

附件 2

**广东省塑料制品与制造业、人造石制造业、
电子元件制造业挥发性有机化合物
排放系数使用指南**

广东省生态环境厅

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前 言

为切实推进《关于印发〈广东省涉挥发性有机物（VOCs）重点行业治理指引〉的通知》（粤环办〔2021〕43号）、《关于开展涉挥发性有机物企业分级管理工作的通知》（粤环办函〔2021〕79号）等文件提出关于加强挥发性有机物（VOCs）深度治理的要求，贯彻落实《广东省工业源挥发性有机物减排量核算方法》（粤环办〔2021〕92号），为精准统计广东省典型行业的VOCs排放清单和典型企业VOCs排放量提供参考依据，制定本指南。

本指南规定了广东省塑料制品与制造业、人造石制造业、电子元件制造业挥发性有机化合物排放系数。

本指南由广东省生态环境厅组织制定。

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本指南由广东省生态环境厅解释。

1 总则

为切实推进挥发性有机物（VOCs）深度治理，贯彻落实《广东省工业源挥发性有机物减排量核算方法》（粤环办〔2021〕92号），有效指导开展塑料制品与制造业、人造石制造业、电子元件制造业行业 VOCs 排放量核算工作，为统计广东省工业源 VOCs 排放清单和典型企业排放量、减排量提供参考依据。

2 编制原则

2.1 实用性原则：指南说明了排放系数的来源、适用范围、以及使用方法。

2.2 使用简便原则：排放系数可用于指导行业、企业 VOCs 排放量计算，便于生态环境管理部门掌握行业、企业的 VOCs 排放水平。

2.3 科学性原则：指南的制定要反映生产实践和科研成果的统一，在进行广泛调研和科学验证的基础上，以现场调研及监测数据为依据来制定。

3 适用范围

本指南 VOCs 排放系数适用人员包括：生态环境管理机构和科研单位机构内从事 VOCs 产排量核算、环境空气质量研究的专业工作人员；也可适用于企业相关人员用来核算本企业 VOCs 排放量。本指南可用于区域行业 VOCs 产排量核算，应急天气管理 VOCs 削减量核算，可持续性或回顾性管理，以及行业 VOCs 源清单编制。

本指南适用于广东省塑料制品与制造业、人造石制造业、电子元件制造业，具体的行业适用范围如下：

根据《国民经济行业分类和代码》（GB/T4754-2017），塑料制品与制造业是指以合成树脂（高分子化合物）为主要原料，经采用挤塑、注塑、吹塑、压延、层压等工艺加工成型的各种制品的生产，以及利用回收的废旧塑料加工再生产塑料制品的活动。本指南中塑料制品与制造业涉及的生产工业类别为塑料制造成型工序（包括注塑、挤出、压延、吹膜等），后处理工序（印刷工序和涂装工序）、塑料薄膜制造（印刷）工艺。考虑到广东塑料行业发展情况，本指南把塑料玩具制造也纳入到塑料制品业范畴。对于后处理工序（印刷工序和涂装工序），企业可采用物料衡算法核算 VOCs 产排量，核算过程可参考《广东省工业源挥发性有机物减排量核算方法》（粤环办〔2021〕92号），无法采用物料衡算法的其他生产工序可参考本指南排放系数。

根据《国民经济行业分类和代码》(GB/T4754-2017), 人造石制造业归类为其他建筑材料制造 (C3039), 本指南适用于石英石、岗石制造的生产工艺。

考虑广东省行业特色, 本指南主要适用于电子元器件制造业中印刷线路板和覆铜板制造两个行业, 根据《国民经济行业分类和代码》(GB/T4754-2017), 即集成电路制造 (C3973) 和电子专用材料制造 (C3985)。

4 使用方法

4.1 VOCs 排放系数

本研究基于塑料制品业、电子元器件制造业和人造石制造业产品生产及销售计量单位, 参考行业标准以及上海和台湾省等国内标准和美国、欧盟标准等国外有关研究, 以制定的 VOCs 排放系数具有本地性、易操作性为目的, 本研究采用单一数值(常数)表达方式, 即塑料制品业 VOCs 排放系数单位为: kg/t (塑胶原辅料用量)、电子元器件制造业和人造石制造业 VOCs 排放系数单位为: g/m² (产品产量)。

4.1.1 塑料制品与制造业

本指南明确并细化了塑料制品制造业成型工序、后处理印刷工序、后处理涂装工序和塑料薄膜制造印刷工序的 VOCs 排放系数, 同时考虑了企业不同废气收集效率和治理水平。各类生产工序或工艺的 VOCs 排放系数矩阵表如表 4-1 至 4-4 所示。成型工序、后处理印刷工序和后处理涂装工序的排放系数均以 VOCs 原辅材料用量计量, 单位均为: kg/t 塑胶原料用量。塑料薄膜制造(印刷)工艺的排放系数以产品产量进行计量, 单位为: kg/t 产品产量。

需要指出的是塑料行业后处理工序(印刷工序和涂装工序) VOCs 排放系数中塑胶原料统计量仅指需要进行印刷和涂装后处理的塑胶原辅材料, 并不是整个企业的塑料原料投用量, 如某个塑胶企业塑胶用量为 1000 吨, 用于印刷、涂装等后处理的塑胶使用量为 100 吨, 进行塑料行业印刷和涂装后处理过程 VOCs 排放量核算时只采用 100 吨的塑胶使用量。

表 4-1 塑料制品与制造业成型工序 VOCs 排放系数（单位：kg/t 塑胶原料用量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368	2.368
5%	2.368	2.362	2.356	2.35	2.344	2.338	2.332	2.327	2.321	2.315	2.309	2.303	2.297	2.291	2.285	2.279	2.273	2.267	2.261	2.256	2.25
10%	2.368	2.356	2.344	2.332	2.321	2.309	2.297	2.285	2.273	2.261	2.25	2.238	2.226	2.214	2.202	2.19	2.179	2.167	2.155	2.143	2.131
15%	2.368	2.35	2.332	2.315	2.297	2.279	2.261	2.244	2.226	2.208	2.19	2.173	2.155	2.137	2.119	2.102	2.084	2.066	2.048	2.031	2.013
20%	2.368	2.344	2.321	2.297	2.273	2.25	2.226	2.202	2.179	2.155	2.131	2.108	2.084	2.06	2.036	2.013	1.989	1.965	1.942	1.918	1.894
25%	2.368	2.338	2.309	2.279	2.25	2.22	2.19	2.161	2.131	2.102	2.072	2.042	2.013	1.983	1.954	1.924	1.894	1.865	1.835	1.806	1.776
30%	2.368	2.332	2.297	2.261	2.226	2.19	2.155	2.119	2.084	2.048	2.013	1.977	1.942	1.906	1.871	1.835	1.8	1.764	1.729	1.693	1.658
35%	2.368	2.327	2.285	2.244	2.202	2.161	2.119	2.078	2.036	1.995	1.954	1.912	1.871	1.829	1.788	1.746	1.705	1.664	1.622	1.581	1.539
40%	2.368	2.321	2.273	2.226	2.179	2.131	2.084	2.036	1.989	1.942	1.894	1.847	1.8	1.752	1.705	1.658	1.61	1.563	1.516	1.468	1.421
45%	2.368	2.315	2.261	2.208	2.155	2.102	2.048	1.995	1.942	1.888	1.835	1.782	1.729	1.675	1.622	1.569	1.516	1.462	1.409	1.356	1.302
50%	2.368	2.309	2.25	2.19	2.131	2.072	2.013	1.954	1.894	1.835	1.776	1.717	1.658	1.598	1.539	1.48	1.421	1.362	1.302	1.243	1.184
55%	2.368	2.303	2.238	2.173	2.108	2.042	1.977	1.912	1.847	1.782	1.717	1.652	1.587	1.521	1.456	1.391	1.326	1.261	1.196	1.131	1.066
60%	2.368	2.297	2.226	2.155	2.084	2.013	1.942	1.871	1.8	1.729	1.658	1.587	1.516	1.444	1.373	1.302	1.231	1.16	1.089	1.018	0.947
65%	2.368	2.291	2.214	2.137	2.06	1.983	1.906	1.829	1.752	1.675	1.598	1.521	1.444	1.368	1.291	1.214	1.137	1.06	0.983	0.906	0.829
70%	2.368	2.285	2.202	2.119	2.036	1.954	1.871	1.788	1.705	1.622	1.539	1.456	1.373	1.291	1.208	1.125	1.042	0.959	0.876	0.793	0.71
75%	2.368	2.279	2.19	2.102	2.013	1.924	1.835	1.746	1.658	1.569	1.48	1.391	1.302	1.214	1.125	1.036	0.947	0.858	0.77	0.681	0.592
80%	2.368	2.273	2.179	2.084	1.989	1.894	1.8	1.705	1.61	1.516	1.421	1.326	1.231	1.137	1.042	0.947	0.852	0.758	0.663	0.568	0.474
85%	2.368	2.267	2.167	2.066	1.965	1.865	1.764	1.664	1.563	1.462	1.362	1.261	1.16	1.06	0.959	0.858	0.758	0.657	0.556	0.456	0.355
90%	2.368	2.261	2.155	2.048	1.942	1.835	1.729	1.622	1.516	1.409	1.302	1.196	1.089	0.983	0.876	0.77	0.663	0.556	0.45	0.343	0.237
95%	2.368	2.256	2.143	2.031	1.918	1.806	1.693	1.581	1.468	1.356	1.243	1.131	1.018	0.906	0.793	0.681	0.568	0.456	0.343	0.231	0.118
100%	2.368	2.25	2.131	2.013	1.894	1.776	1.658	1.539	1.421	1.302	1.184	1.066	0.947	0.829	0.71	0.592	0.474	0.355	0.237	0.118	0

表 4-2 塑料制品与制造业后处理印刷工序 VOCs 排放系数（单位：kg/t 塑胶原料用量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
5%	0.93	0.927	0.925	0.923	0.921	0.918	0.916	0.914	0.911	0.909	0.907	0.904	0.902	0.9	0.897	0.895	0.893	0.89	0.888	0.886	0.883
10%	0.93	0.925	0.921	0.916	0.911	0.907	0.902	0.897	0.893	0.888	0.883	0.879	0.874	0.869	0.865	0.86	0.855	0.851	0.846	0.841	0.837
15%	0.93	0.923	0.916	0.909	0.902	0.895	0.888	0.881	0.874	0.867	0.86	0.853	0.846	0.839	0.832	0.825	0.818	0.811	0.804	0.797	0.79
20%	0.93	0.921	0.911	0.902	0.893	0.883	0.874	0.865	0.855	0.846	0.837	0.828	0.818	0.809	0.8	0.79	0.781	0.772	0.762	0.753	0.744
25%	0.93	0.918	0.907	0.895	0.883	0.872	0.86	0.848	0.837	0.825	0.814	0.802	0.79	0.779	0.767	0.755	0.744	0.732	0.721	0.709	0.697
30%	0.93	0.916	0.902	0.888	0.874	0.86	0.846	0.832	0.818	0.804	0.79	0.776	0.762	0.748	0.735	0.721	0.707	0.693	0.679	0.665	0.651
35%	0.93	0.914	0.897	0.881	0.865	0.848	0.832	0.816	0.8	0.783	0.767	0.751	0.735	0.718	0.702	0.686	0.669	0.653	0.637	0.621	0.604
40%	0.93	0.911	0.893	0.874	0.855	0.837	0.818	0.8	0.781	0.762	0.744	0.725	0.707	0.688	0.669	0.651	0.632	0.614	0.595	0.576	0.558
45%	0.93	0.909	0.888	0.867	0.846	0.825	0.804	0.783	0.762	0.742	0.721	0.7	0.679	0.658	0.637	0.616	0.595	0.574	0.553	0.532	0.511
50%	0.93	0.907	0.883	0.86	0.837	0.814	0.79	0.767	0.744	0.721	0.697	0.674	0.651	0.628	0.604	0.581	0.558	0.535	0.511	0.488	0.465
55%	0.93	0.904	0.879	0.853	0.828	0.802	0.776	0.751	0.725	0.7	0.674	0.649	0.623	0.597	0.572	0.546	0.521	0.495	0.47	0.444	0.418
60%	0.93	0.902	0.874	0.846	0.818	0.79	0.762	0.735	0.707	0.679	0.651	0.623	0.595	0.567	0.539	0.511	0.483	0.456	0.428	0.4	0.372
65%	0.93	0.9	0.869	0.839	0.809	0.779	0.748	0.718	0.688	0.658	0.628	0.597	0.567	0.537	0.507	0.477	0.446	0.416	0.386	0.356	0.325
70%	0.93	0.897	0.865	0.832	0.8	0.767	0.735	0.702	0.669	0.637	0.604	0.572	0.539	0.507	0.474	0.442	0.409	0.377	0.344	0.311	0.279
75%	0.93	0.895	0.86	0.825	0.79	0.755	0.721	0.686	0.651	0.616	0.581	0.546	0.511	0.477	0.442	0.407	0.372	0.337	0.302	0.267	0.232
80%	0.93	0.893	0.855	0.818	0.781	0.744	0.707	0.669	0.632	0.595	0.558	0.521	0.483	0.446	0.409	0.372	0.335	0.298	0.26	0.223	0.186
85%	0.93	0.89	0.851	0.811	0.772	0.732	0.693	0.653	0.614	0.574	0.535	0.495	0.456	0.416	0.377	0.337	0.298	0.258	0.219	0.179	0.139
90%	0.93	0.888	0.846	0.804	0.762	0.721	0.679	0.637	0.595	0.553	0.511	0.47	0.428	0.386	0.344	0.302	0.26	0.219	0.177	0.135	0.093
95%	0.93	0.886	0.841	0.797	0.753	0.709	0.665	0.621	0.576	0.532	0.488	0.444	0.4	0.356	0.311	0.267	0.223	0.179	0.135	0.091	0.046
100%	0.93	0.883	0.837	0.79	0.744	0.697	0.651	0.604	0.558	0.511	0.465	0.418	0.372	0.325	0.279	0.232	0.186	0.139	0.093	0.046	0

表 4-3 塑料制品与制造业后处理涂装工序 VOCs 排放系数（单位：kg/t 塑胶原料用量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397	40.397
5%	40.397	40.296	40.195	40.094	39.993	39.892	39.791	39.69	39.589	39.488	39.387	39.286	39.185	39.084	38.983	38.882	38.781	38.68	38.579	38.478	38.377
10%	40.397	40.195	39.993	39.791	39.589	39.387	39.185	38.983	38.781	38.579	38.377	38.175	37.973	37.771	37.569	37.367	37.165	36.963	36.761	36.559	36.357
15%	40.397	40.094	39.791	39.488	39.185	38.882	38.579	38.276	37.973	37.67	37.367	37.064	36.761	36.458	36.155	35.852	35.549	35.246	34.943	34.64	34.337
20%	40.397	39.993	39.589	39.185	38.781	38.377	37.973	37.569	37.165	36.761	36.357	35.953	35.549	35.145	34.741	34.337	33.933	33.53	33.126	32.722	32.318
25%	40.397	39.892	39.387	38.882	38.377	37.872	37.367	36.862	36.357	35.852	35.347	34.842	34.337	33.832	33.328	32.823	32.318	31.813	31.308	30.803	30.298
30%	40.397	39.791	39.185	38.579	37.973	37.367	36.761	36.155	35.549	34.943	34.337	33.731	33.126	32.52	31.914	31.308	30.702	30.096	29.49	28.884	28.278
35%	40.397	39.69	38.983	38.276	37.569	36.862	36.155	35.448	34.741	34.034	33.328	32.621	31.914	31.207	30.5	29.793	29.086	28.379	27.672	26.965	26.258
40%	40.397	39.589	38.781	37.973	37.165	36.357	35.549	34.741	33.933	33.126	32.318	31.51	30.702	29.894	29.086	28.278	27.47	26.662	25.854	25.046	24.238
45%	40.397	39.488	38.579	37.67	36.761	35.852	34.943	34.034	33.126	32.217	31.308	30.399	29.49	28.581	27.672	26.763	25.854	24.945	24.036	23.127	22.218
50%	40.397	39.387	38.377	37.367	36.357	35.347	34.337	33.328	32.318	31.308	30.298	29.288	28.278	27.268	26.258	25.248	24.238	23.228	22.218	21.208	20.199
55%	40.397	39.286	38.175	37.064	35.953	34.842	33.731	32.621	31.51	30.399	29.288	28.177	27.066	25.955	24.844	23.733	22.622	21.511	20.4	19.29	18.179
60%	40.397	39.185	37.973	36.761	35.549	34.337	33.126	31.914	30.702	29.49	28.278	27.066	25.854	24.642	23.43	22.218	21.006	19.795	18.583	17.371	16.159
65%	40.397	39.084	37.771	36.458	35.145	33.832	32.52	31.207	29.894	28.581	27.268	25.955	24.642	23.329	22.016	20.703	19.391	18.078	16.765	15.452	14.139
70%	40.397	38.983	37.569	36.155	34.741	33.328	31.914	30.5	29.086	27.672	26.258	24.844	23.43	22.016	20.602	19.189	17.775	16.361	14.947	13.533	12.119
75%	40.397	38.882	37.367	35.852	34.337	32.823	31.308	29.793	28.278	26.763	25.248	23.733	22.218	20.703	19.189	17.674	16.159	14.644	13.129	11.614	10.099
80%	40.397	38.781	37.165	35.549	33.933	32.318	30.702	29.086	27.47	25.854	24.238	22.622	21.006	19.391	17.775	16.159	14.543	12.927	11.311	9.695	8.079
85%	40.397	38.68	36.963	35.246	33.53	31.813	30.096	28.379	26.662	24.945	23.228	21.511	19.795	18.078	16.361	14.644	12.927	11.21	9.493	7.776	6.06
90%	40.397	38.579	36.761	34.943	33.126	31.308	29.49	27.672	25.854	24.036	22.218	20.4	18.583	16.765	14.947	13.129	11.311	9.493	7.675	5.858	4.04
95%	40.397	38.478	36.559	34.64	32.722	30.803	28.884	26.965	25.046	23.127	21.208	19.29	17.371	15.452	13.533	11.614	9.695	7.776	5.858	3.939	2.02
100%	40.397	38.377	36.357	34.337	32.318	30.298	28.278	26.258	24.238	22.218	20.199	18.179	16.159	14.139	12.119	10.099	8.079	6.06	4.04	2.02	0

表 4-4 塑料薄膜制造印刷工艺 VOCs 排放系数（单位：kg/t 产品产量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268	133.268
5%	133.268	132.935	132.602	132.268	131.935	131.602	131.269	130.936	130.603	130.269	129.936	129.603	129.27	128.937	128.604	128.27	127.937	127.604	127.271	126.938	126.605
10%	133.268	132.602	131.935	131.269	130.603	129.936	129.27	128.604	127.937	127.271	126.605	125.938	125.272	124.606	123.939	123.273	122.607	121.94	121.274	120.608	119.941
15%	133.268	132.268	131.269	130.269	129.27	128.27	127.271	126.271	125.272	124.272	123.273	122.273	121.274	120.274	119.275	118.275	117.276	116.276	115.277	114.277	113.278
20%	133.268	131.935	130.603	129.27	127.937	126.605	125.272	123.939	122.607	121.274	119.941	118.609	117.276	115.943	114.61	113.278	111.945	110.612	109.28	107.947	106.614
25%	133.268	131.602	129.936	128.27	126.605	124.939	123.273	121.607	119.941	118.275	116.61	114.944	113.278	111.612	109.946	108.28	106.614	104.949	103.283	101.617	99.951
30%	133.268	131.269	129.27	127.271	125.272	123.273	121.274	119.275	117.276	115.277	113.278	111.279	109.28	107.281	105.282	103.283	101.284	99.285	97.286	95.287	93.288
35%	133.268	130.936	128.604	126.271	123.939	121.607	119.275	116.943	114.61	112.278	109.946	107.614	105.282	102.95	100.617	98.285	95.953	93.621	91.289	88.956	86.624
40%	133.268	130.603	127.937	125.272	122.607	119.941	117.276	114.61	111.945	109.28	106.614	103.949	101.284	98.618	95.953	93.288	90.622	87.957	85.292	82.626	79.961
45%	133.268	130.269	127.271	124.272	121.274	118.275	115.277	112.278	109.28	106.281	103.283	100.284	97.286	94.287	91.289	88.29	85.292	82.293	79.294	76.296	73.297
50%	133.268	129.936	126.605	123.273	119.941	116.61	113.278	109.946	106.614	103.283	99.951	96.619	93.288	89.956	86.624	83.293	79.961	76.629	73.297	69.966	66.634
55%	133.268	129.603	125.938	122.273	118.609	114.944	111.279	107.614	103.949	100.284	96.619	92.954	89.29	85.625	81.96	78.295	74.63	70.965	67.3	63.635	59.971
60%	133.268	129.27	125.272	121.274	117.276	113.278	109.28	105.282	101.284	97.286	93.288	89.29	85.292	81.293	77.295	73.297	69.299	65.301	61.303	57.305	53.307
65%	133.268	128.937	124.606	120.274	115.943	111.612	107.281	102.95	98.618	94.287	89.956	85.625	81.293	76.962	72.631	68.3	63.969	59.637	55.306	50.975	46.644
70%	133.268	128.604	123.939	119.275	114.61	109.946	105.282	100.617	95.953	91.289	86.624	81.96	77.295	72.631	67.967	63.302	58.638	53.974	49.309	44.645	39.98
75%	133.268	128.27	123.273	118.275	113.278	108.28	103.283	98.285	93.288	88.29	83.293	78.295	73.297	68.3	63.302	58.305	53.307	48.31	43.312	38.315	33.317
80%	133.268	127.937	122.607	117.276	111.945	106.614	101.284	95.953	90.622	85.292	79.961	74.63	69.299	63.969	58.638	53.307	47.976	42.646	37.315	31.984	26.654
85%	133.268	127.604	121.94	116.276	110.612	104.949	99.285	93.621	87.957	82.293	76.629	70.965	65.301	59.637	53.974	48.31	42.646	36.982	31.318	25.654	19.99
90%	133.268	127.271	121.274	115.277	109.28	103.283	97.286	91.289	85.292	79.294	73.297	67.3	61.303	55.306	49.309	43.312	37.315	31.318	25.321	19.324	13.327
95%	133.268	126.938	120.608	114.277	107.947	101.617	95.287	88.956	82.626	76.296	69.966	63.635	57.305	50.975	44.645	38.315	31.984	25.654	19.324	12.994	6.663
100%	133.268	126.605	119.941	113.278	106.614	99.951	93.288	86.624	79.961	73.297	66.634	59.971	53.307	46.644	39.98	33.317	26.654	19.99	13.327	6.663	0

4.1.2 人造石制造业

基于生产工艺和原辅材料类别的差异性，本指南明确并细化了人造石制造业中岗石和石英石制造工艺的 VOCs 排放系数，同时考虑企业不同废气收集效率和治理水平。各类生产工序或工艺的 VOCs 排放系数矩阵表如表 4-5 和表 4-6 所示。值得注意的是，人造岗石和人造英石的 VOCs 排放系数均以产品产量（人造石产品生产面积）进行计量，单位为： g/m^2 （产品产量）。

表4-5 岗石制造工艺VOCs排放系数：g/m²（产品产量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970	233.970
5%	233.970	233.385	232.800	232.215	231.630	231.045	230.460	229.876	229.291	228.706	228.121	227.536	226.951	226.366	225.781	225.196	224.611	224.026	223.441	222.856	222.272
10%	233.970	232.800	231.630	230.460	229.291	228.121	226.951	225.781	224.611	223.441	222.272	221.102	219.932	218.762	217.592	216.422	215.252	214.083	212.913	211.743	210.573
15%	233.970	232.215	230.460	228.706	226.951	225.196	223.441	221.687	219.932	218.177	216.422	214.667	212.913	211.158	209.403	207.648	205.894	204.139	202.384	200.629	198.875
20%	233.970	231.630	229.291	226.951	224.611	222.272	219.932	217.592	215.252	212.913	210.573	208.233	205.894	203.554	201.214	198.875	196.535	194.195	191.855	189.516	187.176
25%	233.970	231.045	228.121	225.196	222.272	219.347	216.422	213.498	210.573	207.648	204.724	201.799	198.875	195.950	193.025	190.101	187.176	184.251	181.327	178.402	175.478
30%	233.970	230.460	226.951	223.441	219.932	216.422	212.913	209.403	205.894	202.384	198.875	195.365	191.855	188.346	184.836	181.327	177.817	174.308	170.798	167.289	163.779
35%	233.970	229.876	225.781	221.687	217.592	213.498	209.403	205.309	201.214	197.120	193.025	188.931	184.836	180.742	176.647	172.553	168.458	164.364	160.269	156.175	152.081
40%	233.970	229.291	224.611	219.932	215.252	210.573	205.894	201.214	196.535	191.855	187.176	182.497	177.817	173.138	168.458	163.779	159.100	154.420	149.741	145.061	140.382
45%	233.970	228.706	223.441	218.177	212.913	207.648	202.384	197.120	191.855	186.591	181.327	176.062	170.798	165.534	160.269	155.005	149.741	144.476	139.212	133.948	128.684
50%	233.970	228.121	222.272	216.422	210.573	204.724	198.875	193.025	187.176	181.327	175.478	169.628	163.779	157.930	152.081	146.231	140.382	134.533	128.684	122.834	116.985
55%	233.970	227.536	221.102	214.667	208.233	201.799	195.365	188.931	182.497	176.062	169.628	163.194	156.760	150.326	143.892	137.457	131.023	124.589	118.155	111.721	105.287
60%	233.970	226.951	219.932	212.913	205.894	198.875	191.855	184.836	177.817	170.798	163.779	156.760	149.741	142.722	135.703	128.684	121.664	114.645	107.626	100.607	93.588
65%	233.970	226.366	218.762	211.158	203.554	195.950	188.346	180.742	173.138	165.534	157.930	150.326	142.722	135.118	127.514	119.910	112.306	104.702	97.098	89.494	81.890
70%	233.970	225.781	217.592	209.403	201.214	193.025	184.836	176.647	168.458	160.269	152.081	143.892	135.703	127.514	119.325	111.136	102.947	94.758	86.569	78.380	70.191
75%	233.970	225.196	216.422	207.648	198.875	190.101	181.327	172.553	163.779	155.005	146.231	137.457	128.684	119.910	111.136	102.362	93.588	84.814	76.040	67.266	58.493
80%	233.970	224.611	215.252	205.894	196.535	187.176	177.817	168.458	159.100	149.741	140.382	131.023	121.664	112.306	102.947	93.588	84.229	74.870	65.512	56.153	46.794
85%	233.970	224.026	214.083	204.139	194.195	184.251	174.308	164.364	154.420	144.476	134.533	124.589	114.645	104.702	94.758	84.814	74.870	64.927	54.983	45.039	35.096
90%	233.970	223.441	212.913	202.384	191.855	181.327	170.798	160.269	149.741	139.212	128.684	118.155	107.626	97.098	86.569	76.040	65.512	54.983	44.454	33.926	23.397
95%	233.970	222.856	211.743	200.629	189.516	178.402	167.289	156.175	145.061	133.948	122.834	111.721	100.607	89.494	78.380	67.266	56.153	45.039	33.926	22.812	11.699
100%	233.970	222.272	210.573	198.875	187.176	175.478	163.779	152.081	140.382	128.684	116.985	105.287	93.588	81.890	70.191	58.493	46.794	35.096	23.397	11.699	0.000

表4-6 石英石制造工艺VOCs排放系数：g/m²（产品产量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251	161.251
5%	161.251	160.848	160.445	160.042	159.638	159.235	158.832	158.429	158.026	157.623	157.22	156.817	156.413	156.01	155.607	155.204	154.801	154.398	153.995	153.592	153.188
10%	161.251	160.445	159.638	158.832	158.026	157.22	156.413	155.607	154.801	153.995	153.188	152.382	151.576	150.77	149.963	149.157	148.351	147.545	146.738	145.932	145.126
15%	161.251	160.042	158.832	157.623	156.413	155.204	153.995	152.785	151.576	150.367	149.157	147.948	146.738	145.529	144.32	143.11	141.901	140.691	139.482	138.273	137.063
20%	161.251	159.638	158.026	156.413	154.801	153.188	151.576	149.963	148.351	146.738	145.126	143.513	141.901	140.288	138.676	137.063	135.451	133.838	132.226	130.613	129.001
25%	161.251	159.235	157.22	155.204	153.188	151.173	149.157	147.142	145.126	143.11	141.095	139.079	137.063	135.048	133.032	131.016	129.001	126.985	124.97	122.954	120.938
30%	161.251	158.832	156.413	153.995	151.576	149.157	146.738	144.32	141.901	139.482	137.063	134.645	132.226	129.807	127.388	124.97	122.551	120.132	117.713	115.294	112.876
35%	161.251	158.429	155.607	152.785	149.963	147.142	144.32	141.498	138.676	135.854	133.032	130.21	127.388	124.566	121.745	118.923	116.101	113.279	110.457	107.635	104.813
40%	161.251	158.026	154.801	151.576	148.351	145.126	141.901	138.676	135.451	132.226	129.001	125.776	122.551	119.326	116.101	112.876	109.651	106.426	103.201	99.976	96.751
45%	161.251	157.623	153.995	150.367	146.738	143.11	139.482	135.854	132.226	128.598	124.97	121.341	117.713	114.085	110.457	106.829	103.201	99.572	95.944	92.316	88.688
50%	161.251	157.22	153.188	149.157	145.126	141.095	137.063	133.032	129.001	124.97	120.938	116.907	112.876	108.844	104.813	100.782	96.751	92.719	88.688	84.657	80.626
55%	161.251	156.817	152.382	147.948	143.513	139.079	134.645	130.21	125.776	121.341	116.907	112.473	108.038	103.604	99.169	94.735	90.301	85.866	81.432	76.997	72.563
60%	161.251	156.413	151.576	146.738	141.901	137.063	132.226	127.388	122.551	117.713	112.876	108.038	103.201	98.363	93.526	88.688	83.851	79.013	74.175	69.338	64.5
65%	161.251	156.01	150.77	145.529	140.288	135.048	129.807	124.566	119.326	114.085	108.844	103.604	98.363	93.122	87.882	82.641	77.4	72.16	66.919	61.679	56.438
70%	161.251	155.607	149.963	144.32	138.676	133.032	127.388	121.745	116.101	110.457	104.813	99.169	93.526	87.882	82.238	76.594	70.95	65.307	59.663	54.019	48.375
75%	161.251	155.204	149.157	143.11	137.063	131.016	124.97	118.923	112.876	106.829	100.782	94.735	88.688	82.641	76.594	70.547	64.5	58.453	52.407	46.36	40.313
80%	161.251	154.801	148.351	141.901	135.451	129.001	122.551	116.101	109.651	103.201	96.751	90.301	83.851	77.4	70.95	64.5	58.05	51.6	45.15	38.7	32.25
85%	161.251	154.398	147.545	140.691	133.838	126.985	120.132	113.279	106.426	99.572	92.719	85.866	79.013	72.16	65.307	58.453	51.6	44.747	37.894	31.041	24.188
90%	161.251	153.995	146.738	139.482	132.226	124.97	117.713	110.457	103.201	95.944	88.688	81.432	74.175	66.919	59.663	52.407	45.15	37.894	30.638	23.381	16.125
95%	161.251	153.592	145.932	138.273	130.613	122.954	115.294	107.635	99.976	92.316	84.657	76.997	69.338	61.679	54.019	46.36	38.7	31.041	23.381	15.722	8.063
100%	161.251	153.188	145.126	137.063	129.001	120.938	112.876	104.813	96.751	88.688	80.626	72.563	64.5	56.438	48.375	40.313	32.25	24.188	16.125	8.063	0

4.1.3 电子元件制造业

基于生产工艺和原辅材料类别的差异性，本指南明确并细化了电子元件制造业线路板和覆铜板制造业的 VOCs 排放系数，同时考虑企业不同废气收集效率和治理水平。各类生产工序或工艺的 VOCs 排放系数矩阵表如表 4-7 和表 4-8 所示。值得注意的是，线路板和覆铜板制造业的 VOCs 排放系数均以产品产量（产品生产面积）进行计量，单位为： g/m^2 （产品产量）。

表4-7 线路板印刷制造业VOCs排放系数（单位：g/m² 产品产量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245	110.245
5%	110.245	109.969	109.694	109.418	109.143	108.867	108.591	108.316	108.04	107.764	107.489	107.213	106.938	106.662	106.386	106.111	105.835	105.56	105.284	105.008	104.733
10%	110.245	109.694	109.143	108.591	108.04	107.489	106.938	106.386	105.835	105.284	104.733	104.182	103.63	103.079	102.528	101.977	101.425	100.874	100.323	99.772	99.221
15%	110.245	109.418	108.591	107.764	106.938	106.111	105.284	104.457	103.63	102.803	101.977	101.15	100.323	99.496	98.669	97.842	97.016	96.189	95.362	94.535	93.708
20%	110.245	109.143	108.04	106.938	105.835	104.733	103.63	102.528	101.425	100.323	99.221	98.118	97.016	95.913	94.811	93.708	92.606	91.503	90.401	89.298	88.196
25%	110.245	108.867	107.489	106.111	104.733	103.355	101.977	100.599	99.221	97.842	96.464	95.086	93.708	92.33	90.952	89.574	88.196	86.818	85.44	84.062	82.684
30%	110.245	108.591	106.938	105.284	103.63	101.977	100.323	98.669	97.016	95.362	93.708	92.055	90.401	88.747	87.094	85.44	83.786	82.133	80.479	78.825	77.172
35%	110.245	108.316	106.386	104.457	102.528	100.599	98.669	96.74	94.811	92.881	90.952	89.023	87.094	85.164	83.235	81.306	79.376	77.447	75.518	73.589	71.659
40%	110.245	108.04	105.835	103.63	101.425	99.221	97.016	94.811	92.606	90.401	88.196	85.991	83.786	81.581	79.376	77.172	74.967	72.762	70.557	68.352	66.147
45%	110.245	107.764	105.284	102.803	100.323	97.842	95.362	92.881	90.401	87.92	85.44	82.959	80.479	77.998	75.518	73.037	70.557	68.076	65.596	63.115	60.635
50%	110.245	107.489	104.733	101.977	99.221	96.464	93.708	90.952	88.196	85.44	82.684	79.928	77.172	74.415	71.659	68.903	66.147	63.391	60.635	57.879	55.123
55%	110.245	107.213	104.182	101.15	98.118	95.086	92.055	89.023	85.991	82.959	79.928	76.896	73.864	70.832	67.801	64.769	61.737	58.705	55.674	52.642	49.61
60%	110.245	106.938	103.63	100.323	97.016	93.708	90.401	87.094	83.786	80.479	77.172	73.864	70.557	67.249	63.942	60.635	57.327	54.02	50.713	47.405	44.098
65%	110.245	106.662	103.079	99.496	95.913	92.33	88.747	85.164	81.581	77.998	74.415	70.832	67.249	63.666	60.084	56.501	52.918	49.335	45.752	42.169	38.586
70%	110.245	106.386	102.528	98.669	94.811	90.952	87.094	83.235	79.376	75.518	71.659	67.801	63.942	60.084	56.225	52.366	48.508	44.649	40.791	36.932	33.074
75%	110.245	106.111	101.977	97.842	93.708	89.574	85.44	81.306	77.172	73.037	68.903	64.769	60.635	56.501	52.366	48.232	44.098	39.964	35.83	31.695	27.561
80%	110.245	105.835	101.425	97.016	92.606	88.196	83.786	79.376	74.967	70.557	66.147	61.737	57.327	52.918	48.508	44.098	39.688	35.278	30.869	26.459	22.049
85%	110.245	105.56	100.874	96.189	91.503	86.818	82.133	77.447	72.762	68.076	63.391	58.705	54.02	49.335	44.649	39.964	35.278	30.593	25.908	21.222	16.537
90%	110.245	105.284	100.323	95.362	90.401	85.44	80.479	75.518	70.557	65.596	60.635	55.674	50.713	45.752	40.791	35.83	30.869	25.908	20.947	15.986	11.025
95%	110.245	105.008	99.772	94.535	89.298	84.062	78.825	73.589	68.352	63.115	57.879	52.642	47.405	42.169	36.932	31.695	26.459	21.222	15.986	10.749	5.512
100%	110.245	104.733	99.221	93.708	88.196	82.684	77.172	71.659	66.147	60.635	55.123	49.61	44.098	38.586	33.074	27.561	22.049	16.537	11.025	5.512	0

表4-8 覆铜板制造业VOCs排放系数（单位：g/m² 产品产量）

收集效率	治 理 效 率																				
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
0%	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751	256.751
5%	256.751	256.109	255.467	254.825	254.183	253.542	252.9	252.258	251.616	250.974	250.332	249.69	249.048	248.407	247.765	247.123	246.481	245.839	245.197	244.555	243.913
10%	256.751	255.467	254.183	252.9	251.616	250.332	249.048	247.765	246.481	245.197	243.913	242.63	241.346	240.062	238.778	237.495	236.211	234.927	233.643	232.36	231.076
15%	256.751	254.825	252.9	250.974	249.048	247.123	245.197	243.272	241.346	239.42	237.495	235.569	233.643	231.718	229.792	227.867	225.941	224.015	222.09	220.164	218.238
20%	256.751	254.183	251.616	249.048	246.481	243.913	241.346	238.778	236.211	233.643	231.076	228.508	225.941	223.373	220.806	218.238	215.671	213.103	210.536	207.968	205.401
25%	256.751	253.542	250.332	247.123	243.913	240.704	237.495	234.285	231.076	227.867	224.657	221.448	218.238	215.029	211.82	208.61	205.401	202.191	198.982	195.773	192.563
30%	256.751	252.9	249.048	245.197	241.346	237.495	233.643	229.792	225.941	222.09	218.238	214.387	210.536	206.685	202.833	198.982	195.131	191.279	187.428	183.577	179.726
35%	256.751	252.258	247.765	243.272	238.778	234.285	229.792	225.299	220.806	216.313	211.82	207.326	202.833	198.34	193.847	189.354	184.861	180.368	175.874	171.381	166.888
40%	256.751	251.616	246.481	241.346	236.211	231.076	225.941	220.806	215.671	210.536	205.401	200.266	195.131	189.996	184.861	179.726	174.591	169.456	164.321	159.186	154.051
45%	256.751	250.974	245.197	239.42	233.643	227.867	222.09	216.313	210.536	204.759	198.982	193.205	187.428	181.651	175.874	170.098	164.321	158.544	152.767	146.99	141.213
50%	256.751	250.332	243.913	237.495	231.076	224.657	218.238	211.82	205.401	198.982	192.563	186.144	179.726	173.307	166.888	160.469	154.051	147.632	141.213	134.794	128.376
55%	256.751	249.69	242.63	235.569	228.508	221.448	214.387	207.326	200.266	193.205	186.144	179.084	172.023	164.963	157.902	150.841	143.781	136.72	129.659	122.599	115.538
60%	256.751	249.048	241.346	233.643	225.941	218.238	210.536	202.833	195.131	187.428	179.726	172.023	164.321	156.618	148.916	141.213	133.511	125.808	118.105	110.403	102.7
65%	256.751	248.407	240.062	231.718	223.373	215.029	206.685	198.34	189.996	181.651	173.307	164.963	156.618	148.274	139.929	131.585	123.24	114.896	106.552	98.207	89.863
70%	256.751	247.765	238.778	229.792	220.806	211.82	202.833	193.847	184.861	175.874	166.888	157.902	148.916	139.929	130.943	121.957	112.97	103.984	94.998	86.012	77.025
75%	256.751	247.123	237.495	227.867	218.238	208.61	198.982	189.354	179.726	170.098	160.469	150.841	141.213	131.585	121.957	112.329	102.7	93.072	83.444	73.816	64.188
80%	256.751	246.481	236.211	225.941	215.671	205.401	195.131	184.861	174.591	164.321	154.051	143.781	133.511	123.24	112.97	102.7	92.43	82.16	71.89	61.62	51.35
85%	256.751	245.839	234.927	224.015	213.103	202.191	191.279	180.368	169.456	158.544	147.632	136.72	125.808	114.896	103.984	93.072	82.16	71.248	60.336	49.425	38.513
90%	256.751	245.197	233.643	222.09	210.536	198.982	187.428	175.874	164.321	152.767	141.213	129.659	118.105	106.552	94.998	83.444	71.89	60.336	48.783	37.229	25.675
95%	256.751	244.555	232.36	220.164	207.968	195.773	183.577	171.381	159.186	146.99	134.794	122.599	110.403	98.207	86.012	73.816	61.62	49.425	37.229	25.033	12.838
100%	256.751	243.913	231.076	218.238	205.401	192.563	179.726	166.888	154.051	141.213	128.376	115.538	102.7	89.863	77.025	64.188	51.35	38.513	25.675	12.838	0

4.2 排放系数使用方法

根据《广东省工业源挥发性有机物减排量核算方法》(粤环办〔2021〕92号),企业可根据自身实际的废气收集设施类型和使用情景,以确定废气收集效率,及末端治理设施运维情况或有机废气监测报告,以确定治理效率,选择相对应的 VOCs 排放系数进行动态的 VOCs 排放量核算,公式如下:

$$E = m \times f$$

式中:

E—企业 VOCs 排放量, t;

m—企业原辅材料使用量或产品产量,其中塑料行业为塑胶原辅料用量或产品产量: t; 人造石制造业和电子元器件制造业为产品产量: m²。

f—不同废气收集和治理效率对应的企业 VOCs 排放系数,其中塑料制品业 VOCs 排放系数单位为: kg/t (塑胶原辅料用量)、电子元器件制造业和人造石制造业 VOCs 排放系数单位为: g/m² (产品产量)。