OIC 2025 Manufacturing Challenge

Organizers:

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Evaluation Team:

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John J. Gilmore , *Optimax, USA.*

1. Introduction

For the 2025 Optical Interference Coatings Conference, we would like to propose another challenging Manufacturing problem. As in the previous manufacturing contests, the objective of this challenge is to provide valuable insight into the state-of-the-art capability in manufacturing complex thin film optical coatings.

In the OIC 2025 Manufacturing Challenge, the targeted wavelength region remains in the visible and near infrared as in the last contests. This time the problem has one transmittance and two reflectance curves (with light incident from face 1 and facet 2 of the substrate) as targets. As before, no specific suggestions are given with regard to the coating materials, the coating design and deposition processes. These are left to the participants to decide. The only basis for the evaluation of submitted samples will again be the measured performance, which will be carried out by four independent laboratories.

We require participants to submit their samples before the deadline of ***15 January 2025***.

Good luck to all participants!

2. Problem description

The OIC 2025 Manufacturing Challenge covers both the visible and near infrared regions and is defined from 416.0 nm to 1086.0 nm. The target performance of the problem is specified as one transmittance curve at normal angle of incidence (AOI), as well as face-1- and face-2-reflectance curves at near normal AOI (7.5°), as shown in Figure 1 and listed in Appendix A (linear values). An Excel file of the filter specifications is also provided for downloading from the OIC 2025 web page.

The merit function *MF* defined below will be used to evaluate the performances of the submitted samples:

$$MF = \left\{\frac{1}{(N_0+N_1+N_2)}\left[\sum_{i=1}^{N_0}\left(\frac{T_{0,i}-T_{0,i}^D}{\Delta T_{0,i}}\right)^2 + \sum_{i=1}^{N_1}\left(\frac{R_{1,i}-R_{1,i}^D}{\Delta R_{1,i}}\right)^2 + \sum_{i=1}^{N_2}\left(\frac{R_{2,i}-R_{2,i}^D}{\Delta R_{2,i}}\right)^2\right]\right\}^{1/2}, \quad (1)$$

where $T_{0,i}$, $T_{0,i}^D$ are the measured and target transmittance values, while $R_{1,i}$, $R_{1,i}^D$ are the measured and target reflectance values as measured from the front side, and $R_{2,i}$, $R_{2,i}^D$ are the measured and target reflectance values as measured from the back side, at the specified wavelength λ_i; N_0, N_1 and N_2 are the total number of wavelengths defining $T_{0,i}^D$, $R_{1,i}^D$ and $R_{2,i}^D$ targets; $\Delta T_{0,i}$ = 0.001, $\Delta R_{1,i}$ = 0.002

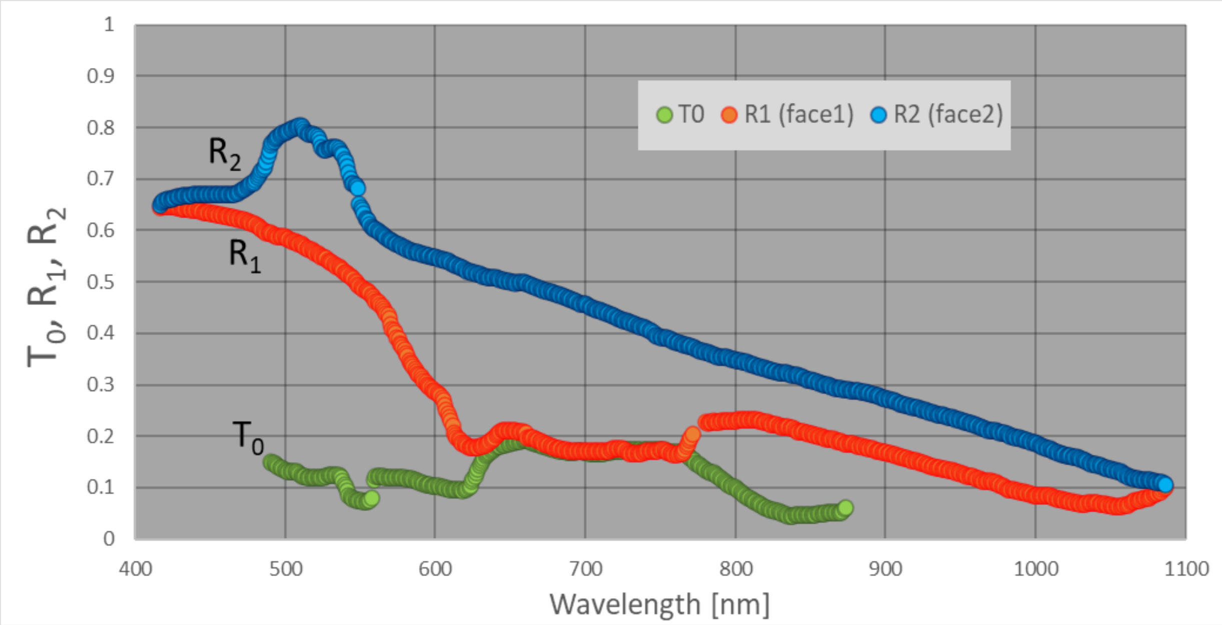

Figure 1 - The transmittance targets for OIC 2025 Manufacturing Challenge

and $\Delta R_{2,i}$ = 0.002 are the transmittance and reflectance tolerances. Note that all the transmittance, reflectance and tolerance values are expressed as fractions between 0 and 1, not percentage.

A number of numerical approximative solutions to this problem have been found that are based on different coating materials and with different total number of layers and overall layer thicknesses. Manufacturing simulations with random errors have shown that the problem is not trivial if a good performance is to be achieved. We think that this problem will be challenging to everyone; simple solutions requiring a limited number of layers and total thickness, while still matching relatively well the target curves, will be particularly appreciated.

As we all know, in the manufacture of practical optical coatings, deposition processes and filter designs are often selected not only to produce satisfactory optical performance, but also to meet other non-optical requirements, such as manufacturing cost, mechanical properties, durability, etc. Therefore, many compromises have to be made with different constraints and often there are no optimal solutions that can be applicable to all situations. For this reason, we encourage the optical thin film community to try using different processes to fabricate the filter for the contest (for example, e-beam evaporation, sputtering, or plasma deposition), as those processes are commonly used in many places.

3. Sample preparation

3.1 Intent of participation

Please notify the organizers by email (daniel.poitras@nrc-cnrc.gc.ca, *arig@lle.rochester.edu*) of your intent to participate in the manufacturing problem. We will send you the required number of substrates (maximum 3 per team). The substrates are B270 glass windows. Please note that an organization (company, university, research institute) can have more than one team participating to the contest (but no more than 3 teams); however, it [an organization] can only submit a maximum of three samples, each of which with a different filter design.

3.2 Substrate specifications and coating(s) location

To minimize any problems in the performance evaluation, all multilayer coatings of the submitted samples are required to be deposited on standard blank substrates according to following specifications:

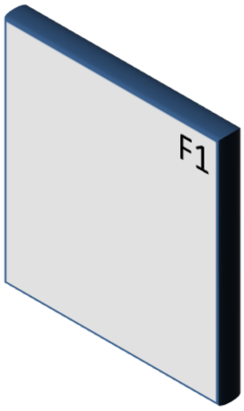

Figure 2 – Marking on the substrate to identify its face 1.

- *Material:* Schott B270
- *Size:* 50.0 mm × 50.0 mm × 2.0 mm thick
- *Coating location:* Center of the substrate
- *Minimum coated area:* 30 mm × 30 mm (Please note that the measurement labs will not be able to scan multiple locations on the sample in order to find the one exhibiting the best performance.)
- *Sample marking:* We ask the participants to identify the face 1 of their samples with a '**F1**' on the top side corner (see Fig. 2).

3.3 Coating materials and durability

No toxic or radioactive materials such as ZnSe, ThF_4 should be used in the fabrication of the submitted samples because of strict regulations that exist in some jurisdictions. Other than this, participants are encouraged to use any materials that they feel are suitable and that will survive normal handling during the evaluation. Un-measurable samples will be disqualified.

4. Submitting samples

For the presentation of the OIC 2025 Manufacturing Problem Contest at the conference and also for the paper to be submitted for publication, we need not only to evaluate the samples but also show the layer designs in an electronic form in order to plot the refractive index profiles and the transmittance and reflectance data from 400.0 nm to 1100.0 nm (with 1.0 nm steps) as measured by the participants. The organizers recognize that many groups are very protective of their design methods and deposition processes. Therefore, such information is not required, though participants are encouraged to provide as many details as they can so that the whole thin film community can learn and benefit from this exercise because their contributions.

The deadline for sending the samples is ***15 January 2025***. Each participating organization (one or multiple teams) can submit a maximum of three samples with different designs. Please use the provided Excel file for submitting data (see Appendix A). The sample submission should include the following items:

- Index profile [refractive index *n* and extinction coefficient *k* at a wavelength of 750 nm, and layer thickness) and calculated *MF* in electronic form.

- Measured transmittance at 0° AOI, and front- and back-reflectance at approximately 7.5° AOI, and estimated merit function in electronic form
- Suitably packed sample(s) to be sent to:

  Ms. Amy Rigatti
  c/o OIC 2025 Manufacturing Challenge
  Laboratory for Laser Energetics (LLE)
  University of Rochester
  250 E. River Rd., Rochester NY 14623-1299
  Tel: 1(585)275-8016
  arig@lle.rochester.edu

Please use a courier service for sending the samples (regular and registered mails are unreliable in terms of delivering time). Please also specify that the samples are for evaluation purpose only and they have no commercial value. Once you have sent your sample(s), please notify the organizers by email so that we will know when to expect the package. We will send you a confirmation email once we receive your sample(s).

5. Evaluation and results

Once received, the submitted samples will first be assigned random numbers and will then be sent, in identical packages, to the four independent laboratories for evaluation measurements. Neither of evaluation labs is allowed to submit a sample to the OIC 2025 Manufacturing Problem Contest. The target transmittance and reflectance curves at wavelengths specified in Appendix A will be measured with dual-beam spectrophotometers. The measured merit functions will be then calculated based on Eq. (1) and the averaged merit function measured by the three labs will be used to rate the corresponding sample.

Measurement conditions:

- Beam divergence: approximately f/6
- Beam size: < 18 mm in diameter
- Angle of incidence: 0° for transmittance; around 7.5° for reflectance
- Polarization: unpolarized
- Wavelength range: 400.0 nm to 1100.0 nm
- Wavelength steps: 1 nm
- Spectral bandwidth: 2 nm
- Measured location: at the center of the substrate

Apart from the above measurements, the samples will not be submitted to any other analytical measurements and analysis, such as Auger, SEM or TEM. All samples will be returned to the participants after the presentation of the results. Before and after measurements, the samples will be kept indoor and under normal ambient conditions of temperature and humidity.

The results of the Manufacturing Problem Contest will be presented at the *Optical Interference Coatings* conference in May 2025 and a more detailed report will be submitted for publication in *Applied Optics*.

6. Anonymous participation

As for the last Manufacturing Problem Contest in 2022, the measured performance of the samples will not be publicly linked to their creators. The names and affiliations of all the participants will be listed in the presentation at the OIC 2025 conference and also in the subsequent paper submitted to *Applied Optics*. The participants will be able to recognize the relative ranking of their own contributions, but no one else will. We would like to ask all participants to respect the anonymity rule and not to share information about their ranking in order to protect other participants and also to ensure the continuous participation of future contests.

One exception is that the identity of the team with the best result will be announced at the OIC 2025 Conference.

References of previous contests

1. J.A. Dobrowolski, S. Browning, M. Jacobson and M. Nadal, "Topical Meeting on Optical Interference Coatings (OIC' 2001): Manufacturing Problem," Appl. Opt. 41, 3039-3052 (2002).
2. J.A. Dobrowolski, S. Browning, M. Jacobson and M. Nadal, "2004 Optical Society of America's Topical Meeting on Optical Interference Coatings: Manufacturing Problem," Appl. Opt. 45, 1303-1311 (2006).
3. J.A. Dobrowolski, S. Browning, M. Jacobson and M. Nadal, "2007 Topical Meeting on Optical Interference Coatings: Manufacturing Problem," Appl. Opt. 47, C231-C245 (2008).
4. J.A. Dobrowolski, Li Li, M. Jacobson and D.W. Allen, "2010 Topical Meeting on Optical Interference Coatings: Manufacturing Problem," Appl. Opt. 50, C408-C419 (2011).
5. Li Li, J.A. Dobrowolski, M. Jacobson and C. Cooksey “Broadband transmission filters from the 2013 Optical Interference Coatings manufacturing problem contest,” Appl. Opt. 53, A248-A258 (2014).
6. D. Poitras, Li Li, M. Jacobson, and C. Cooksey, "Manufacturing problem contest [invited]," Appl. Opt. 56, C1-C10 (2017).
7. D. Poitras, Li Li, M. R. Jacobson, and C. C. Cooksey, "2019 Topical Meeting on Optical Interference Coatings: Manufacturing Problem Contest [invited]," Appl. Opt. 59, A31-A39 (2020).
8. D. Poitras, P. Ma, M.R. Jacobson, C.C. Cooksey, L.J. Sandilands, S. Lee, “2022 Optical Interference Coatings Conference: Manufacturing Problem Contest,” Appl. Opt. 62, B104-B111 (2023).

Appendix A – Downloading filter specification and submitting data

An Excel file (*OIC2025_Manufacturing_Challenge_Targets.xls*), as well as a CSV text files, are provided for participants to download the transmittance and reflectance targets. The Excel file includes a template for submitting their index profile and measured transmittance and reflectance data. When submitting data, please add the last name of the first investigator to the above file name; for example, '*OIC 2025 Manufacturing Challenge Doe.xlsx*'.

The transmittance and reflectance targets are also listed below, along with the index profile and measured transmittance and reflectance data templates.

(a) Transmittance target

OIC 2025 Manufacturing Challenge Target Specifications

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}^{D}$
1	490	0.1516	0.001
2	491	0.1499	0.001
3	492	0.1482	0.001
4	493	0.1465	0.001
5	494	0.1449	0.001
6	495	0.1428	0.001
7	496	0.1407	0.001
8	497	0.1386	0.001
9	498	0.1365	0.001
10	499	0.1354	0.001
11	500	0.1346	0.001
12	501	0.1337	0.001
13	502	0.1329	0.001
14	503	0.1326	0.001
15	504	0.1326	0.001
16	505	0.1326	0.001
17	506	0.1326	0.001
18	507	0.1326	0.001
19	508	0.1305	0.001
20	509	0.1280	0.001
21	510	0.1255	0.001
22	511	0.1237	0.001
23	512	0.1230	0.001
24	513	0.1223	0.001
25	514	0.1215	0.001
26	515	0.1208	0.001
27	516	0.1205	0.001
28	517	0.1205	0.001
29	518	0.1205	0.001
30	519	0.1205	0.001
31	520	0.1205	0.001
32	521	0.1207	0.001
33	522	0.1210	0.001
34	523	0.1214	0.001
35	524	0.1217	0.001
36	525	0.1220	0.001
37	526	0.1225	0.001
38	527	0.1235	0.001
39	528	0.1245	0.001
40	529	0.1255	0.001
41	530	0.1256	0.001
42	531	0.1256	0.001
43	532	0.1256	0.001
44	533	0.1256	0.001
45	534	0.1256	0.001
46	535	0.1251	0.001
47	536	0.1234	0.001
48	537	0.1204	0.001
49	538	0.1138	0.001
50	539	0.1073	0.001
51	540	0.1014	0.001
52	541	0.0953	0.001

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$
1	416	0.6459	0.002
2	417	0.6468	0.002
3	418	0.6476	0.002
4	419	0.6484	0.002
5	420	0.6488	0.002
6	421	0.6488	0.002
7	422	0.6488	0.002
8	423	0.6487	0.002
9	424	0.6481	0.002
10	425	0.6474	0.002
11	426	0.6468	0.002
12	427	0.6462	0.002
13	428	0.6455	0.002
14	429	0.6449	0.002
15	430	0.6443	0.002
16	431	0.6436	0.002
17	432	0.6436	0.002
18	433	0.6436	0.002
19	434	0.6435	0.002
20	435	0.6429	0.002
21	436	0.6422	0.002
22	437	0.6416	0.002
23	438	0.6410	0.002
24	439	0.6403	0.002
25	440	0.6401	0.002
26	441	0.6401	0.002
27	442	0.6401	0.002
28	443	0.6392	0.002
29	444	0.6382	0.002
30	445	0.6372	0.002
31	446	0.6364	0.002
32	447	0.6360	0.002
33	448	0.6355	0.002
34	449	0.6351	0.002
35	450	0.6345	0.002
36	451	0.6340	0.002
37	452	0.6334	0.002
38	453	0.6328	0.002
39	454	0.6322	0.002
40	455	0.6316	0.002
41	456	0.6310	0.002
42	457	0.6305	0.002
43	458	0.6300	0.002
44	459	0.6295	0.002
45	460	0.6288	0.002
46	461	0.6282	0.002
47	462	0.6276	0.002
48	463	0.6269	0.002
49	464	0.6263	0.002
50	465	0.6257	0.002
51	466	0.6251	0.002
52	467	0.6244	0.002

i	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
1	416	0.6506	0.002
2	417	0.6540	0.002
3	418	0.6573	0.002
4	419	0.6586	0.002
5	420	0.6599	0.002
6	421	0.6610	0.002
7	422	0.6616	0.002
8	423	0.6622	0.002
9	424	0.6630	0.002
10	425	0.6638	0.002
11	426	0.6646	0.002
12	427	0.6655	0.002
13	428	0.6662	0.002
14	429	0.6669	0.002
15	430	0.6675	0.002
16	431	0.6681	0.002
17	432	0.6687	0.002
18	433	0.6694	0.002
19	434	0.6695	0.002
20	435	0.6695	0.002
21	436	0.6695	0.002
22	437	0.6701	0.002
23	438	0.6708	0.002
24	439	0.6712	0.002
25	440	0.6712	0.002
26	441	0.6712	0.002
27	442	0.6712	0.002
28	443	0.6712	0.002
29	444	0.6712	0.002
30	445	0.6712	0.002
31	446	0.6712	0.002
32	447	0.6711	0.002
33	448	0.6711	0.002
34	449	0.6711	0.002
35	450	0.6711	0.002
36	451	0.6708	0.002
37	452	0.6705	0.002
38	453	0.6703	0.002
39	454	0.6706	0.002
40	455	0.6709	0.002
41	456	0.6711	0.002
42	457	0.6711	0.002
43	458	0.6711	0.002
44	459	0.6711	0.002
45	460	0.6711	0.002
46	461	0.6711	0.002
47	462	0.6711	0.002
48	463	0.6711	0.002
49	464	0.6711	0.002
50	465	0.6711	0.002
51	466	0.6711	0.002
52	467	0.6725	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}^{D}$
53	542	0.0866	0.001
54	543	0.0830	0.001
55	544	0.0813	0.001
56	545	0.0796	0.001
57	546	0.0780	0.001
58	547	0.0770	0.001
59	548	0.0764	0.001
60	549	0.0758	0.001
61	550	0.0753	0.001
62	551	0.0747	0.001
63	552	0.0742	0.001
64	553	0.0742	0.001
65	554	0.0750	0.001
66	555	0.0758	0.001
67	556	0.0767	0.001
68	557	0.0822	0.001
69	558		0.001
70	559	0.1165	0.001
71	560	0.1238	0.001
72	561	0.1238	0.001
73	562	0.1238	0.001
74	563	0.1238	0.001
75	564	0.1238	0.001
76	565	0.1231	0.001
77	566	0.1221	0.001
78	567	0.1211	0.001
79	568	0.1204	0.001
80	569	0.1204	0.001
81	570	0.1204	0.001
82	571	0.1204	0.001
83	572	0.1204	0.001
84	573	0.1204	0.001
85	574	0.1204	0.001
86	575	0.1204	0.001
87	576	0.1204	0.001
88	577	0.1203	0.001
89	578	0.1200	0.001
90	579	0.1198	0.001
91	580	0.1196	0.001
92	581	0.1193	0.001
93	582	0.1191	0.001
94	583	0.1189	0.001
95	584	0.1187	0.001
96	585	0.1174	0.001
97	586	0.1159	0.001
98	587	0.1144	0.001
99	588	0.1130	0.001
100	589	0.1117	0.001
101	590	0.1104	0.001
102	591	0.1092	0.001
103	592	0.1081	0.001
104	593	0.1075	0.001

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$
53	468	0.6238	0.002
54	469	0.6232	0.002
55	470	0.6225	0.002
56	471	0.6219	0.002
57	472	0.6213	0.002
58	473	0.6203	0.002
59	474	0.6190	0.002
60	475	0.6178	0.002
61	476	0.6165	0.002
62	477	0.6152	0.002
63	478	0.6140	0.002
64	479	0.6132	0.002
65	480	0.6123	0.002
66	481	0.6098	0.002
67	482	0.6073	0.002
68	483	0.6054	0.002
69	484	0.6035	0.002
70	485	0.6015	0.002
71	486	0.5990	0.002
72	487	0.5968	0.002
73	488	0.5968	0.002
74	489	0.5968	0.002
75	490	0.5962	0.002
76	491	0.5945	0.002
77	492	0.5928	0.002
78	493	0.5911	0.002
79	494	0.5898	0.002
80	495	0.5891	0.002
81	496	0.5885	0.002
82	497	0.5882	0.002
83	498	0.5882	0.002
84	499	0.5882	0.002
85	500	0.5869	0.002
86	501	0.5852	0.002
87	502	0.5835	0.002
88	503	0.5819	0.002
89	504	0.5809	0.002
90	505	0.5802	0.002
91	506	0.5796	0.002
92	507	0.5781	0.002
93	508	0.5764	0.002
94	509	0.5756	0.002
95	510	0.5749	0.002
96	511	0.5741	0.002
97	512	0.5703	0.002
98	513	0.5683	0.002
99	514	0.5670	0.002
100	515	0.5658	0.002
101	516	0.5641	0.002
102	517	0.5625	0.002
103	518	0.5608	0.002
104	519	0.5591	0.002

i	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
53	468	0.6742	0.002
54	469	0.6760	0.002
55	470	0.6779	0.002
56	471	0.6798	0.002
57	472	0.6815	0.002
58	473	0.6831	0.002
59	474	0.6856	0.002
60	475	0.6881	0.002
61	476	0.6904	0.002
62	477	0.6919	0.002
63	478	0.6934	0.002
64	479	0.6949	0.002
65	480	0.6993	0.002
66	481	0.7043	0.002
67	482	0.7093	0.002
68	483	0.7144	0.002
69	484	0.7177	0.002
70	485	0.7202	0.002
71	486	0.7251	0.002
72	487	0.7338	0.002
73	488	0.7460	0.002
74	489	0.7561	0.002
75	490	0.7663	0.002
76	491	0.7713	0.002
77	492	0.7755	0.002
78	493	0.7783	0.002
79	494	0.7808	0.002
80	495	0.7833	0.002
81	496	0.7859	0.002
82	497	0.7884	0.002
83	498	0.7896	0.002
84	499	0.7909	0.002
85	500	0.7923	0.002
86	501	0.7942	0.002
87	502	0.7961	0.002
88	503	0.7974	0.002
89	504	0.7982	0.002
90	505	0.7993	0.002
91	506	0.8005	0.002
92	507	0.8018	0.002
93	508	0.8033	0.002
94	509	0.8050	0.002
95	510	0.8045	0.002
96	511	0.8029	0.002
97	512	0.7986	0.002
98	513	0.7931	0.002
99	514	0.7913	0.002
100	515	0.7894	0.002
101	516	0.7883	0.002
102	517	0.7883	0.002
103	518	0.7878	0.002
104	519	0.7866	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}^D$	*i*	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^D$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^D$
105	594	0.1070	0.001	105	520	0.5573	0.002	105	520	0.7853	0.002
106	595	0.1064	0.001	106	521	0.5554	0.002	106	521	0.7828	0.002
107	596	0.1059	0.001	107	522	0.5535	0.002	107	522	0.7795	0.002
108	597	0.1053	0.001	108	523	0.5519	0.002	108	523	0.7725	0.002
109	598	0.1048	0.001	109	524	0.5502	0.002	109	524	0.7625	0.002
110	599	0.1044	0.001	110	525	0.5489	0.002	110	525	0.7575	0.002
111	600	0.1041	0.001	111	526	0.5477	0.002	111	526	0.7582	0.002
112	601	0.1038	0.001	112	527	0.5461	0.002	112	527	0.7588	0.002
113	602	0.1035	0.001	113	528	0.5436	0.002	113	528	0.7599	0.002
114	603	0.1032	0.001	114	529	0.5412	0.002	114	529	0.7611	0.002
115	604	0.1025	0.001	115	530	0.5396	0.002	115	530	0.7624	0.002
116	605	0.1016	0.001	116	531	0.5378	0.002	116	531	0.7624	0.002
117	606	0.1006	0.001	117	532	0.5353	0.002	117	532	0.7624	0.002
118	607	0.0997	0.001	118	533	0.5328	0.002	118	533	0.7624	0.002
119	608	0.0987	0.001	119	534	0.5316	0.002	119	534	0.7624	0.002
120	609	0.0978	0.001	120	535	0.5303	0.002	120	535	0.7592	0.002
121	610	0.0978	0.001	121	536	0.5287	0.002	121	536	0.7554	0.002
122	611	0.0978	0.001	122	537	0.5262	0.002	122	537	0.7517	0.002
123	612	0.0978	0.001	123	538	0.5234	0.002	123	538	0.7479	0.002
124	613	0.0978	0.001	124	539	0.5197	0.002	124	539	0.7399	0.002
125	614	0.0975	0.001	125	540	0.5180	0.002	125	540	0.7349	0.002
126	615	0.0972	0.001	126	541	0.5168	0.002	126	541	0.7251	0.002
127	616	0.0969	0.001	127	542	0.5154	0.002	127	542	0.7139	0.002
128	617	0.0966	0.001	128	543	0.5129	0.002	128	543	0.7027	0.002
129	618	0.0963	0.001	129	544	0.5104	0.002	129	544	0.6931	0.002
130	619	0.0968	0.001	130	545	0.5070	0.002	130	545	0.6919	0.002
131	620	0.0985	0.001	131	546	0.5037	0.002	131	546	0.6906	0.002
132	621	0.1001	0.001	132	547	0.5000	0.002	132	547	0.6883	0.002
133	622	0.1018	0.001	133	548	0.4962	0.002	133	548	0.6834	0.002
134	623	0.1052	0.001	134	549	0.4927	0.002	134	549	0.6522	0.002
135	624	0.1128	0.001	135	550	0.4902	0.002	135	550	0.6453	0.002
136	625	0.1186	0.001	136	551	0.4883	0.002	136	551	0.6400	0.002
137	626	0.1243	0.001	137	552	0.4867	0.002	137	552	0.6338	0.002
138	627	0.1301	0.001	138	553	0.4850	0.002	138	553	0.6239	0.002
139	628	0.1369	0.001	139	554	0.4833	0.002	139	554	0.6214	0.002
140	629	0.1434	0.001	140	555	0.4811	0.002	140	555	0.6189	0.002
141	630	0.1491	0.001	141	556	0.4782	0.002	141	556	0.6122	0.002
142	631	0.1548	0.001	142	557	0.4745	0.002	142	557	0.6074	0.002
143	632	0.1594	0.001	143	558	0.4718	0.002	143	558	0.6055	0.002
144	633	0.1623	0.001	144	559	0.4680	0.002	144	559	0.6036	0.002
145	634	0.1652	0.001	145	560	0.4635	0.002	145	560	0.6024	0.002
146	635	0.1682	0.001	146	561	0.4619	0.002	146	561	0.6011	0.002
147	636	0.1709	0.001	147	562	0.4600	0.002	147	562	0.5996	0.002
148	637	0.1730	0.001	148	563	0.4567	0.002	148	563	0.5971	0.002
149	638	0.1752	0.001	149	564	0.4533	0.002	149	564	0.5946	0.002
150	639	0.1773	0.001	150	565	0.4483	0.002	150	565	0.5921	0.002
151	640	0.1795	0.001	151	566	0.4441	0.002	151	566	0.5896	0.002
152	641	0.1809	0.001	152	567	0.4403	0.002	152	567	0.5871	0.002
153	642	0.1817	0.001	153	568	0.4366	0.002	153	568	0.5845	0.002
154	643	0.1824	0.001	154	569	0.4290	0.002	154	569	0.5824	0.002
155	644	0.1831	0.001	155	570	0.4191	0.002	155	570	0.5812	0.002
156	645	0.1838	0.001	156	571	0.4099	0.002	156	571	0.5799	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}$ [D]	*i*	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}$ [D]	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}$ [D]
157	646	0.1847	0.001	157	572	0.4065	0.002	157	572	0.5783	0.002
158	647	0.1856	0.001	158	573	0.4028	0.002	158	573	0.5764	0.002
159	648	0.1865	0.001	159	574	0.3934	0.002	159	574	0.5746	0.002
160	649	0.1875	0.001	160	575	0.3897	0.002	160	575	0.5732	0.002
161	650	0.1884	0.001	161	576	0.3818	0.002	161	576	0.5719	0.002
162	651	0.1893	0.001	162	577	0.3788	0.002	162	577	0.5707	0.002
163	652	0.1899	0.001	163	578	0.3742	0.002	163	578	0.5694	0.002
164	653	0.1905	0.001	164	579	0.3685	0.002	164	579	0.5677	0.002
165	654	0.1910	0.001	165	580	0.3630	0.002	165	580	0.5658	0.002
166	655	0.1916	0.001	166	581	0.3580	0.002	166	581	0.5640	0.002
167	656	0.1922	0.001	167	582	0.3479	0.002	167	582	0.5629	0.002
168	657	0.1928	0.001	168	583	0.3446	0.002	168	583	0.5619	0.002
169	658	0.1933	0.001	169	584	0.3412	0.002	169	584	0.5609	0.002
170	659	0.1939	0.001	170	585	0.3362	0.002	170	585	0.5601	0.002
171	660	0.1941	0.001	171	586	0.3320	0.002	171	586	0.5594	0.002
172	661	0.1930	0.001	172	587	0.3280	0.002	172	587	0.5588	0.002
173	662	0.1919	0.001	173	588	0.3230	0.002	173	588	0.5579	0.002
174	663	0.1907	0.001	174	589	0.3201	0.002	174	589	0.5569	0.002
175	664	0.1896	0.001	175	590	0.3176	0.002	175	590	0.5559	0.002
176	665	0.1885	0.001	176	591	0.3141	0.002	176	591	0.5550	0.002
177	666	0.1874	0.001	177	592	0.3088	0.002	177	592	0.5544	0.002
178	667	0.1865	0.001	178	593	0.3049	0.002	178	593	0.5537	0.002
179	668	0.1855	0.001	179	594	0.3024	0.002	179	594	0.5529	0.002
180	669	0.1846	0.001	180	595	0.2993	0.002	180	595	0.5519	0.002
181	670	0.1836	0.001	181	596	0.2960	0.002	181	596	0.5509	0.002
182	671	0.1827	0.001	182	597	0.2931	0.002	182	597	0.5499	0.002
183	672	0.1817	0.001	183	598	0.2906	0.002	183	598	0.5494	0.002
184	673	0.1808	0.001	184	599	0.2886	0.002	184	599	0.5489	0.002
185	674	0.1799	0.001	185	600	0.2869	0.002	185	600	0.5484	0.002
186	675	0.1789	0.001	186	601	0.2848	0.002	186	601	0.5474	0.002
187	676	0.1780	0.001	187	602	0.2823	0.002	187	602	0.5462	0.002
188	677	0.1770	0.001	188	603	0.2795	0.002	188	603	0.5449	0.002
189	678	0.1763	0.001	189	604	0.2762	0.002	189	604	0.5444	0.002
190	679	0.1756	0.001	190	605	0.2715	0.002	190	605	0.5440	0.002
191	680	0.1749	0.001	191	606	0.2625	0.002	191	606	0.5436	0.002
192	681	0.1742	0.001	192	607	0.2526	0.002	192	607	0.5431	0.002
193	682	0.1735	0.001	193	608	0.2446	0.002	193	608	0.5416	0.002
194	683	0.1730	0.001	194	609	0.2384	0.002	194	609	0.5397	0.002
195	684	0.1725	0.001	195	610	0.2321	0.002	195	610	0.5378	0.002
196	685	0.1720	0.001	196	611	0.2207	0.002	196	611	0.5366	0.002
197	686	0.1715	0.001	197	612	0.2081	0.002	197	612	0.5353	0.002
198	687	0.1710	0.001	198	613	0.2031	0.002	198	613	0.5340	0.002
199	688	0.1705	0.001	199	614	0.1987	0.002	199	614	0.5323	0.002
200	689	0.1702	0.001	200	615	0.1958	0.002	200	615	0.5308	0.002
201	690	0.1704	0.001	201	616	0.1929	0.002	201	616	0.5297	0.002
202	691	0.1707	0.001	202	617	0.1900	0.002	202	617	0.5287	0.002
203	692	0.1709	0.001	203	618	0.1872	0.002	203	618	0.5277	0.002
204	693	0.1711	0.001	204	619	0.1854	0.002	204	619	0.5261	0.002
205	694	0.1713	0.001	205	620	0.1837	0.002	205	620	0.5242	0.002
206	695	0.1716	0.001	206	621	0.1819	0.002	206	621	0.5223	0.002
207	696	0.1718	0.001	207	622	0.1801	0.002	207	622	0.5213	0.002
208	697	0.1714	0.001	208	623	0.1789	0.002	208	623	0.5203	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}^{D}$	*i*	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
209	698	0.1709	0.001	209	624	0.1789	0.002	209	624	0.5193	0.002
210	699	0.1704	0.001	210	625	0.1789	0.002	210	625	0.5186	0.002
211	700	0.1699	0.001	211	626	0.1791	0.002	211	626	0.5182	0.002
212	701	0.1694	0.001	212	627	0.1796	0.002	212	627	0.5178	0.002
213	702	0.1689	0.001	213	628	0.1802	0.002	213	628	0.5174	0.002
214	703	0.1684	0.001	214	629	0.1807	0.002	214	629	0.5163	0.002
215	704	0.1684	0.001	215	630	0.1814	0.002	215	630	0.5144	0.002
216	705	0.1684	0.001	216	631	0.1820	0.002	216	631	0.5125	0.002
217	706	0.1684	0.001	217	632	0.1831	0.002	217	632	0.5116	0.002
218	707	0.1684	0.001	218	633	0.1850	0.002	218	633	0.5111	0.002
219	708	0.1684	0.001	219	634	0.1869	0.002	219	634	0.5106	0.002
220	709	0.1683	0.001	220	635	0.1888	0.002	220	635	0.5102	0.002
221	710	0.1683	0.001	221	636	0.1907	0.002	221	636	0.5102	0.002
222	711	0.1683	0.001	222	637	0.1925	0.002	222	637	0.5102	0.002
223	712	0.1687	0.001	223	638	0.1958	0.002	223	638	0.5102	0.002
224	713	0.1694	0.001	224	639	0.1991	0.002	224	639	0.5101	0.002
225	714	0.1700	0.001	225	640	0.2025	0.002	225	640	0.5091	0.002
226	715	0.1706	0.001	226	641	0.2059	0.002	226	641	0.5081	0.002
227	716	0.1712	0.001	227	642	0.2080	0.002	227	642	0.5071	0.002
228	717	0.1718	0.001	228	643	0.2099	0.002	228	643	0.5060	0.002
229	718	0.1721	0.001	229	644	0.2117	0.002	229	644	0.5050	0.002
230	719	0.1723	0.001	230	645	0.2120	0.002	230	645	0.5040	0.002
231	720	0.1726	0.001	231	646	0.2124	0.002	231	646	0.5032	0.002
232	721	0.1728	0.001	232	647	0.2127	0.002	232	647	0.5028	0.002
233	722	0.1731	0.001	233	648	0.2131	0.002	233	648	0.5023	0.002
234	723	0.1733	0.001	234	649	0.2132	0.002	234	649	0.5019	0.002
235	724	0.1736	0.001	235	650	0.2127	0.002	235	650	0.5014	0.002
236	725	0.1738	0.001	236	651	0.2122	0.002	236	651	0.5004	0.002
237	726	0.1741	0.001	237	652	0.2117	0.002	237	652	0.4994	0.002
238	727	0.1743	0.001	238	653	0.2113	0.002	238	653	0.4984	0.002
239	728	0.1746	0.001	239	654	0.2110	0.002	239	654	0.4992	0.002
240	729	0.1748	0.001	240	655	0.2106	0.002	240	655	0.5009	0.002
241	730	0.1750	0.001	241	656	0.2103	0.002	241	656	0.5012	0.002
242	731	0.1751	0.001	242	657	0.2099	0.002	242	657	0.5007	0.002
243	732	0.1748	0.001	243	658	0.2089	0.002	243	658	0.5002	0.002
244	733	0.1745	0.001	244	659	0.2079	0.002	244	659	0.4996	0.002
245	734	0.1742	0.001	245	660	0.2069	0.002	245	660	0.4983	0.002
246	735	0.1740	0.001	246	661	0.1975	0.002	246	661	0.4971	0.002
247	736	0.1737	0.001	247	662	0.1976	0.002	247	662	0.4958	0.002
248	737	0.1735	0.001	248	663	0.1976	0.002	248	663	0.4945	0.002
249	738	0.1737	0.001	249	664	0.1977	0.002	249	664	0.4933	0.002
250	739	0.1740	0.001	250	665	0.1978	0.002	250	665	0.4922	0.002
251	740	0.1742	0.001	251	666	0.1964	0.002	251	666	0.4912	0.002
252	741	0.1744	0.001	252	667	0.1945	0.002	252	667	0.4902	0.002
253	742	0.1746	0.001	253	668	0.1926	0.002	253	668	0.4891	0.002
254	743	0.1749	0.001	254	669	0.1914	0.002	254	669	0.4879	0.002
255	744	0.1751	0.001	255	670	0.1901	0.002	255	670	0.4866	0.002
256	745	0.1752	0.001	256	671	0.1889	0.002	256	671	0.4856	0.002
257	746	0.1752	0.001	257	672	0.1876	0.002	257	672	0.4847	0.002
258	747	0.1752	0.001	258	673	0.1863	0.002	258	673	0.4839	0.002
259	748	0.1752	0.001	259	674	0.1851	0.002	259	674	0.4830	0.002
260	749	0.1752	0.001	260	675	0.1838	0.002	260	675	0.4823	0.002
261	750	0.1751	0.001	261	676	0.1826	0.002	261	676	0.4816	0.002
262	751	0.1751	0.001	262	677	0.1813	0.002	262	677	0.4810	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}^{D}$	*i*	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
263	752	0.1743	0.001	263	678	0.1801	0.002	263	678	0.4800	0.002
264	753	0.1732	0.001	264	679	0.1788	0.002	264	679	0.4788	0.002
265	754	0.1722	0.001	265	680	0.1782	0.002	265	680	0.4775	0.002
266	755	0.1711	0.001	266	681	0.1775	0.002	266	681	0.4768	0.002
267	756	0.1700	0.001	267	682	0.1769	0.002	267	682	0.4761	0.002
268	757	0.1700	0.001	268	683	0.1763	0.002	268	683	0.4755	0.002
269	758	0.1700	0.001	269	684	0.1756	0.002	269	684	0.4742	0.002
270	759	0.1700	0.001	270	685	0.1750	0.002	270	685	0.4730	0.002
271	760	0.1699	0.001	271	686	0.1744	0.002	271	686	0.4717	0.002
272	761	0.1699	0.001	272	687	0.1738	0.002	272	687	0.4704	0.002
273	762	0.1698	0.001	273	688	0.1730	0.002	273	688	0.4692	0.002
274	763	0.1694	0.001	274	689	0.1721	0.002	274	689	0.4679	0.002
275	764	0.1691	0.001	275	690	0.1723	0.002	275	690	0.4667	0.002
276	765	0.1687	0.001	276	691	0.1729	0.002	276	691	0.4657	0.002
277	766	0.1683	0.001	277	692	0.1735	0.002	277	692	0.4647	0.002
278	767	0.1666	0.001	278	693	0.1736	0.002	278	693	0.4637	0.002
279	768	0.1641	0.001	279	694	0.1736	0.002	279	694	0.4620	0.002
280	769	0.1616	0.001	280	695	0.1731	0.002	280	695	0.4601	0.002
281	770	0.1591	0.001	281	696	0.1726	0.002	281	696	0.4583	0.002
282	771	0.1563	0.001	282	697	0.1721	0.002	282	697	0.4583	0.002
283	772	0.1531	0.001	283	698	0.1718	0.002	283	698	0.4583	0.002
284	773	0.1500	0.001	284	699	0.1718	0.002	284	699	0.4583	0.002
285	774	0.1477	0.001	285	700	0.1718	0.002	285	700	0.4583	0.002
286	775	0.1456	0.001	286	701	0.1718	0.002	286	701	0.4561	0.002
287	776	0.1435	0.001	287	702	0.1718	0.002	287	702	0.4536	0.002
288	777	0.1414	0.001	288	703	0.1718	0.002	288	703	0.4519	0.002
289	778	0.1393	0.001	289	704	0.1718	0.002	289	704	0.4504	0.002
290	779	0.1373	0.001	290	705	0.1718	0.002	290	705	0.4488	0.002
291	780	0.1353	0.001	291	706	0.1718	0.002	291	706	0.4477	0.002
292	781	0.1335	0.001	292	707	0.1718	0.002	292	707	0.4472	0.002
293	782	0.1324	0.001	293	708	0.1718	0.002	293	708	0.4467	0.002
294	783	0.1313	0.001	294	709	0.1718	0.002	294	709	0.4462	0.002
295	784	0.1302	0.001	295	710	0.1718	0.002	295	710	0.4450	0.002
296	785	0.1292	0.001	296	711	0.1718	0.002	296	711	0.4437	0.002
297	786	0.1276	0.001	297	712	0.1718	0.002	297	712	0.4425	0.002
298	787	0.1251	0.001	298	713	0.1723	0.002	298	713	0.4412	0.002
299	788	0.1226	0.001	299	714	0.1728	0.002	299	714	0.4400	0.002
300	789	0.1201	0.001	300	715	0.1733	0.002	300	715	0.4388	0.002
301	790	0.1176	0.001	301	716	0.1740	0.002	301	716	0.4378	0.002
302	791	0.1151	0.001	302	717	0.1750	0.002	302	717	0.4368	0.002
303	792	0.1129	0.001	303	718	0.1760	0.002	303	718	0.4358	0.002
304	793	0.1108	0.001	304	719	0.1770	0.002	304	719	0.4339	0.002
305	794	0.1087	0.001	305	720	0.1769	0.002	305	720	0.4321	0.002
306	795	0.1066	0.001	306	721	0.1769	0.002	306	721	0.4303	0.002
307	796	0.1053	0.001	307	722	0.1769	0.002	307	722	0.4291	0.002
308	797	0.1042	0.001	308	723	0.1769	0.002	308	723	0.4278	0.002
309	798	0.1031	0.001	309	724	0.1760	0.002	309	724	0.4268	0.002
310	799	0.1020	0.001	310	725	0.1750	0.002	310	725	0.4259	0.002
311	800	0.1009	0.001	311	726	0.1740	0.002	311	726	0.4251	0.002
312	801	0.0986	0.001	312	727	0.1725	0.002	312	727	0.4242	0.002
313	802	0.0961	0.001	313	728	0.1706	0.002	313	728	0.4233	0.002
314	803	0.0936	0.001	314	729	0.1687	0.002	314	729	0.4223	0.002
315	804	0.0911	0.001	315	730	0.1683	0.002	315	730	0.4213	0.002
316	805	0.0886	0.001	316	731	0.1683	0.002	316	731	0.4203	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}^{D}$	*i*	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
317	806	0.0864	0.001	317	732	0.1683	0.002	317	732	0.4195	0.002
318	807	0.0843	0.001	318	733	0.1683	0.002	318	733	0.4186	0.002
319	808	0.0821	0.001	319	734	0.1683	0.002	319	734	0.4171	0.002
320	809	0.0800	0.001	320	735	0.1683	0.002	320	735	0.4154	0.002
321	810	0.0780	0.001	321	736	0.1683	0.002	321	736	0.4146	0.002
322	811	0.0764	0.001	322	737	0.1683	0.002	322	737	0.4139	0.002
323	812	0.0749	0.001	323	738	0.1691	0.002	323	738	0.4133	0.002
324	813	0.0733	0.001	324	739	0.1708	0.002	324	739	0.4120	0.002
325	814	0.0717	0.001	325	740	0.1721	0.002	325	740	0.4108	0.002
326	815	0.0701	0.001	326	741	0.1729	0.002	326	741	0.4093	0.002
327	816	0.0685	0.001	327	742	0.1734	0.002	327	742	0.4075	0.002
328	817	0.0668	0.001	328	743	0.1734	0.002	328	743	0.4056	0.002
329	818	0.0652	0.001	329	744	0.1734	0.002	329	744	0.4034	0.002
330	819	0.0635	0.001	330	745	0.1734	0.002	330	745	0.4009	0.002
331	820	0.0621	0.001	331	746	0.1734	0.002	331	746	0.3984	0.002
332	821	0.0608	0.001	332	747	0.1734	0.002	332	747	0.3968	0.002
333	822	0.0595	0.001	333	748	0.1734	0.002	333	748	0.3955	0.002
334	823	0.0583	0.001	334	749	0.1738	0.002	334	749	0.3943	0.002
335	824	0.0573	0.001	335	750	0.1744	0.002	335	750	0.3930	0.002
336	825	0.0565	0.001	336	751	0.1750	0.002	336	751	0.3926	0.002
337	826	0.0558	0.001	337	752	0.1740	0.002	337	752	0.3926	0.002
338	827	0.0550	0.001	338	753	0.1725	0.002	338	753	0.3926	0.002
339	828	0.0543	0.001	339	754	0.1710	0.002	339	754	0.3923	0.002
340	829	0.0535	0.001	340	755	0.1696	0.002	340	755	0.3908	0.002
341	830	0.0527	0.001	341	756	0.1683	0.002	341	756	0.3893	0.002
342	831	0.0517	0.001	342	757	0.1670	0.002	342	757	0.3878	0.002
343	832	0.0504	0.001	343	758	0.1665	0.002	343	758	0.3864	0.002
344	833	0.0492	0.001	344	759	0.1665	0.002	344	759	0.3852	0.002
345	834	0.0479	0.001	345	760	0.1665	0.002	345	760	0.3839	0.002
346	835	0.0467	0.001	346	761	0.1666	0.002	346	761	0.3833	0.002
347	836	0.0456	0.001	347	762	0.1671	0.002	347	762	0.3827	0.002
348	837	0.0463	0.001	348	763	0.1676	0.002	348	763	0.3819	0.002
349	838	0.0470	0.001	349	764	0.1681	0.002	349	764	0.3806	0.002
350	839	0.0477	0.001	350	765	0.1711	0.002	350	765	0.3794	0.002
351	840	0.0484	0.001	351	766	0.1753	0.002	351	766	0.3784	0.002
352	841	0.0489	0.001	352	767	0.1809	0.002	352	767	0.3778	0.002
353	842	0.0485	0.001	353	768	0.1875	0.002	353	768	0.3772	0.002
354	843	0.0481	0.001	354	769	0.1936	0.002	354	769	0.3763	0.002
355	844	0.0478	0.001	355	770	0.1991	0.002	355	770	0.3753	0.002
356	845	0.0474	0.001	356	771	0.2060	0.002	356	771	0.3742	0.002
357	846	0.0472	0.001	357	772		0.002	357	772	0.3730	0.002
358	847	0.0472	0.001	358	773		0.002	358	773	0.3711	0.002
359	848	0.0472	0.001	359	774		0.002	359	774	0.3692	0.002
360	849	0.0475	0.001	360	775		0.002	360	775	0.3681	0.002
361	850	0.0479	0.001	361	776		0.002	361	776	0.3676	0.002
362	851	0.0483	0.001	362	777		0.002	362	777	0.3671	0.002
363	852	0.0488	0.001	363	778		0.002	363	778	0.3665	0.002
364	853	0.0492	0.001	364	779		0.002	364	779	0.3655	0.002
365	854	0.0496	0.001	365	780	0.2278	0.002	365	780	0.3645	0.002
366	855	0.0500	0.001	366	781	0.2270	0.002	366	781	0.3635	0.002
367	856	0.0504	0.001	367	782	0.2279	0.002	367	782	0.3623	0.002
368	857	0.0508	0.001	368	783	0.2287	0.002	368	783	0.3611	0.002
369	858	0.0513	0.001	369	784	0.2295	0.002	369	784	0.3598	0.002
370	859	0.0517	0.001	370	785	0.2302	0.002	370	785	0.3588	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $T_{0,i}$	Tol. $\Delta T_{0,i}{}^{D}$
371	860	0.0521	0.001
372	861	0.0521	0.001
373	862	0.0521	0.001
374	863	0.0521	0.001
375	864	0.0521	0.001
376	865	0.0521	0.001
377	866	0.0521	0.001
378	867	0.0521	0.001
379	868	0.0521	0.001
380	869	0.0521	0.001
381	870	0.0536	0.001
382	871	0.0561	0.001
383	872	0.0608	0.001
384	873	0.0621	0.001

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}{}^{D}$
371	786	0.2296	0.002
372	787	0.2289	0.002
373	788	0.2288	0.002
374	789	0.2294	0.002
375	790	0.2300	0.002
376	791	0.2303	0.002
377	792	0.2303	0.002
378	793	0.2303	0.002
379	794	0.2303	0.002
380	795	0.2303	0.002
381	796	0.2303	0.002
382	797	0.2303	0.002
383	798	0.2307	0.002
384	799	0.2313	0.002
385	800	0.2320	0.002
386	801	0.2324	0.002
387	802	0.2328	0.002
388	803	0.2332	0.002
389	804	0.2336	0.002
390	805	0.2337	0.002
391	806	0.2337	0.002
392	807	0.2337	0.002
393	808	0.2337	0.002
394	809	0.2337	0.002
395	810	0.2337	0.002
396	811	0.2337	0.002
397	812	0.2337	0.002
398	813	0.2331	0.002
399	814	0.2323	0.002
400	815	0.2316	0.002
401	816	0.2310	0.002
402	817	0.2303	0.002
403	818	0.2298	0.002
404	819	0.2293	0.002
405	820	0.2288	0.002
406	821	0.2279	0.002
407	822	0.2264	0.002
408	823	0.2249	0.002
409	824	0.2234	0.002
410	825	0.2233	0.002
411	826	0.2233	0.002
412	827	0.2233	0.002
413	828	0.2225	0.002
414	829	0.2208	0.002
415	830	0.2198	0.002
416	831	0.2198	0.002
417	832	0.2198	0.002
418	833	0.2194	0.002
419	834	0.2188	0.002
420	835	0.2181	0.002
421	836	0.2176	0.002
422	837	0.2171	0.002
423	838	0.2166	0.002
424	839	0.2152	0.002

i	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}{}^{D}$
371	786	0.3578	0.002
372	787	0.3568	0.002
373	788	0.3562	0.002
374	789	0.3562	0.002
375	790	0.3562	0.002
376	791	0.3559	0.002
377	792	0.3554	0.002
378	793	0.3549	0.002
379	794	0.3542	0.002
380	795	0.3532	0.002
381	796	0.3522	0.002
382	797	0.3512	0.002
383	798	0.3505	0.002
384	799	0.3499	0.002
385	800	0.3493	0.002
386	801	0.3486	0.002
387	802	0.3480	0.002
388	803	0.3474	0.002
389	804	0.3469	0.002
390	805	0.3464	0.002
391	806	0.3459	0.002
392	807	0.3447	0.002
393	808	0.3435	0.002
394	809	0.3422	0.002
395	810	0.3412	0.002
396	811	0.3402	0.002
397	812	0.3392	0.002
398	813	0.3382	0.002
399	814	0.3372	0.002
400	815	0.3362	0.002
401	816	0.3353	0.002
402	817	0.3348	0.002
403	818	0.3343	0.002
404	819	0.3338	0.002
405	820	0.3327	0.002
406	821	0.3314	0.002
407	822	0.3302	0.002
408	823	0.3294	0.002
409	824	0.3285	0.002
410	825	0.3277	0.002
411	826	0.3269	0.002
412	827	0.3263	0.002
413	828	0.3258	0.002
414	829	0.3253	0.002
415	830	0.3251	0.002
416	831	0.3251	0.002
417	832	0.3251	0.002
418	833	0.3250	0.002
419	834	0.3237	0.002
420	835	0.3225	0.002
421	836	0.3214	0.002
422	837	0.3205	0.002
423	838	0.3199	0.002
424	839	0.3199	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
425	840	0.2127	0.002	425	840	0.3199	0.002
426	841	0.2111	0.002	426	841	0.3199	0.002
427	842	0.2094	0.002	427	842	0.3185	0.002
428	843	0.2094	0.002	428	843	0.3169	0.002
429	844	0.2094	0.002	429	844	0.3155	0.002
430	845	0.2093	0.002	430	845	0.3142	0.002
431	846	0.2086	0.002	431	846	0.3130	0.002
432	847	0.2080	0.002	432	847	0.3117	0.002
433	848	0.2072	0.002	433	848	0.3109	0.002
434	849	0.2062	0.002	434	849	0.3104	0.002
435	850	0.2052	0.002	435	850	0.3099	0.002
436	851	0.2042	0.002	436	851	0.3094	0.002
437	852	0.2036	0.002	437	852	0.3088	0.002
438	853	0.2029	0.002	438	853	0.3081	0.002
439	854	0.2023	0.002	439	854	0.3071	0.002
440	855	0.2017	0.002	440	855	0.3054	0.002
441	856	0.2010	0.002	441	856	0.3039	0.002
442	857	0.2000	0.002	442	857	0.3026	0.002
443	858	0.1988	0.002	443	858	0.3014	0.002
444	859	0.1975	0.002	444	859	0.3009	0.002
445	860	0.1968	0.002	445	860	0.3008	0.002
446	861	0.1962	0.002	446	861	0.3008	0.002
447	862	0.1956	0.002	447	862	0.2998	0.002
448	863	0.1956	0.002	448	863	0.2985	0.002
449	864	0.1956	0.002	449	864	0.2972	0.002
450	865	0.1950	0.002	450	865	0.2956	0.002
451	866	0.1934	0.002	451	866	0.2939	0.002
452	867	0.1921	0.002	452	867	0.2939	0.002
453	868	0.1921	0.002	453	868	0.2939	0.002
454	869	0.1921	0.002	454	869	0.2938	0.002
455	870	0.1908	0.002	455	870	0.2933	0.002
456	871	0.1883	0.002	456	871	0.2928	0.002
457	872	0.1869	0.002	457	872	0.2923	0.002
458	873	0.1869	0.002	458	873	0.2918	0.002
459	874	0.1869	0.002	459	874	0.2913	0.002
460	875	0.1869	0.002	460	875	0.2908	0.002
461	876	0.1869	0.002	461	876	0.2902	0.002
462	877	0.1869	0.002	462	877	0.2896	0.002
463	878	0.1857	0.002	463	878	0.2889	0.002
464	879	0.1845	0.002	464	879	0.2887	0.002
465	880	0.1834	0.002	465	880	0.2887	0.002
466	881	0.1828	0.002	466	881	0.2887	0.002
467	882	0.1822	0.002	467	882	0.2886	0.002
468	883	0.1817	0.002	468	883	0.2881	0.002
469	884	0.1811	0.002	469	884	0.2876	0.002
470	885	0.1806	0.002	470	885	0.2871	0.002
471	886	0.1800	0.002	471	886	0.2865	0.002
472	887	0.1783	0.002	472	887	0.2859	0.002
473	888	0.1766	0.002	473	888	0.2852	0.002
474	889	0.1765	0.002	474	889	0.2842	0.002
475	890	0.1765	0.002	475	890	0.2832	0.002
476	891	0.1762	0.002	476	891	0.2822	0.002
477	892	0.1746	0.002	477	892	0.2814	0.002
478	893	0.1730	0.002	478	893	0.2808	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^D$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^D$
479	894	0.1725	0.002	479	894	0.2802	0.002
480	895	0.1720	0.002	480	895	0.2790	0.002
481	896	0.1715	0.002	481	896	0.2778	0.002
482	897	0.1709	0.002	482	897	0.2765	0.002
483	898	0.1703	0.002	483	898	0.2755	0.002
484	899	0.1697	0.002	484	899	0.2745	0.002
485	900	0.1690	0.002	485	900	0.2735	0.002
486	901	0.1684	0.002	486	901	0.2728	0.002
487	902	0.1678	0.002	487	902	0.2723	0.002
488	903	0.1671	0.002	488	903	0.2718	0.002
489	904	0.1665	0.002	489	904	0.2712	0.002
490	905	0.1658	0.002	490	905	0.2699	0.002
491	906	0.1649	0.002	491	906	0.2686	0.002
492	907	0.1640	0.002	492	907	0.2674	0.002
493	908	0.1627	0.002	493	908	0.2661	0.002
494	909	0.1615	0.002	494	909	0.2649	0.002
495	910	0.1604	0.002	495	910	0.2639	0.002
496	911	0.1596	0.002	496	911	0.2631	0.002
497	912	0.1589	0.002	497	912	0.2622	0.002
498	913	0.1583	0.002	498	913	0.2614	0.002
499	914	0.1576	0.002	499	914	0.2606	0.002
500	915	0.1567	0.002	500	915	0.2597	0.002
501	916	0.1557	0.002	501	916	0.2590	0.002
502	917	0.1547	0.002	502	917	0.2584	0.002
503	918	0.1538	0.002	503	918	0.2577	0.002
504	919	0.1532	0.002	504	919	0.2572	0.002
505	920	0.1526	0.002	505	920	0.2567	0.002
506	921	0.1516	0.002	506	921	0.2562	0.002
507	922	0.1503	0.002	507	922	0.2554	0.002
508	923	0.1490	0.002	508	923	0.2542	0.002
509	924	0.1484	0.002	509	924	0.2529	0.002
510	925	0.1479	0.002	510	925	0.2520	0.002
511	926	0.1474	0.002	511	926	0.2514	0.002
512	927	0.1464	0.002	512	927	0.2508	0.002
513	928	0.1448	0.002	513	928	0.2496	0.002
514	929	0.1434	0.002	514	929	0.2484	0.002
515	930	0.1425	0.002	515	930	0.2472	0.002
516	931	0.1417	0.002	516	931	0.2465	0.002
517	932	0.1410	0.002	517	932	0.2459	0.002
518	933	0.1406	0.002	518	933	0.2450	0.002
519	934	0.1402	0.002	519	934	0.2433	0.002
520	935	0.1397	0.002	520	935	0.2420	0.002
521	936	0.1390	0.002	521	936	0.2420	0.002
522	937	0.1384	0.002	522	937	0.2420	0.002
523	938	0.1378	0.002	523	938	0.2416	0.002
524	939	0.1371	0.002	524	939	0.2407	0.002
525	940	0.1364	0.002	525	940	0.2399	0.002
526	941	0.1356	0.002	526	941	0.2391	0.002
527	942	0.1349	0.002	527	942	0.2383	0.002
528	943	0.1344	0.002	528	943	0.2377	0.002
529	944	0.1338	0.002	529	944	0.2370	0.002
530	945	0.1333	0.002	530	945	0.2362	0.002
531	946	0.1322	0.002	531	946	0.2352	0.002
532	947	0.1310	0.002	532	947	0.2342	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
533	948	0.1298	0.002	533	948	0.2332	0.002
534	949	0.1291	0.002	534	949	0.2324	0.002
535	950	0.1285	0.002	535	950	0.2315	0.002
536	951	0.1275	0.002	536	951	0.2305	0.002
537	952	0.1259	0.002	537	952	0.2295	0.002
538	953	0.1244	0.002	538	953	0.2285	0.002
539	954	0.1238	0.002	539	954	0.2277	0.002
540	955	0.1232	0.002	540	955	0.2271	0.002
541	956	0.1229	0.002	541	956	0.2265	0.002
542	957	0.1229	0.002	542	957	0.2255	0.002
543	958	0.1221	0.002	543	958	0.2245	0.002
544	959	0.1205	0.002	544	959	0.2235	0.002
545	960	0.1192	0.002	545	960	0.2224	0.002
546	961	0.1185	0.002	546	961	0.2211	0.002
547	962	0.1179	0.002	547	962	0.2199	0.002
548	963	0.1161	0.002	548	963	0.2186	0.002
549	964	0.1142	0.002	549	964	0.2174	0.002
550	965	0.1142	0.002	550	965	0.2161	0.002
551	966	0.1142	0.002	551	966	0.2151	0.002
552	967	0.1142	0.002	552	967	0.2141	0.002
553	968	0.1142	0.002	553	968	0.2131	0.002
554	969	0.1139	0.002	554	969	0.2126	0.002
555	970	0.1133	0.002	555	970	0.2126	0.002
556	971	0.1127	0.002	556	971	0.2126	0.002
557	972	0.1116	0.002	557	972	0.2126	0.002
558	973	0.1104	0.002	558	973	0.2121	0.002
559	974	0.1091	0.002	559	974	0.2108	0.002
560	975	0.1079	0.002	560	975	0.2096	0.002
561	976	0.1066	0.002	561	976	0.2087	0.002
562	977	0.1052	0.002	562	977	0.2081	0.002
563	978	0.1034	0.002	563	978	0.2075	0.002
564	979	0.1015	0.002	564	979	0.2068	0.002
565	980	0.0997	0.002	565	980	0.2062	0.002
566	981	0.0980	0.002	566	981	0.2054	0.002
567	982	0.0969	0.002	567	982	0.2035	0.002
568	983	0.0969	0.002	568	983	0.2016	0.002
569	984	0.0969	0.002	569	984	0.2002	0.002
570	985	0.0966	0.002	570	985	0.1996	0.002
571	986	0.0961	0.002	571	986	0.1990	0.002
572	987	0.0956	0.002	572	987	0.1983	0.002
573	988	0.0949	0.002	573	988	0.1977	0.002
574	989	0.0932	0.002	574	989	0.1971	0.002
575	990	0.0917	0.002	575	990	0.1963	0.002
576	991	0.0917	0.002	576	991	0.1954	0.002
577	992	0.0917	0.002	577	992	0.1945	0.002
578	993	0.0914	0.002	578	993	0.1934	0.002
579	994	0.0906	0.002	579	994	0.1924	0.002
580	995	0.0897	0.002	580	995	0.1915	0.002
581	996	0.0887	0.002	581	996	0.1907	0.002
582	997	0.0877	0.002	582	997	0.1899	0.002
583	998	0.0867	0.002	583	998	0.1893	0.002
584	999	0.0865	0.002	584	999	0.1886	0.002
585	1000	0.0865	0.002	585	1000	0.1873	0.002
586	1001	0.0865	0.002	586	1001	0.1854	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
587	1002	0.0865	0.002	587	1002	0.1835	0.002
588	1003	0.0865	0.002	588	1003	0.1825	0.002
589	1004	0.0865	0.002	589	1004	0.1817	0.002
590	1005	0.0865	0.002	590	1005	0.1802	0.002
591	1006	0.0865	0.002	591	1006	0.1785	0.002
592	1007	0.0865	0.002	592	1007	0.1776	0.002
593	1008	0.0863	0.002	593	1008	0.1769	0.002
594	1009	0.0853	0.002	594	1009	0.1763	0.002
595	1010	0.0843	0.002	595	1010	0.1747	0.002
596	1011	0.0833	0.002	596	1011	0.1730	0.002
597	1012	0.0821	0.002	597	1012	0.1717	0.002
598	1013	0.0808	0.002	598	1013	0.1705	0.002
599	1014	0.0796	0.002	599	1014	0.1692	0.002
600	1015	0.0789	0.002	600	1015	0.1684	0.002
601	1016	0.0783	0.002	601	1016	0.1676	0.002
602	1017	0.0777	0.002	602	1017	0.1666	0.002
603	1018	0.0771	0.002	603	1018	0.1656	0.002
604	1019	0.0764	0.002	604	1019	0.1645	0.002
605	1020	0.0758	0.002	605	1020	0.1638	0.002
606	1021	0.0752	0.002	606	1021	0.1633	0.002
607	1022	0.0745	0.002	607	1022	0.1628	0.002
608	1023	0.0739	0.002	608	1023	0.1623	0.002
609	1024	0.0733	0.002	609	1024	0.1618	0.002
610	1025	0.0727	0.002	610	1025	0.1613	0.002
611	1026	0.0727	0.002	611	1026	0.1608	0.002
612	1027	0.0727	0.002	612	1027	0.1598	0.002
613	1028	0.0711	0.002	613	1028	0.1585	0.002
614	1029	0.0694	0.002	614	1029	0.1573	0.002
615	1030	0.0692	0.002	615	1030	0.1562	0.002
616	1031	0.0692	0.002	616	1031	0.1552	0.002
617	1032	0.0692	0.002	617	1032	0.1542	0.002
618	1033	0.0696	0.002	618	1033	0.1529	0.002
619	1034	0.0706	0.002	619	1034	0.1512	0.002
620	1035	0.0716	0.002	620	1035	0.1498	0.002
621	1036	0.0726	0.002	621	1036	0.1488	0.002
622	1037	0.0726	0.002	622	1037	0.1478	0.002
623	1038	0.0726	0.002	623	1038	0.1468	0.002
624	1039	0.0726	0.002	624	1039	0.1462	0.002
625	1040	0.0719	0.002	625	1040	0.1456	0.002
626	1041	0.0707	0.002	626	1041	0.1451	0.002
627	1042	0.0694	0.002	627	1042	0.1451	0.002
628	1043	0.0692	0.002	628	1043	0.1446	0.002
629	1044	0.0692	0.002	629	1044	0.1421	0.002
630	1045	0.0691	0.002	630	1045	0.1398	0.002
631	1046	0.0686	0.002	631	1046	0.1392	0.002
632	1047	0.0681	0.002	632	1047	0.1386	0.002
633	1048	0.0676	0.002	633	1048	0.1379	0.002
634	1049	0.0669	0.002	634	1049	0.1373	0.002
635	1050	0.0661	0.002	635	1050	0.1367	0.002
636	1051	0.0657	0.002	636	1051	0.1359	0.002
637	1052	0.0657	0.002	637	1052	0.1351	0.002
638	1053	0.0657	0.002	638	1053	0.1342	0.002
639	1054	0.0657	0.002	639	1054	0.1334	0.002
640	1055	0.0657	0.002	640	1055	0.1326	0.002

OIC 2025 Manufacturing Challenge Target Specifications (cont.)

i	Wavelength (nm)	Target $R_{1,i}$	Tol. $\Delta R_{1,i}^{D}$	*i*	Wavelength (nm)	Target $R_{2,i}$	Tol. $\Delta R_{2,i}^{D}$
641	1056	0.0657	0.002	641	1056	0.1317	0.002
642	1057	0.0657	0.002	642	1057	0.1304	0.002
643	1058	0.0660	0.002	643	1058	0.1286	0.002
644	1059	0.0665	0.002	644	1059	0.1267	0.002
645	1060	0.0670	0.002	645	1060	0.1248	0.002
646	1061	0.0678	0.002	646	1061	0.1229	0.002
647	1062	0.0695	0.002	647	1062	0.1210	0.002
648	1063	0.0712	0.002	648	1063	0.1204	0.002
649	1064	0.0731	0.002	649	1064	0.1199	0.002
650	1065	0.0750	0.002	650	1065	0.1194	0.002
651	1066	0.0760	0.002	651	1066	0.1189	0.002
652	1067	0.0760	0.002	652	1067	0.1182	0.002
653	1068	0.0760	0.002	653	1068	0.1176	0.002
654	1069	0.0769	0.002	654	1069	0.1170	0.002
655	1070	0.0781	0.002	655	1070	0.1163	0.002
656	1071	0.0794	0.002	656	1071	0.1157	0.002
657	1072	0.0800	0.002	657	1072	0.1157	0.002
658	1073	0.0807	0.002	658	1073	0.1157	0.002
659	1074	0.0813	0.002	659	1074	0.1157	0.002
660	1075	0.0822	0.002	660	1075	0.1157	0.002
661	1076	0.0832	0.002	661	1076	0.1152	0.002
662	1077	0.0857	0.002	662	1077	0.1147	0.002
663	1078	0.0873	0.002	663	1078	0.1142	0.002
664	1079	0.0885	0.002	664	1079	0.1134	0.002
665	1080	0.0898	0.002	665	1080	0.1122	0.002
666	1081	0.0911	0.002	666	1081	0.1109	0.002
667	1082	0.0923	0.002	667	1082	0.1105	0.002
668	1083	0.0939	0.002	668	1083	0.1105	0.002
669	1084	0.0964	0.002	669	1084	0.1105	0.002
670	1085	0.0989	0.002	670	1085	0.1090	0.002
671	1086	0.1014	0.002	671	1086	0.1073	0.002

(b) Refractive index profile of submitted sample

Participant name(s):	John Doe, …
Affiliation name:	XYZ. Inc
Contact person address:	1 Weatherstation Rd., Eureka, NU X0A 0G0, Canada
Contact person email:	JDoe@XYZ.com
Sample description:	Doe 1
Total physical thickness Σd (nm):	3500.00
Design calculated merit function *MF*:	1.00
Sample measured merit function *MF*:	3.00

Design Index Profile			
Layer Number	Refractive Index *n at 750nm*	Extinction Coefficient *k at 750nm*	Physical thickness *d* (nm)
Incident medium Air	**1.000**	**0.000**	**-**
m	**1.460**	**0.000**	**43.21**
.	**.**	**.**	**.**
.	**.**	**.**	**.**
.	**.**	**.**	**.**
3	**2.450**	**0.000**	**123.45**
2	**1.460**	**0.000**	**250.20**
1	**0.200**	**1.230**	**10.58**
Substrate B270	**1.520**	**0.000**	**-**
1	**2.450**	**0.000**	**250.00**
2	**1.460**	**0.000**	**250.20**
3	**0.200**	**1.230**	**10.58**
.	**.**	**.**	**.**
.	**.**	**.**	**.**
.	**.**	**.**	**.**
l	**1.460**	**0.000**	**125.00**
Exit medium Air	**1.000**	**0.000**	**-**

(c) Performance of the submitted sample measured by the participant

Participant name(s):	John Doe, …
Affiliation name:	XYZ. Inc
Contact person address:	1 Weatherstation Rd., Eureka, NU X0A 0G0, Canada
Contact person email:	JDoe@XYZ.com
Sample description:	Doe 1
Total physical thickness Σd (nm):	3500.00
Design calculated merit function *MF* :	1.00
Sample measured merit function *MF*	3.00

Experimental Measurements				
Data #	Wavelength (nm)	Measured T0 at 0° AOI	Measured R1 (front) at 7.5°	Measured R2 (back) at 7.5°
1	400.0	0.1516	0.6459	0.6506
2	401.0	0.1499	0.6468	0.6540
3	402.0	0.1482	0.6476	0.6573
4	403.0	0.1465	0.6484	0.6586
5	404.0	0.1449	0.6488	0.6599
6	405.0	0.1428	0.6488	0.6610
7	406.0	0.1407	0.6488	0.6616
8	407.0	0.1386	0.6487	0.6622
9	408.0	0.1365	0.6481	0.6630
10	409.0	0.1354	0.6474	0.6638
11	410.0	0.1346	0.6468	0.6646
12	411.0	0.1337	0.6462	0.6655
13	412.0	0.1329	0.6455	0.6662
14	413.0	0.1326	0.6449	0.6669
15	414.0	0.1326	0.6443	0.6675
16	415.0	0.1326	0.6436	0.6681
17	416.0	0.1326	0.6436	0.6687
18	417.0	0.1326	0.6436	0.6694
⋮	⋮	⋮	⋮	⋮
698	1097.0	0.0536	0.0939	0.1105
699	1098.0	0.0561	0.0964	0.1105
700	1099.0	0.0608	0.0989	0.1090
701	1100.0	0.0621	0.1014	0.1073