



# Concrete Sustainability Council

## CO2-Module: Annex

The Concrete Sustainability Council (CSC)

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## Glossary

EPD	Environmental Product Declaration
LCA	Life Cycle Assessment

### L4.01 Quality management System

Applicable to region (s)	Criteria	Applicable sections	Evidence
Global		CO2-Module x	Accepted standards are: ISO 9001  Procedures specified in: EN 206, and the related national application documents  ASTM C94  Procedures built in line with EN 206 or ASTM C94
Australia		CO2-Module x	Procedures specified in: AS 1379
India		CO2-Module x	Procedures specified in: IS 4926

### L5.01 Minimum CO2 reduction vs. baseline

Applicable to region (s)	Criteria	Applicable sections	Evidence
<b>Baseline Determination</b>			
Global		CO2-Module x	Baseline The baseline is defined on country level (see below)
<b>Reduction Levels</b>			
Global		CO2-Module x	Minimum CO2 reduction for all strength classes vs. the baseline of the respective strength class:  Level 1 - 1 Star: - 30 %

				Level 2 - 2 Stars: - 40 % Level 3 - 3 Stars: - 50 % Level 4 - 4 Stars: - 60 %
<b>CO2 Calculation Methods</b>				
Global		CO2-Module	x	Accepted calculation methods are: <ul style="list-style-type: none"> <li>• 3<sup>rd</sup> party verified, valid EPDs</li> <li>• CO2-calculation incl. background calculations (e.g. transport distances) generated by a CSC-accepted LCA-Tool using a CSC-accepted LCI-Database</li> </ul> <p>A simplified Scope 1 CO2-calculation is permitted for CO2-Module 1 Star level and where a Regional System Operator (RSO) is providing the baselines. The calculation has to follow the GCCA Sustainability Guidelines for the monitoring and reporting of CO2 emissions from cement manufacturing. In this case the below requirements for Database and Calculation Tools do not apply.</p>
<b>LCI-Database</b>				
Global		CO2-Module	x	Accepted LCI databases are: <ul style="list-style-type: none"> <li>• GaBi</li> <li>• Ecoinvent</li> </ul>
<b>CSC accepted LCA-Tools</b>				
Global		CO2-Module		Accepted calculation tools are: <ul style="list-style-type: none"> <li>• see E1.03/E1.04 Annex</li> </ul>
<b>Data Upload</b>				
Global		CO2-Module	x	The following information of each mix-designs covered by the CO2-module needs to be uploaded in the CSC Toolbox: <ul style="list-style-type: none"> <li>• Distinctive identification number</li> <li>• CO2 emission value</li> <li>• Number of stars claimed</li> </ul> <p>In case of first time certification:</p> <ul style="list-style-type: none"> <li>• CO2 calculation for at least one individual low CO2 concrete mix design to to be potentially delivered from the concrete plant that is</li> </ul>

				targeting to obtain a CSC CO2 module (see Data Validation / Verification)
<b>Labelling</b>				
Global		CO2-Module	x	CO2 reduction class to be confirmed by the delivery slip or a producer confirmation with reference to the delivery slip
<b>Data Validation / Verification</b>				
Global			x	<p><b>First time certification</b></p> <ul style="list-style-type: none"> <li>The correct CO2 calculation must be proven for at least one individual low CO2 concrete mix design to be potentially delivered from the concrete plant that is targeting to obtain a CSC CO2 module. This can be done by means of a valid EPD or by providing the CO2 calculation for a specific low CO2 concrete mix design with distinctive identification number - including background calculations (e.g. transport distances) - generated by a CSC accepted EPD tool.</li> <li>The CB must name the sample which has been assessed.</li> <li>The number of “stars” granted with the CSC CO2 module corresponds to the reduction level as proven by the distinctive mix design.</li> </ul> <p><b>Upgrade</b></p> <ul style="list-style-type: none"> <li>Higher achievement levels claimed at a later point in time need to be proven by an upgrade certification which follows the same rules as the first time certification.</li> </ul> <p><b>Annual assurance</b></p> <ul style="list-style-type: none"> <li>Management confirms by means of an annual compliance declaration by the management that               <ul style="list-style-type: none"> <li>the CO2-module has been issued only for the declared mix designs</li> <li>all calculations are in line with the CSC CO2-criteria</li> </ul> </li> <li>The annual compliance declaration must come with a list of all</li> </ul>

				<p>CO2-module deliveries of the previous year containing and include</p> <ul style="list-style-type: none"> <li>○ Identification number</li> <li>○ Concrete strength class</li> <li>○ Volume supplied (per strength class or per mix design)</li> <li>○ kg CO2/m3 (per strength class or per mix design)</li> <li>○ CO2-module performance (1-4 stars)</li> </ul> <ul style="list-style-type: none"> <li>● Upload of the annual compliance declaration and CO2-module delivery list to the CSC toolbox (per document upload, or per tool entry)</li> </ul> <p><b>Re-certification</b></p> <ul style="list-style-type: none"> <li>● Full check by the CB upon plant recertification (max. after 3 years), checking representative samples           <ul style="list-style-type: none"> <li>○ <math>n = 0.7 \cdot \text{SQRT}(\text{number of identification numbers delivered as low CO2 concrete})</math>; with a cap at <math>n_{\max} = 15</math></li> <li>○ n to be mathematically rounded, but at least = 1</li> <li>○ The CB must list and name the samples which have been assessed</li> </ul> </li> </ul>
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Germany												
CO2-\Strength-Classes	C8/10	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50 **)	C45/55	C50/60	C55/67	C60/75
Maximum Greenhouse Gas Emissions per reduction level [net kg CO2eq. / m <sup>3</sup> ]*)												
Reference values	145	168	198	213	237	261	286	299	312	325	341	344
Level 1 (↓ ≥ 30%)	102	118	138	149	166	183	200	209	218	228	239	241
Level 2 (↓ ≥ 40%)	87	101	118	128	142	157	172	180	187	195	205	206
Level 3 (↓ ≥ 50%)	73	84	99	107	119	131	143	150	156	163	171	172
Level 4 (↓ ≥ 60%)	58	67	79	85	95	104	114	120	125	130	136	138
<p>*) As the GCCA tool uses Ecoinvent background data sets for aggregates and transports, which are more conservative than the corresponding data sets for Germany in the GaBi database, the reference values of the average OPC/CEM I concrete in the above table can be increased by 5 kg CO2eq / m<sup>3</sup> in the calculation of the global warming potential if standard values (default values) for aggregates and transport are calculated with the GCCA-Tool. This also applies to other software tools that use the same Ecoinvent background data sets as the GCCA tool. If, in deviation, the standard values for the parameters aggregate and transport are not used for the calculation, but rather individual values, the above table applies.</p> <p>**) The values for C40/50 were interpolated.</p>												
A background report to the reference values and composition can be found here: <a href="https://www.csc-zertifizierung.de/downloads/">https://www.csc-zertifizierung.de/downloads/</a>												

<b>Belgium</b>							
CO <sub>2</sub> -Classes	<b>C12/15</b>	<b>C16/20</b>	<b>C20/25</b>	<b>C25/30</b>	<b>C30/37</b>	<b>C35/45</b>	<b>C40/50</b>
Maximum Greenhouse Gas Emissions per reduction level [net kg CO <sub>2</sub> eq. / m <sup>3</sup> ]							
<b>Reference values</b>	<b>228</b>	<b>244</b>	<b>269</b>	<b>294</b>	<b>319</b>	<b>344</b>	<b>361</b>
Level 1 (↓ ≥ 30%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Level 2 (↓ ≥ 40%)	137	146	161	176	194	206	217
Level 3 (↓ ≥ 50%)	114	122	135	147	162	172	181
Level 4 (↓ ≥ 60%)	91	98	108	118	129	138	144

<b>Belgium REFERENCE CONCRETE COMPOSITIONS*</b>							
Kg/m <sup>3</sup>	<b>C12/15 (E0)</b>	<b>C16/20 (E0)</b>	<b>C20/25 (E1)</b>	<b>C25/30 (EE2)</b>	<b>C30/37 (EE3)</b>	<b>C35/45 (EE4)</b>	<b>C40/50 (EE4)</b>
CEM I	250	270	300	330	360	390	410
Limestone	975	1010	1025	1030	1025	1020	1020
Sand	900	860	820	810	800	795	790
Superplasticizer	0	0	0,5	1,5	2,0	2,5	3,0
Water	195	190	190	180	175	170	165

(\*) cement content based on average values of external samples for Benor-certification in Belgium (year 2020)



Netherlands					
CO <sub>2</sub> -Classes	C20/25	C30/37	C35/45	C45/55	C55/67
Maximum Greenhouse Gas Emissions per reduction level [gross kg CO <sub>2</sub> eq. / m <sup>3</sup> ]					
<b>Reference values</b>	<b>283</b>	<b>318</b>	<b>333</b>	<b>363</b>	<b>398</b>
Level 1 (↓ ≥ 30%)	198	223	233	254	279
Level 2 (↓ ≥ 40%)	170	191	200	218	239
Level 3 (↓ ≥ 50%)	142	159	167	182	199
Level 4 (↓ ≥ 60%)	113	127	133	145	159

REFERENCE CONCRETE COMPOSITIONS*					
Kg/m <sup>3</sup>	C20/25	C30/37	C35/45	C45/55	C55/67
CEM I	280	320	340	370	400
Gravel	1050	1030	1035	1040	1020
Sand	820	805	785	800	790
Superplasticizer	0	0.5	0.6	1.8	2.3
Water	182	170	182	180	182

(\*) cement content based on average of annual use in ready mix industry (year 2018)



<b>Austria</b>							
CO <sub>2</sub> -Classes	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C50/60
Maximum Greenhouse Gas Emissions per reduction level [net kg CO <sub>2</sub> eq. / m <sup>3</sup> ]							
<b>Reference values</b>	<b>180</b>	<b>209</b>	<b>237</b>	<b>250</b>	<b>275</b>	<b>294</b>	<b>314</b>
Level 1 (↓ ≥ 30%)	126	146	166	175	193	206	220
Level 2 (↓ ≥ 40%)	108	125	142	150	165	176	189
Level 3 (↓ ≥ 50%)	90	104	118	125	138	147	157
Level 4 (↓ ≥ 60%)	72	83	95	100	110	117	126
A background report on the reference values and their composition was prepared by the Austrian RSO GVTB ( <a href="http://www.gvtb.at">www.gvtb.at</a> ).							

Kg/m <sup>3</sup>	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C50/60
<b>Cement (CEM I)</b>	259	305	350	372	412	441	474
<b>Aggregate</b>	1.961	1.932	1.863	1.822	1.803	1.789	1.787
thereof sand	979	977	962	877	900	860	858
thereof gravel	583	753	721	669	699	711	732
thereof crushed agg.	399	202	180	276	203	218	197
<b>Water</b>	176	175	180	176	178	179	180
thereof moist aggregate	39	53	50	46	48	47	49
thereof fresh water	79	97	118	118	126	130	129
thereof recycling water	58	25	12	13	3	2	2
<b>Admixtures</b>	1,2	2,0	2,3	2,5	2,9	3,0	3,1
<b>Sum</b>	2.397,2	2.414	2.395,3	2.373,5	2.393,9	2.412	2.444,1

Country name						
CO2-Classes	C20/25	C25/30	C30/37	C35/45	C45/55	C50/60
Maximum Greenhouse Gas Emissions per reduction level [net kg CO <sub>2</sub> eq. / m <sup>3</sup> ]						
Reference values						
Level 1 (↓ ≥ 30%)						
Level 2 (↓ ≥ 40%)						
Level 3 (↓ ≥ 50%)						
Level 4 (↓ ≥ 60%)						