, usually expressed in kilowatts (British Thermal Units per minute), that an oil cooler can dissipate under specified conditions.

3.14 Inlet Temperature Differential

The difference in temperature between the fluid being cooled and the cooling medium at the point each enters the heat exchanger.

3.15 Manifold

See Tank or Bonnet. Refer to Figure 1, Figure 6A, Figure 6B, Figure 7, and Figure 8 in Nomenclature.

3.16 Multi-Pass Oil Cooler

An oil cooler that is so circuited that either fluid passes across or through the core more than once.

3.17 Oil Cooler Pressure Relief Valve

A pressure differential activated device which allows oil to bypass the oil cooler.

NOTE: Commonly used for protection under low temperature, high viscosity conditions, or any pressure surge condition where inlet pressure can become excessive.

3.18 Oil Cooler Thermostat

A temperature activated device in the oil cooler circuit, which can either by-pass oil around or modulate oil flow through the cooler.

NOTE: This device regulates oil cooler heat transfer to allow rapid heating of oil at start up or prevent excessive cooling under light load conditions.

3.19 Operating Pressure

That fluid pressure to which the oil cooler is normally exposed during operation.

3.20 Partition

A device that is installed in a manifold, header, bonnet, or tank to create multiple pass of fluids through the core.

3.21 Peak Pressure

The highest pressure to which the oil cooler is intermittently subjected.

3.22 Pressure Drop

The pressure differential between inlet and outlet at a specified fluid flow rate and viscosity.

a. Air side is measured in Pa (inches of water).

b. Oil side is measured in kPa (psi).

c. Water side is measured in kPa (psi).

3.23 Removable Tube Bundle Oil Cooler

A shell and tube heat exchanger utilizing seals between the shell and tube fluids allowing the tube bundle to be removed from the shell.

NOTE: Normally used to provide for disassembly and/or thermal expansion. See Figure 2 in Nomenclature.

3.24 Tank

An enclosure, located at the inlet and/or outlet of an oil cooler, which is sealed against the tube sheet or individual tubes and distributes the tube side fluid into the tubes or collects the tube side fluid as it exits the tubes. See Figure 6A and Figure 6B in Nomenclature.

3.25 Tube Sheet

See Figure 2 and Figure 3 in Nomenclature.

3.26 Turbulator

A device that increases fluid turbulence for the purpose of increasing heat transfer.

NOTE: For typical configurations, see Figure 1, Figure 5, Figure 6A, Figure 6B, and Figure 8 in Nomenclature.

4. NOMENCLATURE

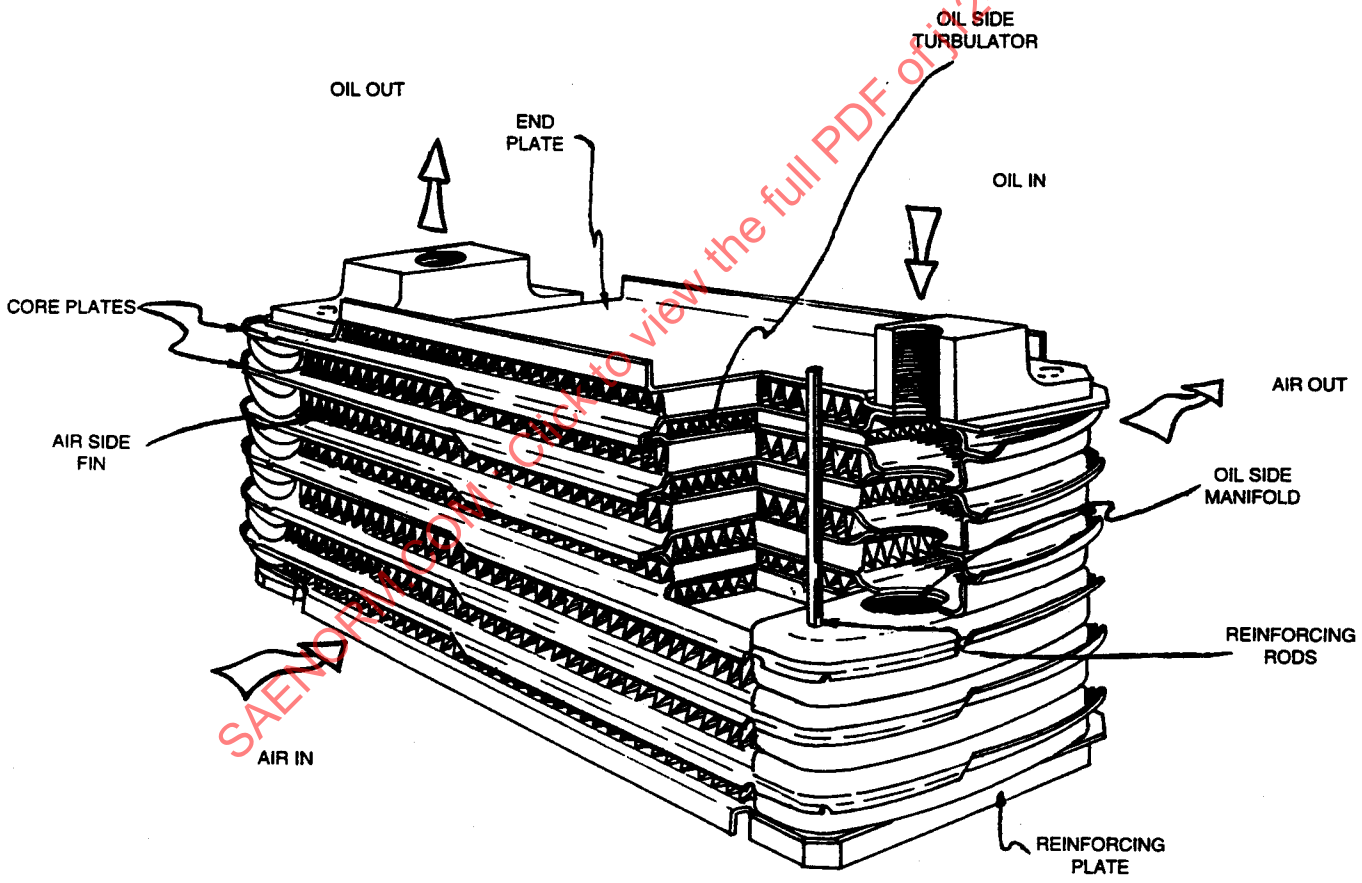

FIGURE 1 - PLATE FIN SEPARATOR OIL TO AIR COOLER

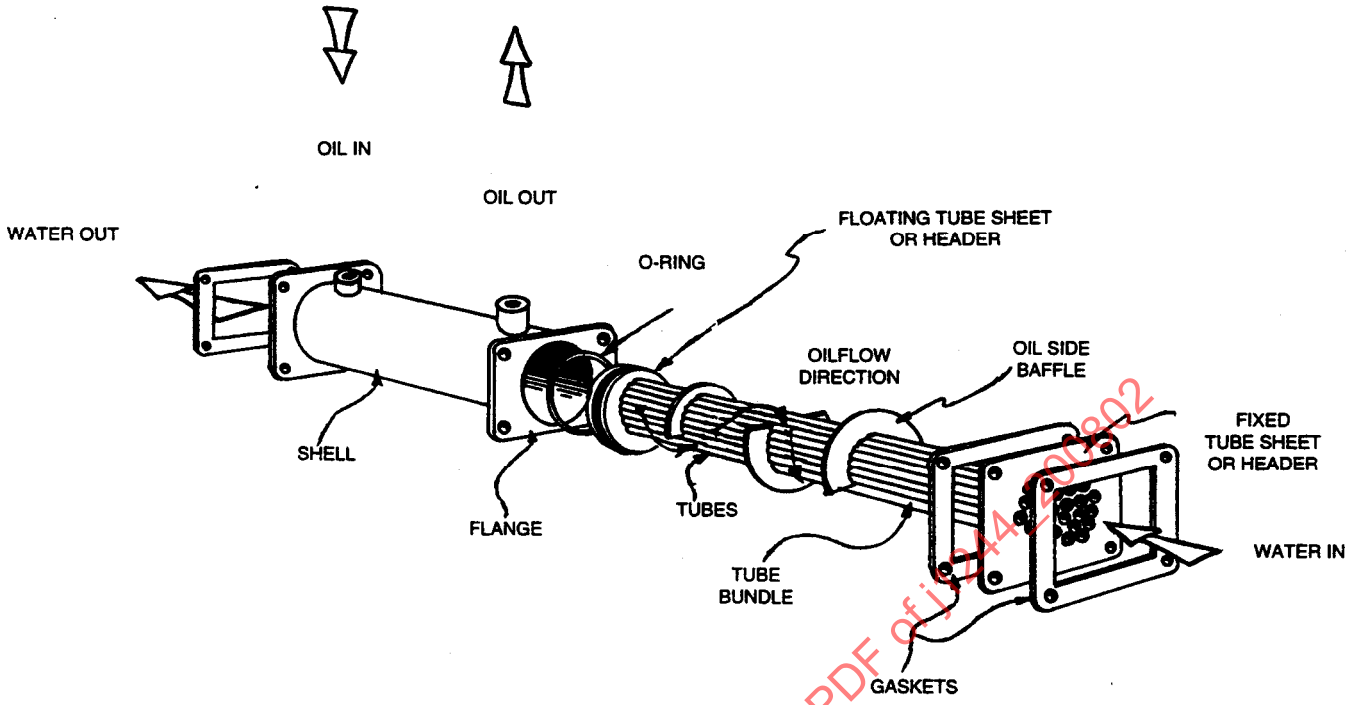

FIGURE 2 - SHELL AND TUBE REMOVABLE BUNDLE OIL TO WATER COOLER

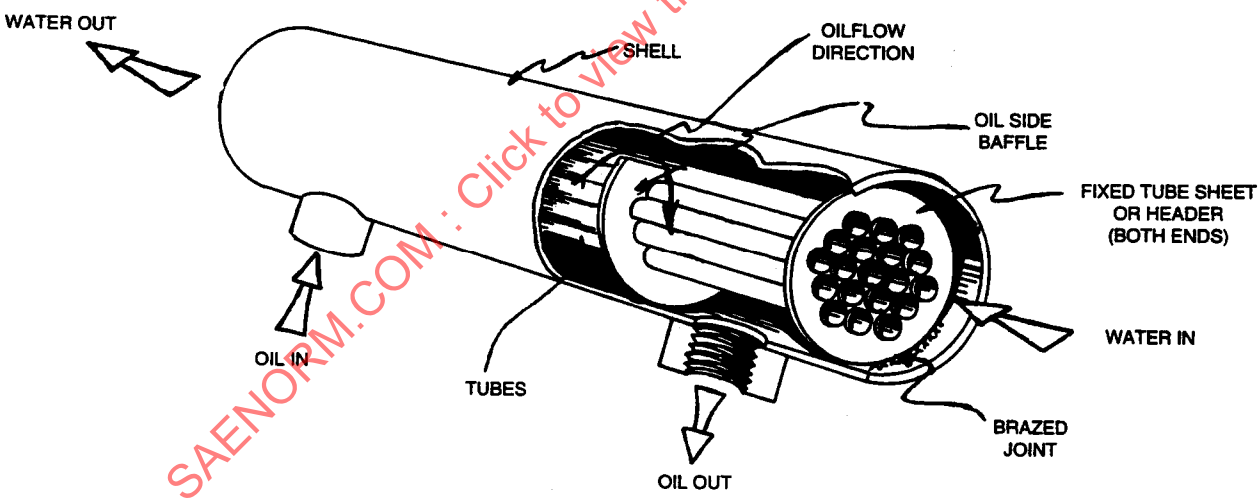

FIGURE 3 - SHELL AND TUBE OIL TO WATER COOLER-FIXED BUNDLE

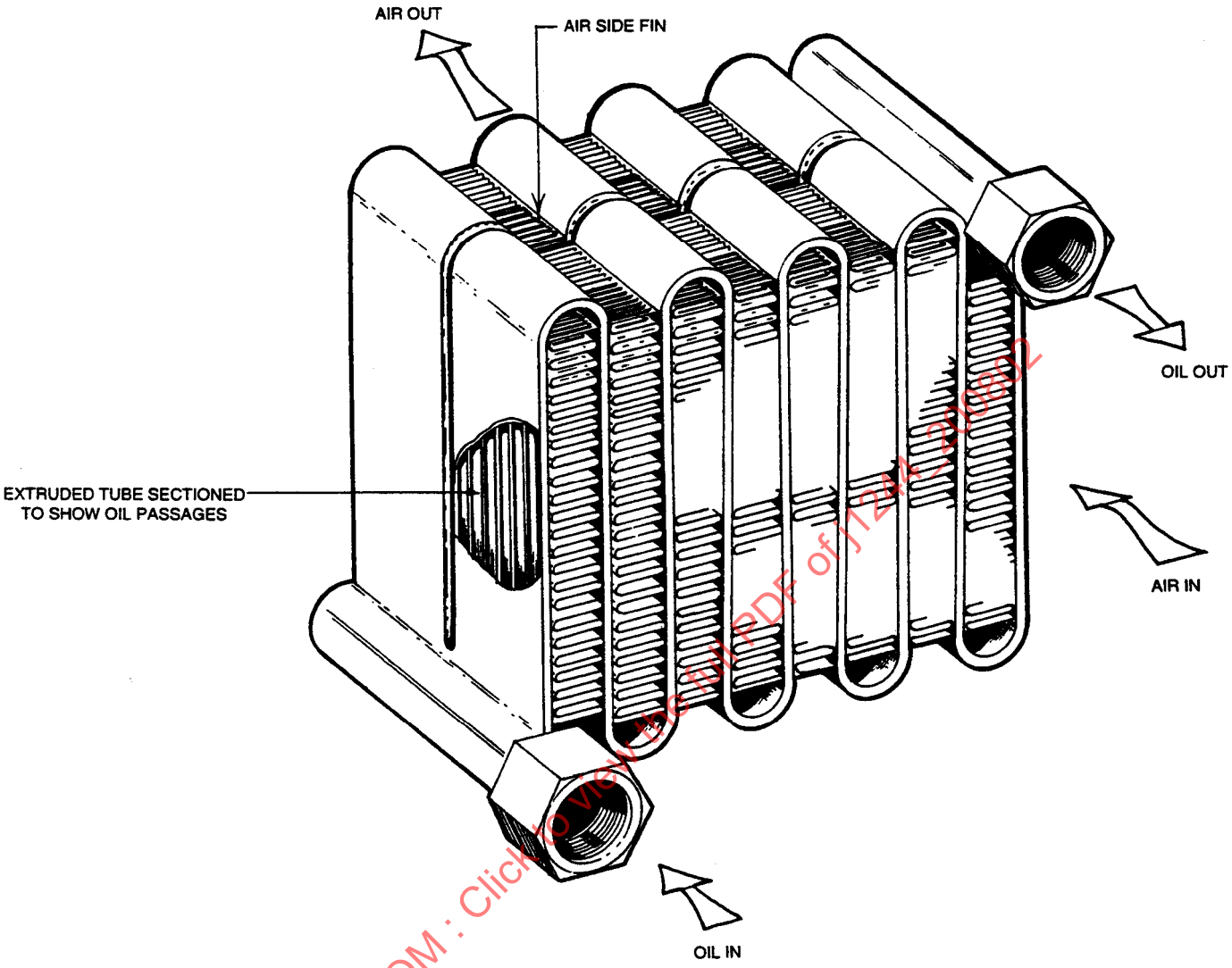

FIGURE 4 - SERPENTINE TUBE AND FIN OIL TO AIR COOLER

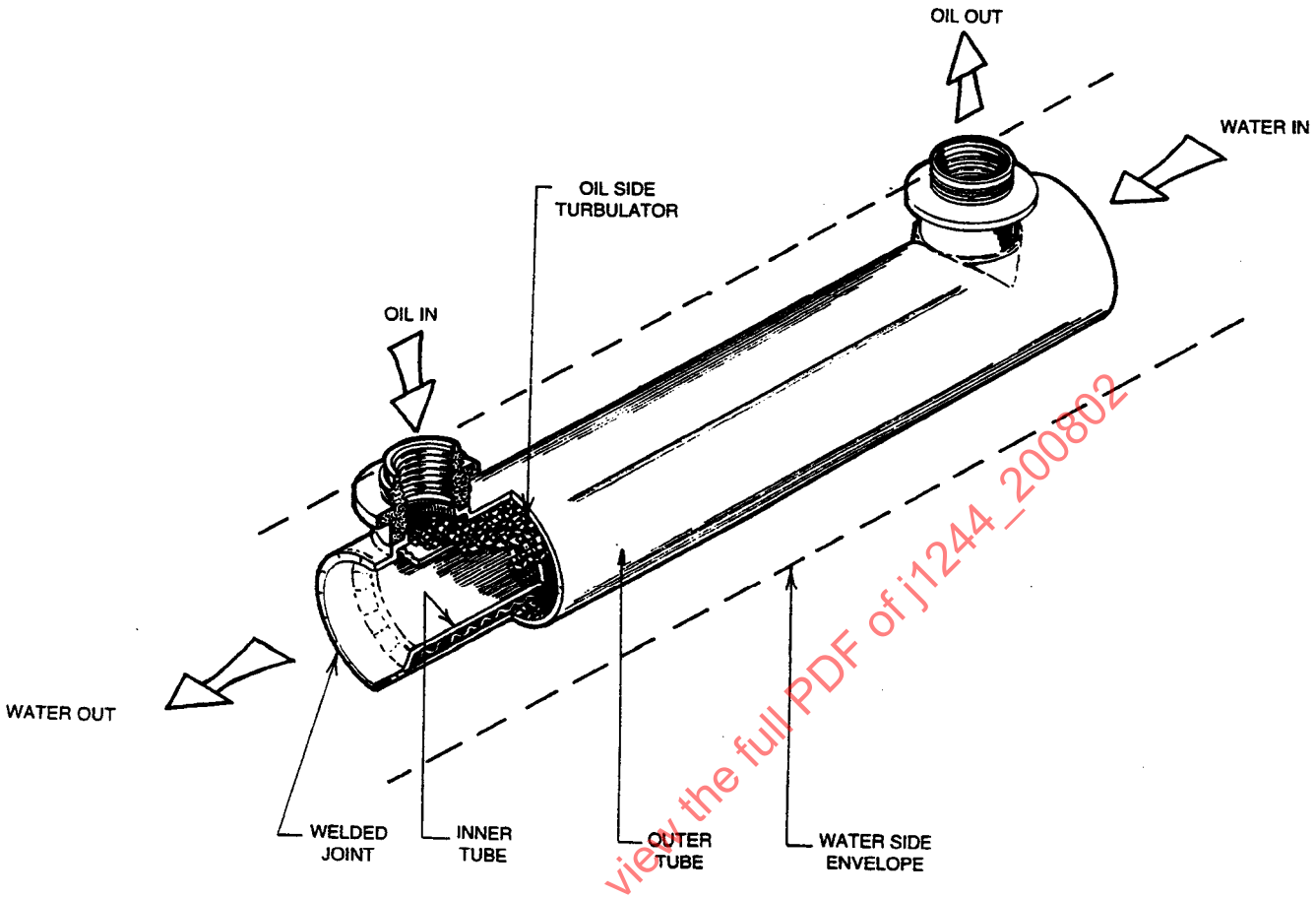

FIGURE 5 - CONCENTRIC TUBE OIL TO WATER COOLER

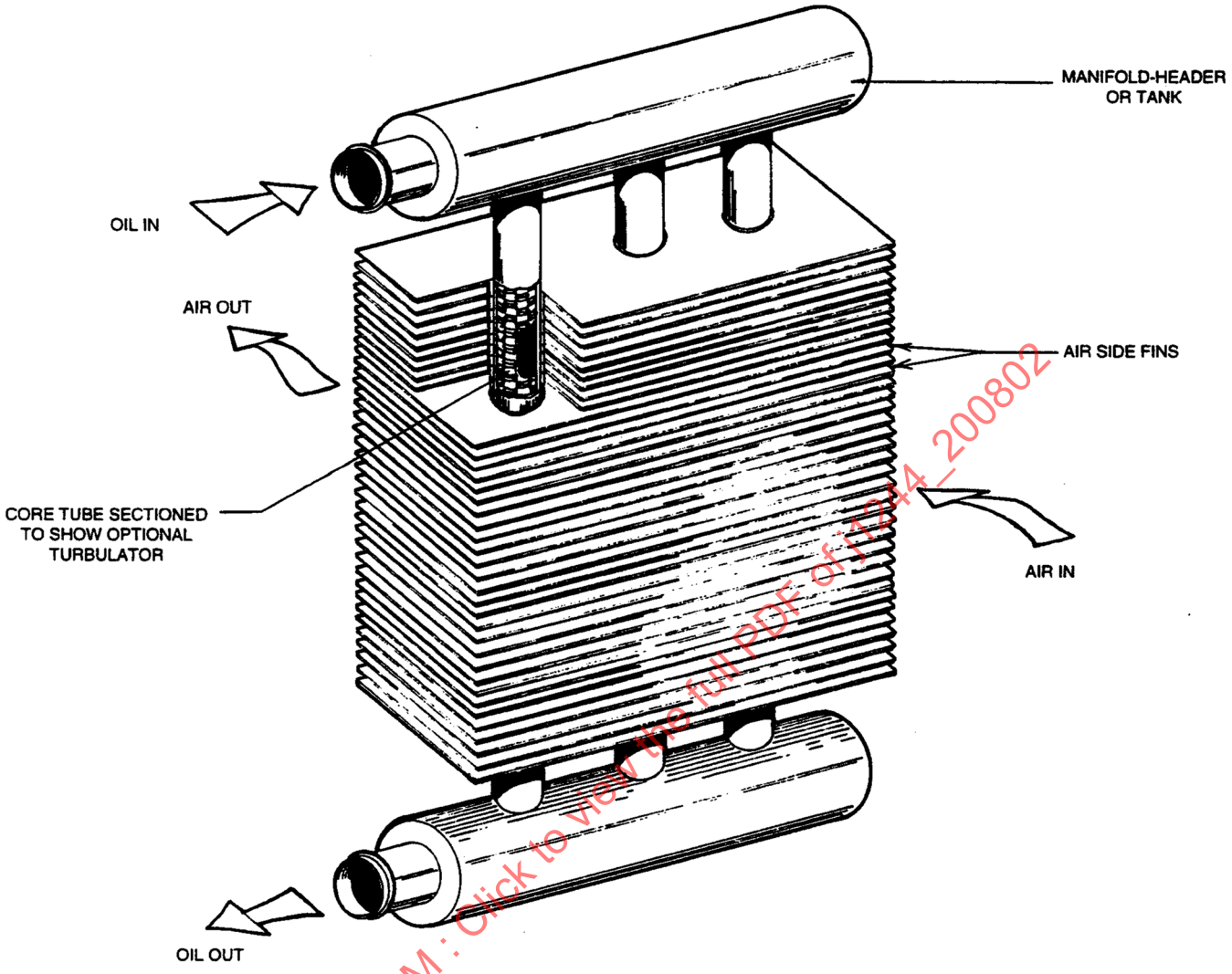

FIGURE 6A - ROUND TUBE AND FIN OIL TO AIR COOLER