6.3.7.1 Specific Thermal Energy Consumption [MJ/t clin]

Description

Thermal energy consumption is the total of GJ consumed to produce clinker. This is the sum of the GJ of all fuel types consumed in the kiln system.

Specific thermal energy consumption corresponds to the amount of thermal energy consumed in order to produce one ton of clinker.

Reference to Process

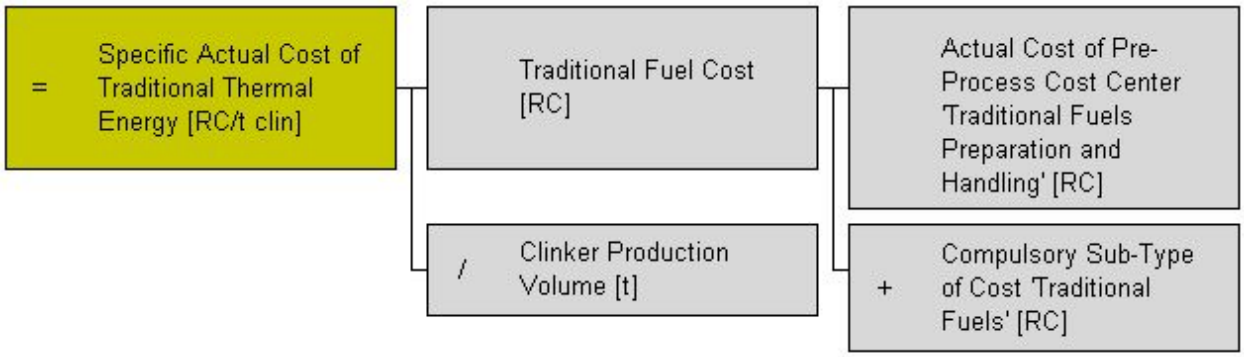
This indicator refers to:

- Main cost center 'Clinker Production' without pre-process cost centers
- All main cost centers up to and including 'Clinker Production' with pre-process cost centers
- Product sub-segment Clinker and Cement

Purpose

To measure the efficiency of thermal energy used.

Calculation



$$\text{Specific Thermal Energy Consumption [MJ/t]} = \frac{\text{Total Thermal Energy Consumed for Clinker Production [MJ]}}{\text{Volume at the Related Stage of Production [t]}}$$

Thermal energy

'Thermal energy consumption (kiln)' is the total of GJ consumed in the cost centre 'Clinker production'.

'Thermal energy consumption (kiln)' is the sum of 'Traditional thermal energy consumption (kiln)' and of 'Alternative thermal energy consumption (kiln)'.

'Traditional thermal energy consumption (kiln) [GJ] is the sum of the thermal energy input of coal, pet coke, natural gas and other traditional fuels consumed in the kiln system.

'Thermal energy consumption' (up to and including Clinker Production) is the total of GJ consumed in the cost centres 'Raw material extraction', 'Raw material preparation', 'Raw meal preparation' and 'Clinker production'.

Specific thermal energy

The calculation of Specific Thermal Energy Consumption up to and including Clinker Production follows the cost per ton principle (see example below).

Comments and Examples

TIS data normalization codes:

Traditional thermal energy consumption (kiln) [GJ] ICS Code 400+GJ+TF

Alternative thermal energy consumption (kiln) [GJ] ICS Code 400+GJ+AF

Thermal energy consumption (kiln) [GJ] ICS Code 460+GJ+CLINKE

STECK indicator should be reviewed together with OEE ('Net Overall Equipment Efficiency, Net OEE [%]', and 'Gross Overall Equipment Efficiency, Gross OEE [%]') and clinker lime saturation.

Positive influences in order to minimize specific energy consumption e.g. process optimization by, i.e. monitoring and improving burning processes, minimizing false air input

Specific Thermal Energy Consumption Kiln (MJ/t clin)				
	Fuel	MJ	t clin	MJ/t clin
Kiln 1	Coal type I	96'750'000		
	Coal type II	29'250'000		
	Natural Gas	16'650'000		

	Total Kiln 1	**142'650'000**	**45'000**	**3'170**
Kiln 2	Coal type I	90'000'000		
	Heavy Fuel Oil	3'500'000		
	Tires	25'000'000		
	Total Kiln 2	**118'500'000**	**35'700**	**3'320**
Total Plant		**261'150'000**	**80'700**	**3'236**

Thermal energy used in raw material preparation, auxiliary furnaces, preheating of heavy fuel oil, etc. taken from other process steps is not included. The thermal energy consumption is determined by multiplication of the volumes of fuels measured with the specific net calorific value of the fuels, given in MJ/ton.

Specific Thermal Energy Consumption Kiln (MJ/t clin)		Raw Material Extraction	Raw Material Preparation	Raw Meal Preparation	All Kilns	Clinker Production	Total up to & incl Clinker Prod.(clin)
Auxiliaries (70/30 rule applied)	MJ					250'000	
Pre-Process	MJ	0	0	400'000		500'000	
Main Cost Center	MJ	0	150'000	0	261'150'000	261'150'000	
Total Consumption	MJ	0	150'000	400'000	261'150'000	261'900'000	262'450'000
Production Tons	t	73'000	72'000	65'000	80'700	80'700	
Thermal Energy Consumption per ton	MJ/t	-	2.08	6.15	3'236.06	3'245.35	
Factors:	#	1.67	1.64	1.62	1.00	1.00	
Specific Thermal Energy Consumption Kiln	MJ/t clin	-	3	10	3'236	3'245	3'259

'Thermal energy consumption (kiln)' is 261'150 [GJ]

'Traditional thermal energy consumption (kiln)' is 236'150 [GJ]

'Alternative thermal energy consumption (kiln)' is 25'000 [GJ]

'Specific thermal energy consumption (kiln)' is 261'150 [GJ]/ 80'700[t clin] = 3'236 [MJ/t clin].

This refers exclusively to the thermal consumption in the kiln systems.

Specific thermal energy consumption up to and including Clinker Production is 3'259 [MJ/t clin].

This refers to the thermal energy consumption in the kiln system, all pre-process cost centers and all main cost centers up to and including 'Clinker Production'.

The net calorific value has to be determined for all fuels. It can be determined in own laboratory, by third parties, by literature reference or consider the one specified on the invoice. If measured, it has to be measured after preparation (at the burner pipe or entrance of the kiln and not at the plant gate).

Sales of thermal energy to third party are excluded.

In the raw meal preparation the thermal energy consumption corresponds to the total energy of all types of fuel fired in the auxiliary furnace for drying purposes and excludes heat recovery from kiln exhaust gases and / or from cooler exhaust air. Bitumen, if consumed as fuel, is considered in the calculation.

Printable version of the example

Spec Thermal Energy Cons_ex.xls

Reporting Requirements

The indicators are reported in SAP FC.