

# Flue gas calculation

Info:

## Fuel Characteristic and flue gas data

| Fuel             | %wt     | Stoichiometric O <sub>2</sub> demand mol/kg fuel | Stoichiometric flue gas |                    | Actual flue gas |           |        |                    |
|------------------|---------|--|-------------------------|--------------------|-----------------|-----------|--------|--------------------|
|                  |         |  | mol/kg fuel             | %n                 | mol/kg fuel     | %n (%vol) | M      | %m [kg/kg]         |
| C                | 30,00%  | 24,98  | 24,98                   | 15,16%             | 24,98           | 9,33%     | 44,01  | 14,38%             |
| H                | 3,60%   | 8,91   | 33,00                   | 20,02%             | 34,03           | 12,71%    | 18,01  | 8,02%              |
| S                | 0,20%   | 0,06   | 0,06                    | 0,04%              | 0,06            | 0,02%     | 64,12  | 0,05%              |
| O                | 18,00%  | -5,63  | 0,00                    | 0,00%              | 21,40           | 7,99%     | 32     | 8,96%              |
| N                | 0,60%   |  | 106,57                  | 64,66%             | 187,07          | 69,87%    | 28     | 68,50%             |
| Cl               | 0,70%   |  | 0,20                    | 0,12%              | 0,20            | 0,07%     | 36,5   | 0,09%              |
| Ash              | 22,00%  |  |                         |                    |                 |           | 222,64 | 100,00%            |
| H <sub>2</sub> O | 24,90%  |  |                         |                    |                 |           | 28,6   |                    |
| Σ                | 100,00% | 28,33  | 164,81                  | 100,00%            | 267,74          | 100,00%   | 1,27   |                    |
| LHV              | 11,5    | MJ/kg  |                         |                    |                 |           |        |                    |
| HHV              | 12,2    | MJ/kg  |                         |                    |                 |           |        |                    |
| M                |         |  | 28,4                    | g/mol              |                 |           | 28,6   | g/mol              |
| Density          |         |  | 1,27                    | kg/Nm <sup>3</sup> |                 |           | 1,27   | kg/Nm <sup>3</sup> |
| cp               |         |  | 1,2199                  | kJ/kg*K            |                 |           | 1,1480 | kJ/kg*K            |

|                                    |  |
|------------------------------------|--|
| Stoichiometric air demand          | 136,26 mol/kg fuel<br>3,05 Nm <sup>3</sup> /kg fuel<br>3,91 kg/kg fuel |
| Stoichiometric flue gas production | 164,81 mol/kg fuel<br>3,69 Nm <sup>3</sup> /kg fuel<br>4,69 kg/kg fuel |

|                     |                          |                    |
|---------------------|--------------------------|--------------------|
| Ref. O <sub>2</sub> | 11%                      |                    |
| SO <sub>2</sub>     | ppm                      | mg/Nm <sup>3</sup> |
|                     | Actual                   | 233 666            |
|                     | Dry, ref. O <sub>2</sub> | 267 763            |
| HCl                 | ppm                      | mg/Nm <sup>3</sup> |
|                     | Actual                   | 736 1200           |
|                     | Dry, ref. O <sub>2</sub> | 844 1375           |

|                            |   |
|----------------------------|---|
| Excess air number (λ)      | 1,75541642  |
| Air humidity (%)           | 1,00%   |
| Actual air demand          | 239,18 mol/kg fuel<br>5,36 Nm <sup>3</sup> /kg fuel<br>6,87 kg/kg fuel  |
| Actual flue gas production | 267,74 mol/kg fuel<br>6,00 Nm <sup>3</sup> /kg fuel<br>7,65 kg/kg fuel<br>0,52 Nm <sup>3</sup> /MJ fuel (LHV) |

|  |                            |
|--|----------------------------|
| Flue gas flow  |                            |
| Input MW   | 112,8 MW                   |
| Fluegas temperature  | 160,0 °C                   |
| kg/sek, , wet, actual O <sub>2</sub> , actual temp                 | 74,7 kg/sek                |
| Actual m <sup>3</sup> /h, wet, actual O <sub>2</sub> , actual temp | 334,688 m <sup>3</sup> /h  |
| Nm <sup>3</sup> /h, wet, actual O <sub>2</sub> , 0°C               | 211,016 Nm <sup>3</sup> /h |
| Dry Nm <sup>3</sup> /h, actual O <sub>2</sub>                      | 184,194 Nm <sup>3</sup> /h |
| Dry, 11% O <sub>2</sub> , 0°C                                      | 239,589 Nm <sup>3</sup> /h |

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