BILL CONNER ASSOCIATES LLC

Lighting Pipes

The subject of lighting pipes and the hardware to support theatrical lighting may seem like a mundane subject. But for the designers and users that must work in a theatre daily they are a critical design feature and must be planned and installed properly. Poorly designed lighting positions can be difficult to use, hamper lighting design flexibility, and can occasionally be dangerous.

First to note is the size and type of pipe to be used. The accessories for stage lighting and even rigging accessories are traditionally designed for 2-inch OD (outside dimension) pipe or tube. In the US the common solution is to use 1-1/2" Schedule 40 trade size black iron pipe which is approximately 1.9-inches in diameter. All standard lighting clamps fit on this size pipe easily, including the scaffold type clamps (aka "cheeseborough" clamps). Commonly we see engineers and contractors suggest the use of 1-1/4" Schedule 40 pipe which less expensive but is also too small and not strong enough in most cases to span the distances required for lighting rails and stage battens. Conversely we sometimes see 2" trade size pipe used which can be a real challenge because so many lighting accessories, especially legacy gear, simply won't fit around it. Occasionally, based on very specific reasons such as longer than typical support spacing (greater than 10-feet) we have designed 2" pipes, but that was an informed choice and compromise. By choosing other than 1-1/2" Schedule 40 pipe the user is forced to purchase non-standard hardware for the theatre which will be a challenge for the life of the building.

Clear Vertical Spacing below horizontal lighting pipes is also critical and frequently in too small. Many theatre catwalks use a mid-height and upper rail. On projects we design we very carefully work with the architect and structural engineer to get the spacing that is permitted and desired, only to find that somewhere in the construction process the spacing was revised because it is different than "typical". It's important to understand the size of portable theatre lighting used in most venues. In our experience, nearly all compact quartz or LED spotlights can work when the pipes are properly spaced a bit wider than is typical for OSHA-compliant guards. OSHA-compliant guards are typically based on a 4-inch toe board with two pipes, an overall minimum height of 42-inches, and preventing a 19 inch sphere from passing through. The problem is that a stage light will not fit in that space properly and be able to focus without angling the yoke out so the light is not plumb. While this appears to work, it makes focus difficult and more importantly it becomes dangerous when the user must reach to the front of the light for color or focus adjustments. This causes the technician to lean out further than necessary, where they can lose their balance. Outriggers where there is a separate lighting pipe from the guards also don't work because the light is still further from the technician and the extra pipes prevent lights from panning or rotating as necessary.

The remedy is found in the International Building Code (IBC) and the Life Safety Code, which doesn't require any guard on a catwalk "appurtenant to a stage". Reference the exceptions to IBC 1013.1 (or 1013.2 in the 2012 edition). Our solution is a wider spacing which is a reasonable height to permit the light to hang properly while also satisfying the need to have some sort of guard to protect the user. Typically we recommend a "mid-rail" centered 23-inches above the toe board and the top pipe centered 24-inches above that. Those dimensions provide approximately 22-inches clear between the pipes, which is sufficient to hang the lights but is not so far apart as to be uncomfortable.

There are other critical features in the design of lighting catwalks, stage battens, box booms, balcony rails and other lighting positions. But the two criteria listed above are the most critical and sadly also the most commonly misunderstood. It's important these details be closely tracked from design to shop drawings to final installation in the building. It's remarkable to us that despite our best efforts, how frequently lighting pipes are incorrectly installed.