60.3.10.2 Compliance to Internal Product Specifications

Description

This indicator measures on a monthly basis the compliance of the manufactured products with the agreed quality characteristics relevant to the market.

It is the percentage of samples that meet all required parameters of the internal product specifications (typically 3 to 5 parameters), with respect to all samples tested.

The indicator is composed of two elements:

- Compliance to cement and mortar specifications
- Compliance to concrete specifications

The internal specifications for cement and mortar have to include parameters specified in the pertinent national Cement Standards and to be equal or more stringent than those. Compliance with Internal Product Specification shall imply that also national Cement Standards are fulfilled.

Purpose

The indicator measures the compliance of the manufactured products with the agreed quality characteristics relevant to the market.

The indicator is used for the calculation of the yearly Product Quality Index, used in the CIPR.

Calculations

<u>For Product A and month k:</u>

Compliance with mortar specifications: $M_{Ak}[\%] = \frac{M_{Ak,\,cpl}}{M_{Ak}}\ 100$

Compliance with concrete specifications: $C_{Ak}[\%] = \frac{C_{Ak,\,cpl}}{C_{Ak}}\ 100$

Compliance to Internal Product Specifications: $CIPS_{Ak}[\%] = \frac{M_{Ak,\,cpl}+C_{Ak,\,cpl}}{M_{Ak}+C_{Ak}}\ 100$

Where

- M_{Ak}: Number of samples tested on cement and mortar
- $M_{Ak,\,cpl}$:Number of samples tested on cement and mortar in compliance
- C_{Ak} :Number of samples tested on concrete
- $C_{Ak,\,cpl}$:Number of samples tested on concrete in compliance

<u>For Product A, 12 months rolling:</u>

Compliance to Internal Product Specifications: $CIPS_{A12M}[\%] = \frac{\sum_{k-12}^{k}(V_{Ak}\,CIPS_{Ak})}{\sum_{k-12}^{k}V_{Ak}}$

Where:

- V_{Ak}: Volume of product A in month k

Aggregation over all products, month k:

The overall compliance to Internal Product Specification is calculated as the volume-weighted average of all M products.

Compliance to Internal Product Specifications: $CIPS_k\,[\%] = \frac{\sum_{P=1}^{M} (V_{Pk}\, CIPS_{Pk})}{\sum_{P=1}^{M} V_{Pk}}$

Aggregation over all products, 12M rolling

Compliance to Internal Product Specifications: $CIPS_{12M}\ [\%] = \frac{\sum_{k-12}^{k} (V_k CIPS_k)}{\sum_{k-12}^{k} V_k}$

Unit of measure:

%

Comments and examples:

Products:

Cements produced at annual volumes less than 10'000 t (or less than 1% of the total cement production) can be excluded.

Internal Product Specifications

Internal Product Specifications have to comprise:

- All specifications of the applicable National Cement Standard for which limits are defined.
- Parameters and targets applicable for meeting customer requirements that go beyond the Cement Standards, referring both to
    - Concrete (standard concrete; tested at plant, company or external laboratory)
    - Mortar / Cement (tested at plant or company laboratory)

Targets have to be set either as maximum or minimum limits or both (range). They should be set such that the expectation is to meet them with a confidence level of 95 %.

Samples

The compliance to Internal Product Specifications should be derived from the routine quality control testing of cement. Preferably samples taken from dispatch should be used; in this case the sales/dispatch volume shall be used for calculation of the weighted average).

However, in cases where this not done (or at low frequency), test results from samples taken from the cement mills can be used; in this case, the production volume is used to calculate the weighted average).

Rating

The indicator is used for the calculation of the Product Quality Index (CIPR report). Its contribution is calculated as follows:

CIPS [%]	Potential for improvement	Rating for Product quality Index (CIPR)
≥ 95	Low	25
75 – 95	Medium	0 – 25 (linear scaling)
< 75	High	0

Example

Compliance to Internal Product Specification

				previous year											
Product			Month	1	2	3	4	5	6	7	8	9	10	11	12
A	Number of concrete property tests performed		C_{Ak}	1	1	1	1	1	1	1	1	7	2	1	1
	Number of concrete property tests in compliance		$C_{Ak,\ cpl}$	1	1	1	1	1	1	1	1	7	2	1	1
	Number of cement and mortar property tests performed		M_{Ak}	5	4	8	10	8	8	7	7	8	8	8	9
	Number of cement and mortar property tests in compliance		$M_{ak,\ cpl}$	5	4	8	9	2	8	7	7	8	7	8	9
	Total cement volume		V_{Ak} (1000 t)	13.5	3.6	9.7	11.7	13.7	14.4	13.7	13.5	10.0	12.3	14.7	17.1
	Compliance to Internal Product specifications	monthly	$CIPS_{Ak}$	100.0	100.0	100.0	90.9	33.3	100.0	100.0	100.0	100.0	90.0	100.0	100.0
		12M	$CIPS_{A12mr}$												92.3
B	Number of concrete property tests performed		nC_{Bk}	5	3	6	7	7	11	10	9	10	6	5	6
	Number of concrete property tests in compliance		nC_{cplBk}	5	3	6	7	7	11	10	9	10	4	5	6
	Number of cement and mortar property tests performed		nM_{Bk}	5	5	8	10	8	9	8	8	8	9	8	9
	Number of cement and mortar property tests in compliance		nM_{cplBk}	5	5	3	8	4	9	8	8	8	9	7	8
	Total cement volume		V_{Bk} (1000 t)	3.2	1.9	10.9	14.5	15.5	9.4	11.7	11.3	12.8	11.3	8.3	7.4
	Compliance to Internal Product specifications	monthly	$CIPS_{Bk}$	100.0	100.0	64.3	88.2	73.3	100.0	100.0	100.0	100.0	86.7	92.3	93.3
		12M	$CIPS_{B12mr}$												89.5
Overall	**Total Volume**		**V_k (1000 t)**	**16.7**	**5.5**	**20.7**	**26.3**	**29.2**	**23.9**	**25.4**	**24.8**	**22.8**	**23.6**	**23.0**	**24.5**
	Overall Compliance to Internal Product Specification	**monthly**	**$CIPS_k$**	**100.0**	**100.0**	**81.1**	**89.4**	**54.5**	**100.0**	**100.0**	**100.0**	**100.0**	**88.4**	**97.2**	**98.0**
		12M	**$CIPS_{12mr}$**												**91.1**

				Actual year											
Product			Month	1	2	3	4	5	6	7	8	9	10	11	12
A	Number of concrete property tests performed		C_{Ak}	1	1	1	1	1	1	1	1	1	1	1	1
	Number of concrete property tests in compliance		$C_{Ak,\ cpl}$	1	1	0	1	1	1	1	1	1	1	1	1
	Number of cement and mortar property tests performed		M_{Ak}	6	6	8	9	8	8	8	9	8	10	8	8
	Number of cement and mortar property tests in compliance		$M_{ak,\ cpl}$	6	6	8	9	8	6	8	9	8	10	8	8
	Total cement volume		V_{Ak} (1000 t)	6.5	4.3	6.2	12.2	13.3	16.5	17.6	16.0	18.0	20.2	21.4	18.1
	Compliance to Internal Product specifications	monthly	$CIPS_{Ak}$	100.0	100.0	88.9	100.0	100.0	77.8	100.0	100.0	100.0	100.0	100.0	100.0
		12M	$CIPS_{A12mr}$	91.9	91.9	91.2	92.0	98.6	96.0	96.1	96.2	96.4	97.3	97.4	97.4
B	Number of concrete property tests performed		nC_{Bk}	1	1	1	2	3	2	2	7	6	7	6	6
	Number of concrete property tests in compliance		nC_{cplBk}	1	1	1	2	3	2	2	5	6	7	6	6
	Number of cement and mortar property tests performed		nM_{Bk}	4	7	6	10	8	8	9	9	8	9	9	8
	Number of cement and mortar property tests in compliance		nM_{cplBk}	4	7	6	10	8	6	9	9	7	9	9	8
	Total cement volume		V_{Bk} (1000 t)	4.3	1.9	3.1	5.4	7.7	7.3	11.9	8.6	10.0	10.7	10.7	7.3
	Compliance to Internal Product specifications	monthly	$CIPS_{Bk}$	100.0	100.0	100.0	100.0	100.0	80.0	100.0	87.5	92.9	100.0	100.0	100.0
		12M	$CIPS_{B12mr}$	89.63	89.63	92.4	93.39	97.21	95.56	95.57	94.25	93.25	94.94	95.79	96.3
Overall	**Total Volume**		**V_k (1000 t)**	**10.9**	**6.3**	**9.3**	**17.6**	**21.0**	**23.8**	**29.5**	**24.7**	**28.0**	**31.0**	**32.0**	**25.4**
	Overall Compliance to Internal Product Specification	**monthly**	**$CIPS_k$**	**100.0**	**100.0**	**92.6**	**100.0**	**100.0**	**78.5**	**100.0**	**95.6**	**97.5**	**100.0**	**100.0**	**100.0**
		12M	**$CIPS_{12mr}$**	**90.86**	**90.88**	**91.75**	**92.61**	**98.04**	**95.84**	**95.91**	**95.45**	**95.26**	**96.5**	**96.86**	**97.1**