

SPECIFIC FUEL CONSUMPTION

Specific Fuel Consumption of an engine may be defined as the amount of fuel consumed per unit work done.i.e.

$SFC = \text{Amount of Fuel consumed (in Kg/ gms/ lbs/.....)} / \text{Amount of work done (in kJm/ Nm/ Joules/BHP.hr ...)}$

In electrical engine, it is the amount of electricity (in KWHr.) consumed per unit work done.

For the locomotive, SFC of the engine can be calculated by measuring time to calculate the Horse Power output in terms of BHP.Hr for a specific amount of fuel consumption while the engine is put on load during load box test. For measuring SFC a special gadget is used having metered quantity of fuel and having the provisions to collect fuel of all return fuel lines of the engine into the gadget. The quantity of fuel consumed is converted into gms by multiplying with density at that ambient condition. Time taken for consumption of the measured quantity of fuel is recorded in hours. Horsepower produced is also recorded in terms of BHP for calculation purpose. The unit used for SFC is gms./ BHP.hr. [Amount of fuel consumed (in gms.) / Amount of works done (in BHP hr.)]

This is more accurate in order to calculate engine efficiency, because output of the engine is measured at the crankshaft, neglecting all other losses of the locomotive.

There is a second method of calculating SFC, in which the amount of work done is measured in terms of Tonne Km. This is more practical because here the total losses incurred in the locomotive/ formation of train are taken into consideration for calculating the SFC. The unit used is in liters/ 1000 GTKM. (GTKM means KM earned with the gross tonnage hauled including the weight of the locomotive).

As train resistance, air resistance and other parasitic loads of locomotive/ train varies at different speed ranges, so SFC of the locomotive is calculated with respect to its service.

As per the statistics of the year 2000- 2001, the values of SFCs are:

$$SFC_{\text{Goods}} = 2.62 \text{ Ltrs./ 1000 GTKM}$$

$$SFC_{\text{Pass}} = 4.65 \text{ Ltrs./ 1000 GTKM}$$

For locomotives in shunting service GTKM earning can't be recorded, hence it is not calculated.

For electric locomotives, there are mainly 3 modes of service for which GTKM earning is recorded to calculate SFC. The figures of SFCs, accordingly are:

$$SFC_{\text{EMU}} = 40- 45 \text{ KWH./ 1000 GTKM}$$

$$SFC_{\text{Pass}} = 20- 22 \text{ KWH./ 1000 GTKM}$$

$$SFC_{\text{Goods}} = 8 - 8.5 \text{ KWH/ 1000 GTKM}$$

Besides other comparison the figures represented by electrical department is entirely rheotic. Because, for EMUs for recording energy consumption the energy meter is not available with the locomotive and the figures are purely based on assumption. For passenger and goods service locomotives, although energy meter is available but the

figures are so manipulated that SFCs for goods service some times come to be negative, as if during hauling instead of consumption it produces power.