If this equation is used, the calculation of the dimensions can be made in a well-organised way.>

{The readers should be aware by now that Giesl's equation (A20.4) shows a strong likeness with the Zeuner's original momentum equation.}

A.20.4.3 The numerical calculation

<In practice the blast system is designed for the highest load of the locomotive. The grate load, or the possibilities of the fireman, determine the amount of coal/hr. The amount of smoke gas is determined by the applied coal and the extra air involved. This amount is around 1.5 or 1.6 and can be kept very constant as tests[4] with the series 17c of the Austrian Südbahn have shown.

The theoretical amount of air for complete combustion of coal of 6,250 kcal/kg is 9.1 kg/kg so that for an extra air amount ratio of 1.55 the smoke gas-weight is 14.8 kg.

On average for mid-European coal and browncoal the theoretical amount of air is: $L = \frac{H}{1000} \cdot (1.4 \div 1.45) \quad kg/kg$. {$H$ appears not to have been defined by Giesl-Gieslingen, it probably means Heizwert, calorific value}

This would mean that for an excess air ratio of 1.5 to 1.6 the amount of smoke gas would be: $G = (2.1 \div 2.35)\frac{H}{1000} + 0.9 \quad kg/kg$. A precise calculation based on coal composition has little use, as the assumptions will not be met in practice.

With high "grate load" levels part of the coal remains unburned.

The specific weight of the smoke gas can be assumed to be γ = 1.33 kg/m^3 for 0 ^{o}C and 760 mm Hg of atmospheric pressure.

The smoke gas weight per second G_2 can be calculated this way.>

A.20.4.4 Steam-making/Evaporation

<The amount of steam per hour can be found from an estimate of the evaporation rate or more accurately from observance of the boiler efficiency. Sufficient experience is present in this area. On average the ratio $\frac{G_2}{G_1}$ moves between 2.0 and 2.7. The lower value is for saturated locomotives and low grate loads. Superheated locomotives use the larger values.>

A.20.4.5 Vacuum in the Smokebox

<The required vacuum can be estimated from experience with the coal used and comparable boilers. A calculation aided by formulae using the resistance coefficients of the grate has a low value, as the results are not better than the estimates. It is clear that the required vacuum is estimated on the high side.

If the vacuum $P_A - P_R$ is estimated for a high load, the vacuum for different loads can be calculated by using the law: $\frac{P_A - P_R}{P_A - P_R^1} = \left(\frac{B}{B^1}\right)^2$.