The Barn Raiser

Mid-South Engineering Company

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Code Matters

Codes ***do*** matter in the building and industrial plant world…..A lot.

by Karen Griffin, Staff Architect, MSECO Hot Springs

Question:

When Does an Office or Plant building require an automatic sprinkler system?

Referenced Codes: The International Building Code (IBC), the International Fire Code, NFPA 101 Life Safety Code, NFPA 13, and other codes say we need to look at these **FACTORS** to answer it:

- The Occupancy classification of the building or incidental spaces within a building.
- The adjacent buildings' occupancy classifications.
- The floor area of the new building and how many stories above grade.
- Travel distance to exits.
- Combustible or non-combustible construction of new and adjacent buildings.
- The combustibility, flammability or hazard level of contents stored in a building,
- or the hazards of the plant processing itself.
- Distance to another building or a lot line.

Example: Freestanding Office Building within a Processing Plant:

The new office building is wood frame construction and will be 8,500 square feet gross. The anticipated number of workers in the building is 42 but the code calculates our occupant load will be 85 people *for the building*. The *conference room* in the building is 730 square feet net so the code calculates our occupant load in this room to be 49. Since the conference room load is under 50, we do not have to classify the room as "Assembly" occupancy, but can design it to be an incidental space to the main "Business" occupancy. The new building will be more than 30' away from any other plant building so we do not need to fire rate any exterior walls or structural elements (this distance is determined from a matrix chart in the code). Even though the building construction is considered "combustible", the new building will **not** need to be sprinkled with all these conditions. Change up any one of these conditions, as well as any of the 50 other things that need to be analyzed (not mentioned here due to the complexity) and a sprinkler system may be needed or possibly a fire rated interior wall to separate occupancies and/or a fire rating on exterior walls of the building may need to be added in addition to a sprinkler system. There are "trade-offs" throughout the codes to help make the decision as to whether to sprinkler a building or which type of system to use when it is required.

Did you know?

✓If a building is required to be sprinkled, most likely the **attic** also will need to be sprinkled.

✓**All** commercial buildings require smoke detectors; **most** buildings require fire alarms with strobe lights and annunciators throughout.

✓If a building is not required to be sprinkled, there are still **additional costs** involved to meet the fire codes.

✓**Portable Fire extinguishers** (sometimes standpipes and hose cabinets) are required in every building, even if there is an automatic sprinkler system installed. The specific types will be determined by a certified fire protection designer.

✓Automatic sprinkler system may be eliminated in **generator** and **transformer** rooms when separated by 2-hour fire resistive assemblies.

✓The Client's **Insurance Company** may have requirements above and beyond code minimums.

✓Some cities have made fire sprinkler systems a requirement for **all** buildings.

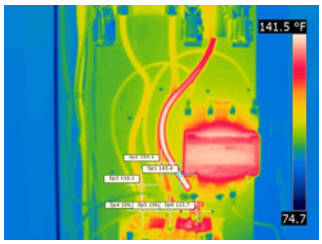
Thermal Imaging in Industrial & Commercial Electrical Applications

By: Dick Angotti, ET

In today's world of electrical components both industrial and commercial small consistent changes can make a big difference in the profitability of any facility. Thermal imaging experts suggest that plant managers and /or facilities engineers have the following systems in their facilities inspected yearly for energy losses:

1. Electrical Motors and Generators

Electric motors are one of the biggest energy consumers in any industrial facility. Overheating and malfunctioning motors and generators tend to indicate mechanical or electrical inefficiencies that lead to unnecessary energy use and sometimes even failure.



This thermal image shows one lead of a 3 phase motor starter running hotter than the other two leads. This Unit was shut down and wiring connection was cleaned and re-tightened and the problem was corrected.

What to scan:

•Airflow. In fan-cooled motors, restricted airflow can cause general overheating often manifesting itself on the entire housing.

•Electrical unbalance. A common cause, a high resistance connection in the switchgear, disconnect or motor junction box, can usually be pinpointed by an infrared inspection and confirmed using a multi-meter, clamp meter or a power quality analyzer.

•Bearings. When thermal images reveal bearing housings with abnormally high temperatures, either lubrication of the bearing or its replacement is often called for. *Beware that over-lubrication can cause abnormal heating as well.*

•Insulation. Look for higher than normal housing temperatures in areas associated with windings. For each 18 °F (10 °C) rise over the maximum rated temperature of a motor, approximately half the life of the motor is lost due to insulation failure.

•Electrical connections. As with electrical connections in motor control circuit, look for loose or corroded connections that increase resistance. High resistance in connections will convert electrical energy into heat causing heat loss and damage in the connection instead of being used for useful work at the motor.

Anticipated savings:

With motors and generators, specific energy losses are usually of less consequence than failure of the unit. The impact of a motor or generator failure will be contingent upon the nature of the enterprise and the system(s) affected. That said the two best ways to reduce motor energy expenditures are to:

1. Keep motors well maintained/operating at maximum efficiency
2. Size them appropriately and operate at constant speeds. Doing this for a period of time will yield incremental energy savings, after which you can re-invest in motor controls that will significantly reduce energy usage.

2. Electrical Systems

Many people don't realize that electrical systems can actually waste money. As components degrade and resistance increases, waste occurs.

This thermal image is of a fuse that had a loose corroded fuse clip causing resistance of current flow there by wasting energy. The fuse clip was replaced and the problem was corrected.

What to scan:

•Distribution panels. Check for unbalance in circuits, loose and corroded connections at breakers, contacts, fuse clips, buss work, insulation deterioration, etc.

•Transformers. Be aware that if the temperature of one electrical leg on a transformer is significantly hotter than the others, that leg may be failing.

•Lighting control circuits. Check all wiring splices and connections at fuses, switches, in panels, and at the fixtures. Be aware that thermal imaging can also be used to monitor low-voltage control circuits.

Anticipated savings:

According to some estimates, lighting accounts for about 20 % of all electricity use in the U.S. and more than 40 % of electricity use in offices, stores, and other industrial and commercial buildings. While complete retrofits of lighting systems are producing phenomenal returns on investment, keeping lighting controls (time clocks, photo sensors, occupancy detectors, etc.) operating properly will also help save energy.

New Construction:

On new construction, facilities should have a thermal inspection done on their new process during the first 3 months of operation to identify faulty connections in electrical wiring and equipment installation misalignment. This will save in premature failure of the new equipment.

Mid-South Engineering Company

Corporate Office
Hot Springs, Arkansas – USA
1658 Malvern Avenue - Hot Springs, AR 71901
501-321-2276 - FAX: 501-624-4214

Cary Office
Cary, North Carolina - USA
200 Mackenan Dr. Cary, NC 27511
919-481-1084 – Fax: 919-481-1184

Millinocket Office
Millinocket, Maine- USA
70 Spring St. Millinocket, ME 04462
207-723-6871 – Fax: 207-723-6872

Web Site: www.mseco.com
E-mail: info@mseco.com