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**IES INDOOR REPORT**  
**PHOTOMETRIC FILENAME : FSN-4151-OPAL.IES**

**DESCRIPTION INFORMATION (From Photometric File)**

IESNA:LM-63-1995  
[TEST] TH-1157A  
[ISSUE DATE] 2020/4/30 16:02  
[MANUFAC]  
[LUMCAT]  
[LUMINAIRE] FSN-4151-OPAL-NCKL  
[LAMPCAT]  
[LAMP]  
[\_VOLTAGE] 120V  
[\_CURRENT] 0.086 A  
[\_POWERFACTOR] 0.804  
[TESTLAB] Inventfine instruments  
[\_TESTINST] GPM-1800B  
[\_TESTDIST] 8.499 m  
[\_TESTTEMPERATURE] 26  
[\_TESTHUMIDITY] 65  
[\_TESTOPERATOR] Jacky tang  
[BALLAST]  
[BALLASTCAT]

**CHARACTERISTICS**

Lumens Per Lamp	421.5 (1 lamp)
Total Lamp Lumens	421.5
Luminaire Lumens	421
Total Luminaire Efficiency	100 %
Luminaire Efficacy Rating (LER)	51
Total Luminaire Watts	8.33
Ballast Factor	1.00
CIE Type	Semi-Direct
Spacing Criterion (0-180)	1.48
Spacing Criterion (90-270)	1.52
Spacing Criterion (Diagonal)	1.64
Basic Luminous Shape	Point
Luminous Length (0-180)	0.00 m
Luminous Width (90-270)	0.00 m
Luminous Height	0.00 m

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**LUMINANCE DATA (cd/sq.m)**

Angle In Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	0	0	0
55	0	0	0
65	0	0	0
75	0	0	0
85	0	0	0

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**CANDELA TABULATION**

	<u>0</u>	<u>90</u>	<u>180</u>	<u>270</u>	<u>360</u>
<b>0</b>	65.03	65.03	65.03	65.03	65.03
<b>1</b>	65.03	65.10	65.03	64.95	65.03
<b>2</b>	65.02	65.18	65.01	64.88	65.02
<b>3</b>	65.01	65.26	65.01	64.80	65.01
<b>4</b>	64.99	65.33	65.01	64.73	64.99
<b>5</b>	64.97	65.40	65.00	64.63	64.97
<b>6</b>	64.95	65.48	65.00	64.54	64.95
<b>7</b>	64.95	65.55	65.01	64.46	64.95
<b>8</b>	64.95	65.62	65.01	64.37	64.95
<b>9</b>	64.96	65.68	65.02	64.28	64.96
<b>10</b>	64.97	65.75	65.01	64.18	64.97
<b>11</b>	64.97	65.79	65.02	64.07	64.97
<b>12</b>	64.97	65.82	65.00	63.94	64.97
<b>13</b>	64.96	65.86	64.98	63.82	64.96
<b>14</b>	64.95	65.89	64.92	63.70	64.95
<b>15</b>	64.93	65.90	64.85	63.56	64.93
<b>16</b>	64.90	65.90	64.77	63.41	64.90
<b>17</b>	64.85	65.90	64.68	63.27	64.85
<b>18</b>	64.79	65.88	64.57	63.09	64.79
<b>19</b>	64.71	65.86	64.45	62.93	64.71
<b>20</b>	64.64	65.82	64.34	62.75	64.64
<b>21</b>	64.54	65.77	64.21	62.58	64.54
<b>22</b>	64.44	65.71	64.07	62.39	64.44
<b>23</b>	64.33	65.64	63.92	62.19	64.33
<b>24</b>	64.22	65.55	63.76	61.96	64.22
<b>25</b>	64.08	65.47	63.58	61.75	64.08
<b>26</b>	63.94	65.36	63.41	61.53	63.94
<b>27</b>	63.80	65.25	63.22	61.31	63.80
<b>28</b>	63.63	65.13	63.03	61.06	63.63
<b>29</b>	63.47	65.00	62.84	60.82	63.47
<b>30</b>	63.30	64.86	62.63	60.55	63.30
<b>31</b>	63.11	64.72	62.41	60.27	63.11
<b>32</b>	62.90	64.54	62.18	60.01	62.90
<b>33</b>	62.71	64.37	61.93	59.74	62.71
<b>34</b>	62.51	64.18	61.69	59.45	62.51
<b>35</b>	62.28	63.98	61.45	59.17	62.28
<b>36</b>	62.06	63.78	61.16	58.85	62.06
<b>37</b>	61.80	63.55	60.88	58.54	61.80
<b>38</b>	61.57	63.33	60.59	58.24	61.57
<b>39</b>	61.31	63.10	60.28	57.93	61.31
<b>40</b>	61.05	62.84	59.97	57.57	61.05
<b>41</b>	60.76	62.59	59.68	57.23	60.76
<b>42</b>	60.49	62.32	59.37	56.90	60.49
<b>43</b>	60.21	62.03	59.02	56.55	60.21
<b>44</b>	59.89	61.75	58.69	56.18	59.89
<b>45</b>	59.60	61.43	58.36	55.81	59.60
<b>46</b>	59.29	61.13	57.98	55.45	59.29
<b>47</b>	58.95	60.79	57.64	55.03	58.95
<b>48</b>	58.61	60.46	57.28	54.66	58.61
<b>49</b>	58.28	60.12	56.93	54.28	58.28
<b>50</b>	57.90	59.78	56.54	53.84	57.90
<b>51</b>	57.55	59.39	56.17	53.45	57.55
<b>52</b>	57.18	59.03	55.79	53.05	57.18
<b>53</b>	56.82	58.66	55.37	52.61	56.82

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**CANDELA TABULATION - (Cont.)**

54	56.42	58.29	54.99	52.19	56.42
55	56.03	57.86	54.59	51.75	56.03
56	55.64	57.45	54.14	51.32	55.64
57	55.19	57.04	53.73	50.85	55.19
58	54.79	56.64	53.32	50.42	54.79
59	54.37	56.17	52.85	49.98	54.37
60	53.92	55.73	52.41	49.49	53.92
61	53.48	55.29	51.98	49.04	53.48
62	53.05	54.84	51.55	48.59	53.05
63	52.60	54.34	51.06	48.09	52.60
64	52.15	53.86	50.60	47.63	52.15
65	51.65	53.39	50.10	47.11	51.65
66	51.18	52.90	49.64	46.64	51.18
67	50.70	52.37	49.17	46.16	50.70
68	50.24	51.87	48.65	45.63	50.24
69	49.75	51.36	48.15	45.14	49.75
70	49.21	50.83	47.66	44.64	49.21
71	48.70	50.24	47.12	44.09	48.70
72	48.19	49.70	46.63	43.59	48.19
73	47.67	49.16	46.12	43.10	47.67
74	47.10	48.60	45.56	42.68	47.10
75	46.58	48.04	45.04	42.17	46.58
76	46.04	47.44	44.52	41.65	46.04
77	45.49	46.80	43.94	41.11	45.49
78	44.95	46.20	43.39	40.42	44.95
79	44.34	45.60	42.85	39.83	44.34
80	43.78	44.92	42.25	39.28	43.78
81	43.20	44.27	41.70	38.72	43.20
82	42.64	43.64	41.12	38.15	42.64
83	41.99	42.99	40.56	37.48	41.99
84	41.41	42.32	39.93	36.85	41.41
85	40.82	41.58	39.35	36.25	40.82
86	40.22	40.87	38.71	35.56	40.22
87	39.60	40.17	38.11	35.06	39.60
88	38.98	39.46	37.52	34.41	38.98
89	38.28	38.77	36.86	33.72	38.28
90	37.64	38.00	36.16	33.00	37.64
91	36.96	37.28	35.59	32.40	36.96
92	36.28	36.57	34.97	31.70	36.28
93	35.52	35.82	34.33	31.13	35.52
94	34.75	34.95	33.69	30.34	34.75
95	33.80	34.10	32.98	29.61	33.80
96	32.81	33.25	32.33	28.80	32.81
97	31.83	32.40	31.63	28.04	31.83
98	30.85	31.45	30.99	27.27	30.85
99	29.78	30.58	30.34	26.44	29.78
100	28.80	29.72	29.63	25.68	28.80
101	27.84	28.86	28.98	24.86	27.84
102	26.88	28.00	28.31	24.10	26.88
103	25.94	27.06	27.57	23.44	25.94
104	25.01	26.22	26.90	22.62	25.01
105	23.98	25.36	26.21	21.88	23.98
106	23.08	24.52	25.46	21.09	23.08
107	22.18	23.68	24.78	20.28	22.18
108	21.36	22.76	24.11	19.55	21.36
109	20.58	21.91	23.36	18.86	20.58

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**CANDELA TABULATION - (Cont.)**

110	19.87	21.06	22.71	17.98	19.87
111	19.18	20.21	22.00	17.24	19.18
112	18.47	19.36	21.35	16.50	18.47
113	17.73	18.54	20.74	15.72	17.73
114	17.09	17.69	20.10	15.00	17.09
115	16.43	16.81	19.47	14.28	16.43
116	15.79	16.03	18.80	13.58	15.79
117	15.14	15.25	18.12	12.91	15.14
118	14.42	14.47	17.52	12.25	14.42
119	13.74	13.65	16.90	11.54	13.74
120	13.08	12.93	16.23	10.90	13.08
121	12.43	12.21	15.61	10.28	12.43
122	11.79	11.52	15.02	9.59	11.79
123	11.17	10.84	14.41	9.12	11.17
124	10.55	10.18	13.81	8.56	10.55
125	9.91	9.48	13.12	7.95	9.91
126	9.33	8.87	12.50	7.42	9.33
127	8.79	8.29	11.89	6.92	8.79
128	8.24	7.71	11.20	6.43	8.24
129	7.72	7.17	10.70	5.97	7.72
130	7.16	6.64	10.03	5.47	7.16
131	6.63	6.14	9.38	5.04	6.63
132	6.12	5.61	8.68	4.63	6.12
133	5.62	5.17	8.02	4.21	5.62
134	5.12	4.72	7.32	3.85	5.12
135	4.65	4.32	6.71	3.51	4.65
136	4.20	3.92	6.11	3.17	4.20
137	3.78	3.56	5.48	2.84	3.78
138	3.35	3.18	4.92	2.56	3.35
139	3.01	2.87	4.38	2.29	3.01
140	2.70	2.56	3.88	2.06	2.70
141	2.48	2.26	3.39	1.80	2.48
142	2.33	1.99	2.89	1.58	2.33
143	2.15	1.77	2.46	1.38	2.15
144	1.95	1.56	2.05	1.21	1.95
145	1.70	1.38	1.61	1.05	1.70
146	1.41	1.22	1.25	0.93	1.41
147	1.11	1.07	0.96	0.82	1.11
148	0.90	0.92	0.76	0.75	0.90
149	0.79	0.79	0.72	0.76	0.79
150	0.80	0.77	0.73	0.77	0.80
151	0.80	0.77	0.73	0.77	0.80
152	0.81	0.78	0.75	0.77	0.81
153	0.81	0.78	0.75	0.78	0.81
154	0.81	0.79	0.75	0.79	0.81
155	0.81	0.79	0.76	0.79	0.81
156	0.82	0.79	0.76	0.80	0.82
157	0.81	0.80	0.77	0.80	0.81
158	0.82	0.80	0.77	0.81	0.82
159	0.82	0.81	0.78	0.81	0.82
160	0.83	0.80	0.79	0.82	0.83
161	0.83	0.82	0.79	0.82	0.83
162	0.84	0.82	0.79	0.83	0.84
163	0.84	0.82	0.79	0.82	0.84
164	0.84	0.82	0.79	0.83	0.84
165	0.84	0.81	0.79	0.83	0.84

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**CANDELA TABULATION - (Cont.)**

<b>166</b>	0.84	0.82	0.79	0.83	0.84
<b>167</b>	0.84	0.82	0.79	0.83	0.84
<b>168</b>	0.84	0.81	0.79	0.83	0.84
<b>169</b>	0.85	0.81	0.79	0.83	0.85
<b>170</b>	0.85	0.82	0.80	0.84	0.85
<b>171</b>	0.84	0.82	0.80	0.84	0.84
<b>172</b>	0.85	0.83	0.80	0.84	0.85
<b>173</b>	0.85	0.83	0.81	0.84	0.85
<b>174</b>	0.85	0.84	0.81	0.84	0.85
<b>175</b>	0.86	0.83	0.81	0.84	0.86
<b>176</b>	0.85	0.83	0.82	0.84	0.85
<b>177</b>	0.86	0.84	0.82	0.84	0.86
<b>178</b>	0.85	0.84	0.83	0.84	0.85
<b>179</b>	0.85	0.84	0.84	0.84	0.85
<b>180</b>	0.84	0.84	0.85	0.84	0.84

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**ZONAL LUMEN SUMMARY**

Zone	Lumens	%Lamp	%Fixt
0-20	24.55	5.80	5.80
0-30	54.01	12.80	12.80
0-40	92.72	22.00	22.00
0-60	187.52	44.50	44.50
0-80	285.67	67.80	67.80
0-90	328.72	78.00	78.00
10-90	322.52	76.50	76.50
20-40	68.17	16.20	16.20
20-50	113.64	27.00	27.00
40-70	144.94	34.40	34.40
60-80	98.15	23.30	23.30
70-80	48.01	11.40	11.40
80-90	43.06	10.20	10.20
90-110	61.32	14.50	14.50
90-120	78.03	18.50	18.50
90-130	87.23	20.70	20.70
90-150	92.06	21.80	21.80
90-180	92.73	22.00	22.00
110-180	31.41	7.50	7.50
0-180	421.45	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

Zone	Lumens
0-10	6.20
10-20	18.35
20-30	29.46
30-40	38.71
40-50	45.47
50-60	49.33
60-70	50.14
70-80	48.01
80-90	43.06
90-100	35.49
100-110	25.83
110-120	16.71
120-130	9.20
130-140	3.83
140-150	0.99
150-160	0.36
160-170	0.23
170-180	0.08

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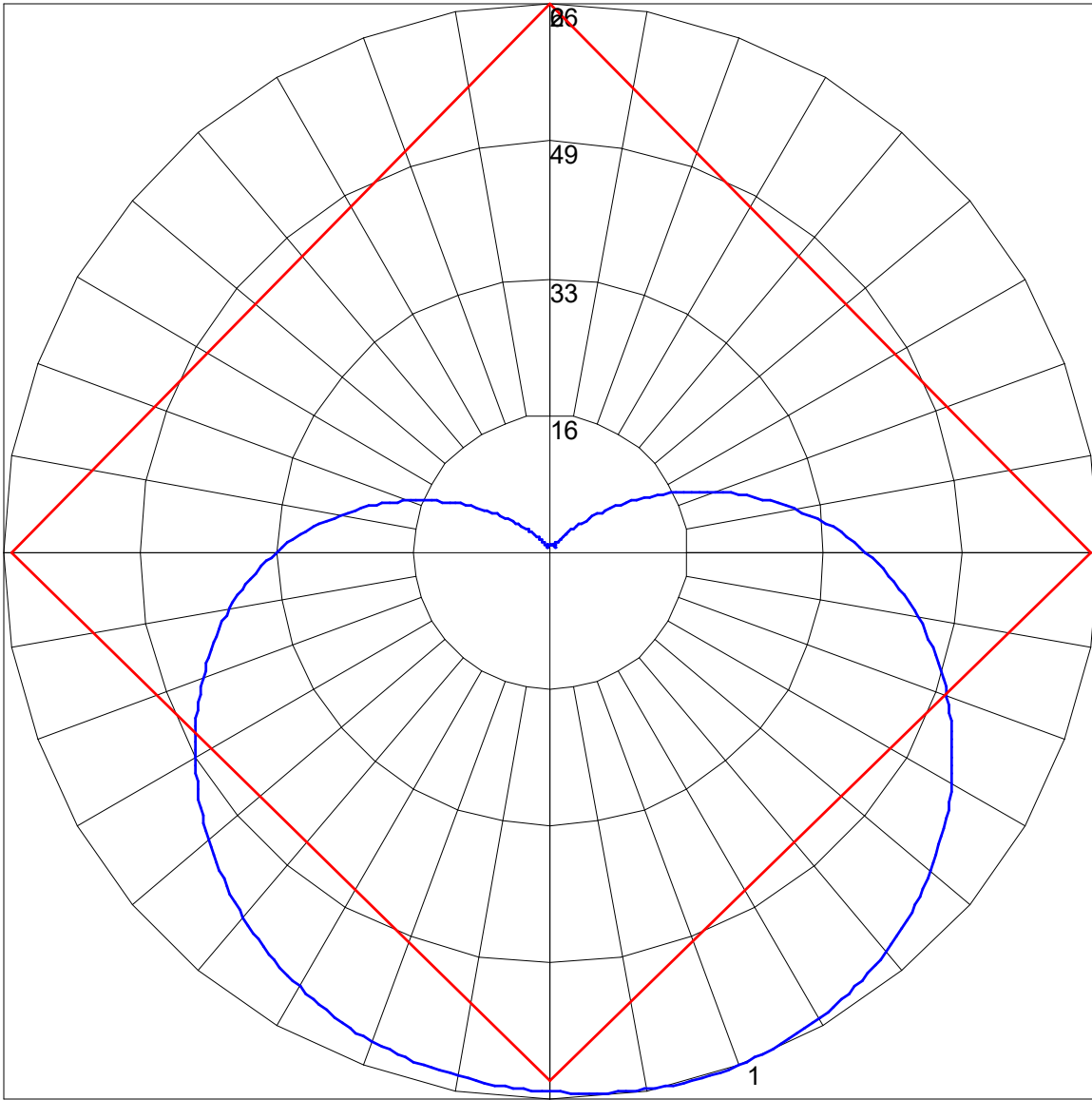
**COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD**

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
	RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
0	114	114	114	114	109	109	109	109	99	99	99	90	90	90	82	82	82	78
1	99	92	87	81	94	88	83	78	79	75	71	72	68	65	65	62	59	56
2	88	78	70	63	83	74	67	60	67	61	55	60	55	51	54	50	46	43
3	80	67	58	50	75	64	55	48	58	50	44	52	46	41	46	42	37	34
4	72	59	49	41	68	56	47	40	50	43	37	45	39	34	41	35	31	28
5	66	52	42	35	62	49	40	33	45	37	31	40	34	29	36	31	26	23
6	61	46	36	30	57	44	35	29	40	32	26	36	30	25	32	27	23	20
7	56	41	32	26	53	40	31	25	36	28	23	33	26	21	29	24	20	17
8	52	38	29	22	49	36	28	22	33	25	20	30	23	19	27	22	17	15
9	48	34	26	20	46	33	25	19	30	23	18	27	21	17	25	19	16	13
10	45	31	23	18	43	30	22	17	28	21	16	25	19	15	23	18	14	12



POLAR GRAPH



Maximum Candela = 65.9 Located At Horizontal Angle = 90, Vertical Angle = 15  
# 1 - Vertical Plane Through Horizontal Angles (90 - 270) (Through Max. Cd.)  
# 2 - Horizontal Cone Through Vertical Angle (15) (Through Max. Cd.)