



TECHNOLOGY INFORMATION SHEET

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DELAMPING AND REDUCED WATTAGE LAMPS

1. Background

One of the most obvious means to reduce energy consumption is to reduce the amount of the service that uses the electricity. Many commercial buildings have a level of light greater than required to perform the tasks conducted within the building. In this case, a simple means to reduce electrical consumption is to reduce the lighting levels. This can be accomplished in three ways.

Firstly, removing some lighting fixtures or removing some lamps; this is called delamping. Secondly, the existing lamps can be replaced with lamps of less wattage and less light output. These "energy saving" lamps are designed to replace standard lamps at a 10-15% savings in electricity and about the same reduction in light levels. For example, a 34 watt lamp replaces a standard 40 watt lamp. Finally, phantom tubes, which draw no power and produce no light, can be used to replace lamps in many of the fixtures.

It is important to recognize the effect of making these changes. While energy is saved by eliminating lamps or consuming less wattage, the lighting service (light

levels) is also reduced to the space. Consequently, these are ideal "first-pass" energy saving activities in areas that are chronically over-lit. However these activities should be implemented with caution, since they could prevent or postpone the change to other more cost-effective energy saving measures.

2. Delamping

The general lighting of commercial buildings typically consists of fluorescent light fixtures installed in multiple lamp configurations (two, three, or four). The light level in the working space will be determined by the number of lamps in the fixture, the light output of the lamps, and the spacing of the fixtures. Consequently, correction for over-lighting could be made by removing lamps or changing the location and number of fixtures. It is, however, much easier to reduce the number of lamps per fixture than it is to change the spacing of the fixtures. Lamp reduction per fixture may require some minimal wiring changes, but it does not involve structural changes.

A delamping operation can be conducted with two general approaches, the simplest (but not necessarily the most effective)

approach is to delamp the same percentage of lamps in all areas that are considered to have more light than is necessary. The other approach would be to measure light levels throughout the working space and delamp the appropriate number of lamps in only those areas that have light levels higher than acceptable working levels.

Then, for example, if a 50% reduction in the number of lamps is desired, either half of the lamps in each fixture can be removed or half of the fixtures can be disconnected. Which of these two practices is used will depend on the spacing of the fixtures. If the active fixtures are too far apart, the resulting variation in the light levels will be too great.

If a complete fixture is to be removed, it is not adequate to simply remove the lamps because the ballast will continue to draw power even when lamps are not installed. Therefore a complete disconnection (and/or removal) of the fixture is recommended.

If some of the lamps in each fixture are to be removed, some re-wiring will be necessary. Ballasts must be reconnected to the remaining lamps. Thus, some ballasts can be removed with the lamps. Alternatively, phantom tubes can be used (see below).

3. Phantom Tubes

Phantom tubes are plain glass tubes with a bi-pin base to fit fluorescent fixtures and a wire conductor in the centre of the tube. They produce no light and draw no power, but allow the fixture wiring and ballasts to be untouched. For a situation where complete fixtures cannot be removed without affecting the lighting design, phantom tubes are a very convenient and low cost solution

3. Reduced Wattage Lamps

When light levels are excessive, energy savings can be also achieved by retrofitting reduced wattage lamps (bulbs). This is most effective in areas where the lighting level is up to 20% greater than what is required. When standard F40T12 lamps have failed, they can be replaced with lower wattage F34T12 lamps. Low wattage 52 watt energy saver lamps can also replace standard wattage (e.g. 60 watt) incandescent lamps.

This is only practical when standard lamps have failed while in service and need to be replaced.

As previously mentioned, the use of reduced wattage lamps does not save as much energy as the use of more efficient lighting systems (see other Lighting Technology Information Sheets), but it is a convenient way to achieve **temporary savings** until a more extensive lighting renovation is due.

4. Energy Savings Potential

The table below presents a comparison of four lighting systems: a standard lamps system, a delamped standard system, a reduced wattage lamp system, and a delamped reduced wattage system. Note the reduction in light levels in each saving arrangement.

Annual operating hours per year are assumed at 3000 hours/year. Annual energy costs are calculated at 7 cents per kilowatt-hour (kWh) and 3.5 cents per kWh. For simplicity of calculation, it assumed that demand charges are not affected.¹ One magnetic ballast is assumed for two lamps and consumes 13 watts². Standard white fixtures and lenses are assumed³.

Other information about delamping and the use of reduced wattage lamps can be obtained through publications listed on the Efficient Lighting Reference List.

¹ In reality demand charges will be affected for many buildings, since most lighting is usually all operating when the peak demand occurs.

² Thirteen watts is for new magnetic ballasts. New electronic ballasts will draw less (3 watts). Older magnetic ballasts could be more.

³ Not all light that is produced by the lamps exits from the fixture; the fixture and the lens (see Efficient Fluorescent Fixtures Technology Information Sheet) absorb some.

Comparison of Delamping and Reduced Wattage Lamps in a 4-lamp Fixture

Number of Lamps	Lamp Type	Input Power including ballast (watts) ⁴	Initial Lumens ⁵ of the 4 lamps	Annual Energy Costs at 7¢ per kWh	Annual Energy Costs at 3.5¢ per kWh
4	40 Watt T12	186 watts	12,200	\$39.06	\$19.53
4	34 Watt T12	162 watts	10,600	\$34.02	\$17.01
2*	40 Watt T12	93 watts	6,100	\$19.53	\$9.77
2*	34 Watt T12	81 watts	5,300	\$17.01	\$8.51

* Using phantom tubes or fixture re-wiring

⁴ Two standard magnetic ballasts are required in a four-lamp fixture. Each ballast consumes approx. 13 watts. It assumed that during delamping, one of the ballasts is disconnected.

⁵ "Initial Lumens" is defined as the lamp performance after 100 hours measured on a reference ballast (actual ballast performance may be different). Initial lumens will vary slightly depending on the manufacturer of the bulb.