

# TOWN OF JUPITER BUILDING DIVISION

## FIELD INSPECTION SERVICES

Friday September 24, 2010

### Expansion Joints Required for Rigid Polyvinyl Chloride Conduit Conduit, type PVC

#### Revision 1.0 Update to the 2008 NEC

Article 352.44 of the 2008 National Electric Code requires that expansion joints be installed for Rigid Polyvinyl Chloride Conduit type PVC, to compensate for thermal expansion and contraction, where the length change is anticipated to be 6 mm (1/4 inch) or greater, in accordance with Table 352.44 of the 2008 NEC, in a straight run between securely mounted items. Securely mounted items are boxes, cabinets, elbows, condulets, and other conduit terminations.

In order to calculate the amount of thermal movement. It is first necessary to determine the high and low temperature range.

Based on historical data from the National Weather Service Forecast Office for Miami-South Florida as recorded at Palm Beach International Airport from 1938 to the present, in mid-July thru mid-September, it is found that temperatures in the uppermost 90's are very common. Winter temperatures are consistently in the mid to low thirties with an occasional hard freeze.

For all indirect or varying sunlight conditions a temperature range of 70 degrees is to be used.

For direct sunlight conditions such as roof tops, the Carlon Company and NEMA state an additional 30 degrees is to be added to the ambient air temperature. Therefore the temperature range for direct sunlight exposure is 100 degrees.

Table 352.44 provides the calculations for the amount of thermal expansion per 100 feet of RNC at various temperature ranges. The coefficient of expansion remains constant regardless of the diameter of the conduit, or whether it is schedule 40 or schedule 80.

To find the thermal movement for an indirect sunlight location go to the center column of Table 352.44; "Temperature Change (F)", for 70 degrees. The amount of thermal movement is 2.84 inches per 100 feet of RNC conduit. Which is also .284 of an inch per 10 feet, or 9/32 of an inch. (slightly more than 1/4") Please note the NEC requires an expansion joint where the thermal movement is 1/4 of an inch or greater.

For a direct sunlight location continue down the same column to the 100 degree line. The thermal movement is shown as 4.1 inches per 100 feet, or 13/32 of an inch per 10 feet. (slightly more than 3/8")

It is a mistake to think that by adding additional straps one can stop the thermal movement of RNC.

The correct way to install RNC is by using only 2 hole straps and to allow the conduit to float within the strap, and to install the required expansion joints.



The expansion joint is made up of two parts; the rigidly fixed barrel, and the movable piston. The barrel is installed as the first fitting at the beginning of the conduit run. It must be securely fastened in place so it cannot move. The piston and the conduit then move back and forth in the barrel as the conduit expands and contracts.

A three hundred foot run of RNC would require three, six-inch expansion joints. The run would then be divided into three sections. Start with the first fixed barrel, insert the piston, then one hundred feet of floating conduit, then the second fixed barrel and the second piston and the second one hundred feet of conduit, then the third fixed barrel and the third piston and the last one hundred feet of floating conduit.

When inserting the piston into the barrel it is important to be aware of the present ambient temperature. In January, one of the coldest months, the conduit will be at its shortest length. Therefore the piston will be inserted to less than half way into the barrel. In August, one of the hottest months, the conduit will be at its greatest length. Therefore the piston needs to be inserted more than half way into the barrel.

Additional information may be obtained at the NEMA web site which is easily accessed thru the Carlon web site at [www.carlon.com](http://www.carlon.com) . At the Carlon home page move your mouse to "Tech Info" then click on "installation and training"