48. We apply Eq. 36-25 to both scenarios: $m = 4001$ and $n_2 = n_{\text{air}}$, and $m = 4000$ and $n_2 = n_{\text{vacuum}} = 1.00000$:

$$2L = (4001)\frac{\lambda}{n_{\text{air}}} \qquad \text{and} \qquad 2L = (4000)\frac{\lambda}{1.00000} \ .$$

Since the $2L$ factor is the same in both cases, we set the right hand sides of these expressions equal to each other and cancel the wavelength. Finally, we obtain

$$n_{\text{air}} = (1.00000)\frac{4001}{4000} = 1.00025 \ .$$

We remark that this same result can be obtained starting with Eq. 36-41 (which is developed in the textbook for a somewhat different situation) and using Eq. 36-40 to eliminate the $2L/\lambda$ term.