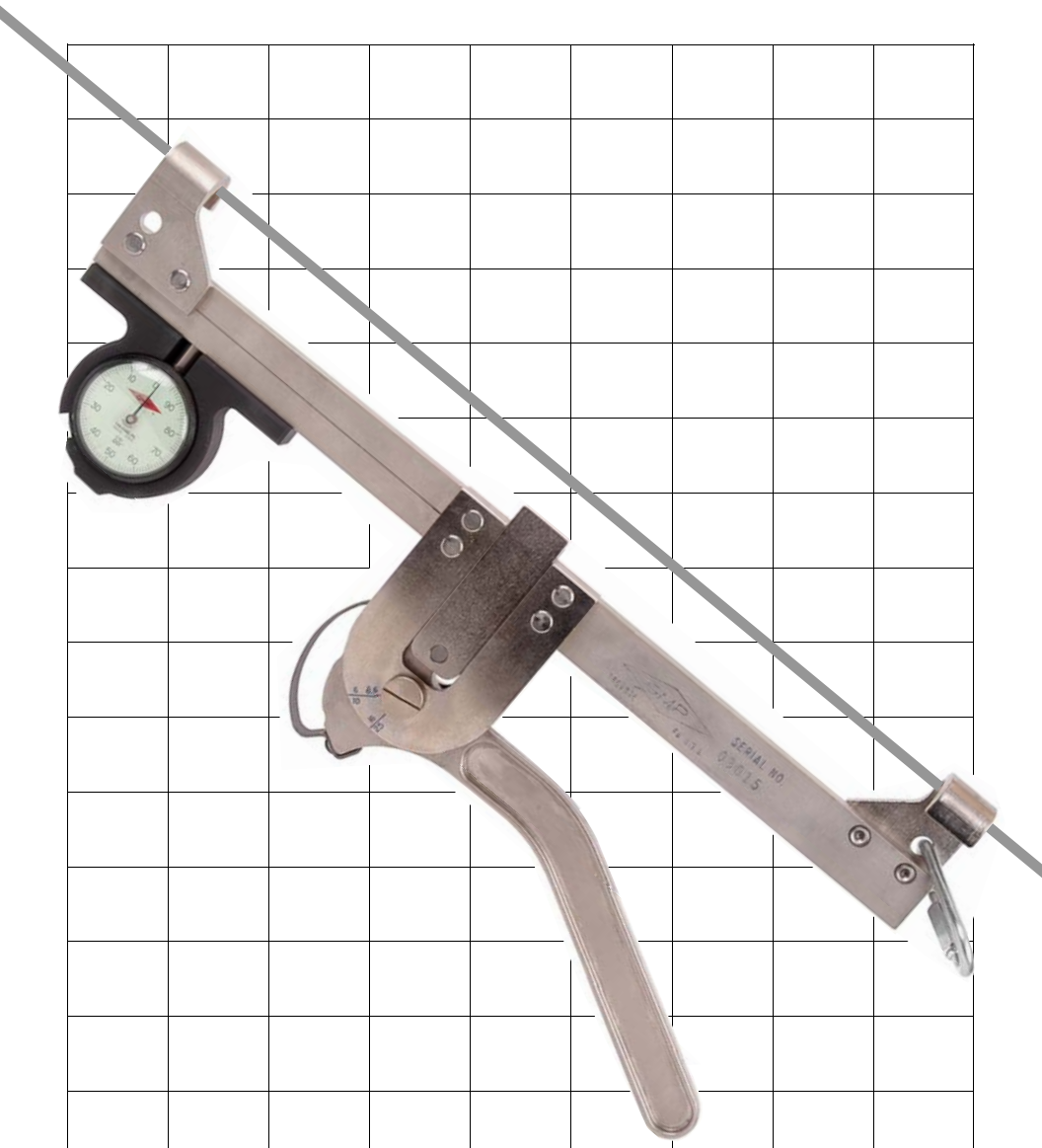
# GMP

# Strand Tensionmeter Operation and Maintenance Manual

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## General

An intensive study by the National Electric Safety Code Clearances Subcommittee has resulted in a completely new "Uniform System of Clearances" adopted in the 1990 and subsequent editions of the NESC. This revision places renewed emphasis on utilities' practices for engineering and stringing of aerial cables to maintain proper cable clearances under the various specified conditions. The ability to accurately measure strand tensions in the field is essential for compliance with the code.

The GMP Strand Tensionmeter, also called a B Strand Dynamometer, is a precision instrument designed to measure the tension of certain specific zinc-coated guy wires and messenger cables per ASTM A-475. The specific sizes and type(s) of cable(s) with which this unit is compatible are listed in the calibration chart which has been prepared for this specific serial numbered tensionmeter and which bears that identical serial number.

The following list shows the various sizes, types and designations of messenger cables for which the tools can be calibrated:

| Nominal Diameter | | | |
|---|---|---|---|
| **Inches** | **mm** | **Designation** | **Description** |
| 1/4 | 6.35 | 6.6M | 1 X 7 EHS |
| 5/16 | 7.94 | 6M | 1 X 7 Utility Grade |
| 5/16 | 7.94 | 10M | 1 X 7 EHS |
| 3/8 | 9.52 | 10M | 1 X 7 Utility Grade |
| 7/16 | 11.11 | 16M | 1 X 7 EHS |
| 7/16 | 11.11 | 16M | 1 X 7 Utility Grade |

To obtain an accurate measurement it is imperative that the strand to be measured be positively identified as to its actual diameter **and** its grade, either Utilities Grade or Extra-High Strength. Secondly, the Strand Tensionmeter to be used must have a current calibration chart with a corresponding serial number which has a calibration for the specific strand you have identified.

The Tensionmeter measures the force required to deflect the strand to an out-of-line position and registers the amount of force required on the integral dial. The actual strand tension is then determined by referring to the calibration chart specifically prepared for and furnished with each Tensionmeter, which converts the dial indicator reading into the actual tension value.

The instrument measures tension in pounds force to within an accuracy of three percent (± 3%) or ± 150 pounds, whichever is greater.

The Tensionmeter is primarily made from nickel-plated steel and is furnished in a hard shell plastic carrying case; the interior is cushioned with foam for unit protection.

Each Tensionmeter has a registered serial number stamped on the unit.

## ▲Precautions

- Do not measure tensions of 1/2" diameter strand with the cable in place; these tension values usually exceed 10,000 pounds.
- Do not drop or jar the Tensionmeter.
- Raise and lower the instrument with a hand line.
- Keep the device away from dirt, grease, sand or water.
- Keep foreign material from damaging the dial or plunger.
- Maintain the unit in the carrying case whenever possible.
- Make certain that the correct calibration chart is always kept in the carrying case.
- Use the Tensionmeter only on strand type and sizes shown on the calibration chart.
- Do not use this device on strand tensioning applications exceeding 10,000 pounds.

## Calibration Chart

Included with each Tensionmeter is a calibration chart registered under the same serial number as the Tensionmeter. This chart is to be used for interpreting the readings for that specific instrument only.

*No other chart should be used. No other type of strand should be used.*

The table across the top of the chart lists the commonly used strand sizes for which the Tensionmeter was calibrated, as well as the handle position for each type of strand. The data in the chart indicates the dial reading of the Tensionmeter corresponding to the amount of strand tension in 100 pound increments for the normal tension range of each strand size.

The chart indicates the date when the initial calibration was made. If the chart is lost, the Tensionmeter must be returned for re-calibration.

## Temperature Compensation Charts

Strand tension is affected by ambient temperature. Generally speaking, strand tension increases as temperature decreases due to the strand contraction and, conversely, strand tension decreases as temperature rises, due to expansion. The Strand Tensionmeter will measure the actual tension at the ambient temperature at the time of the measurement. You should consult with the Outside Plant Facilities Engineer as to the proper strand tension for the ambient temperature at the time of measurement.

## Temperature Compensation Charts (continued)

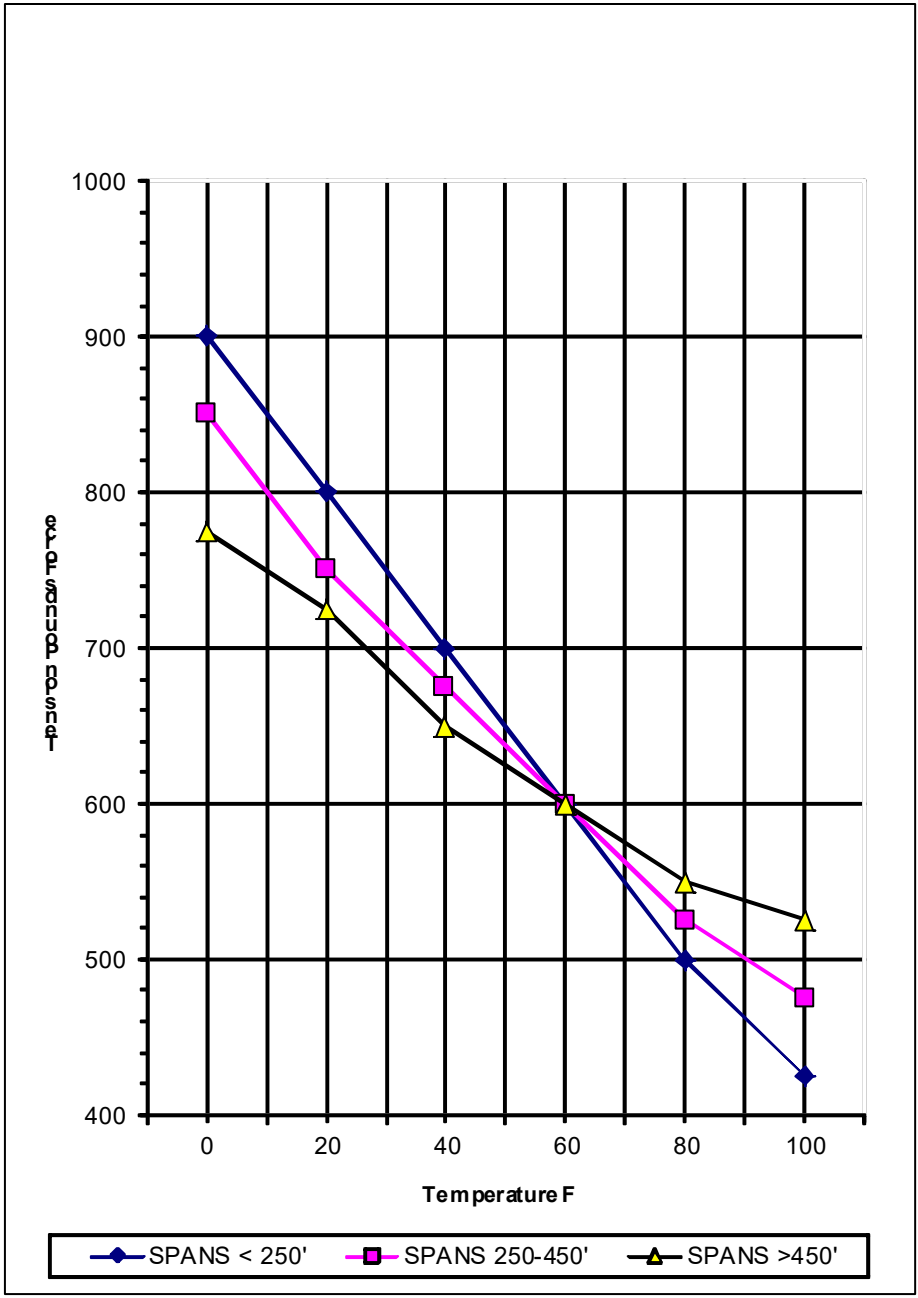
Line charts are provided in these instructions in order for the user to determine how to compensate for changes in ambient temperature. The charts are derived from the recommended values expressed in the referenced industry standard practices. They are not intended to supersede any tension calculations which might be provided to the user by the utility's plant engineering department.

For example, assume that the engineering specifications for tensioning a certain 300 ft. span of 1/4" Extra-High Strength strand (i.e. Bell System 6.6M) calls for the strand to be at 600 lbs. at 60 degrees F. When you are at the work site, your thermometer indicates an ambient temperature of 86 degrees. Referring to the Temperature Compensation Chart for that specific strand, you will see three lines. Find the one which corresponds to spans 250-450 feet. Notice that 600 pounds on the vertical axis corresponds to 60 degrees on the horizontal axis. Now continue right along the horizontal axis to 86 degrees. With a straight edge, follow from that point vertically until you intersect with the 250-450 ft. line. 86 degrees corresponds to just over 500 pounds. That is the strand tension compensated for 86 degrees ambient. On the Tensionmeter Calibration Chart for 1/4" EHS, locate 500 Ibs. and convert to the dial indicator reading. That is the dial indicator number to shoot for when tensioning this particular strand.

An analog thermometer is provided in each Strand Tensionmeter storage case for the purpose of accurately determining the ambient temperature at the time of the measurement. Be sure to hold the thermometer by the dial and not by the sensing stem and to allow at least two minutes for the thermometer to stabilize itself.

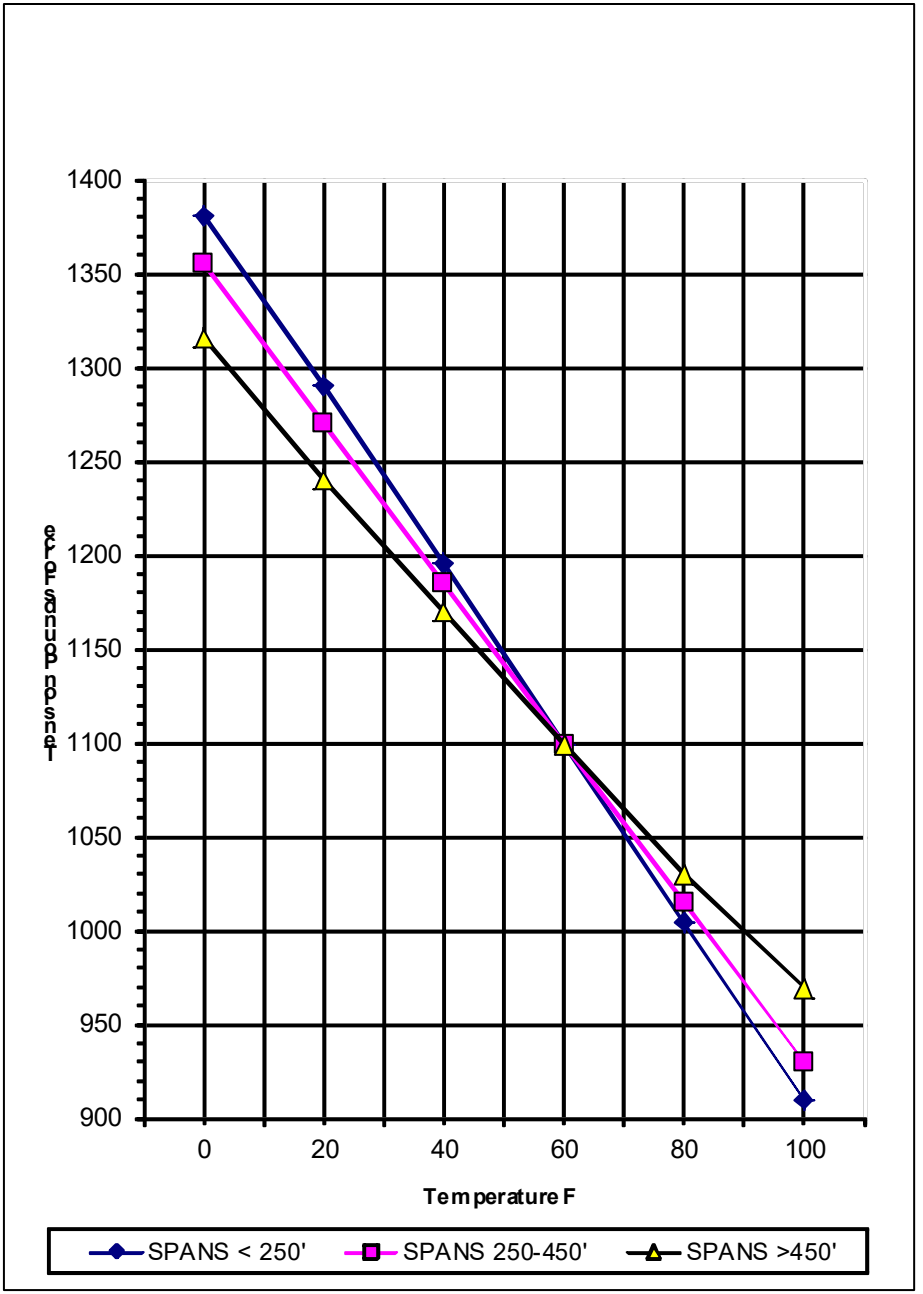
# 1/4” Extra High Strength
# Temperature Compensation Chart

Per BSP 627-210-018 iss. 1



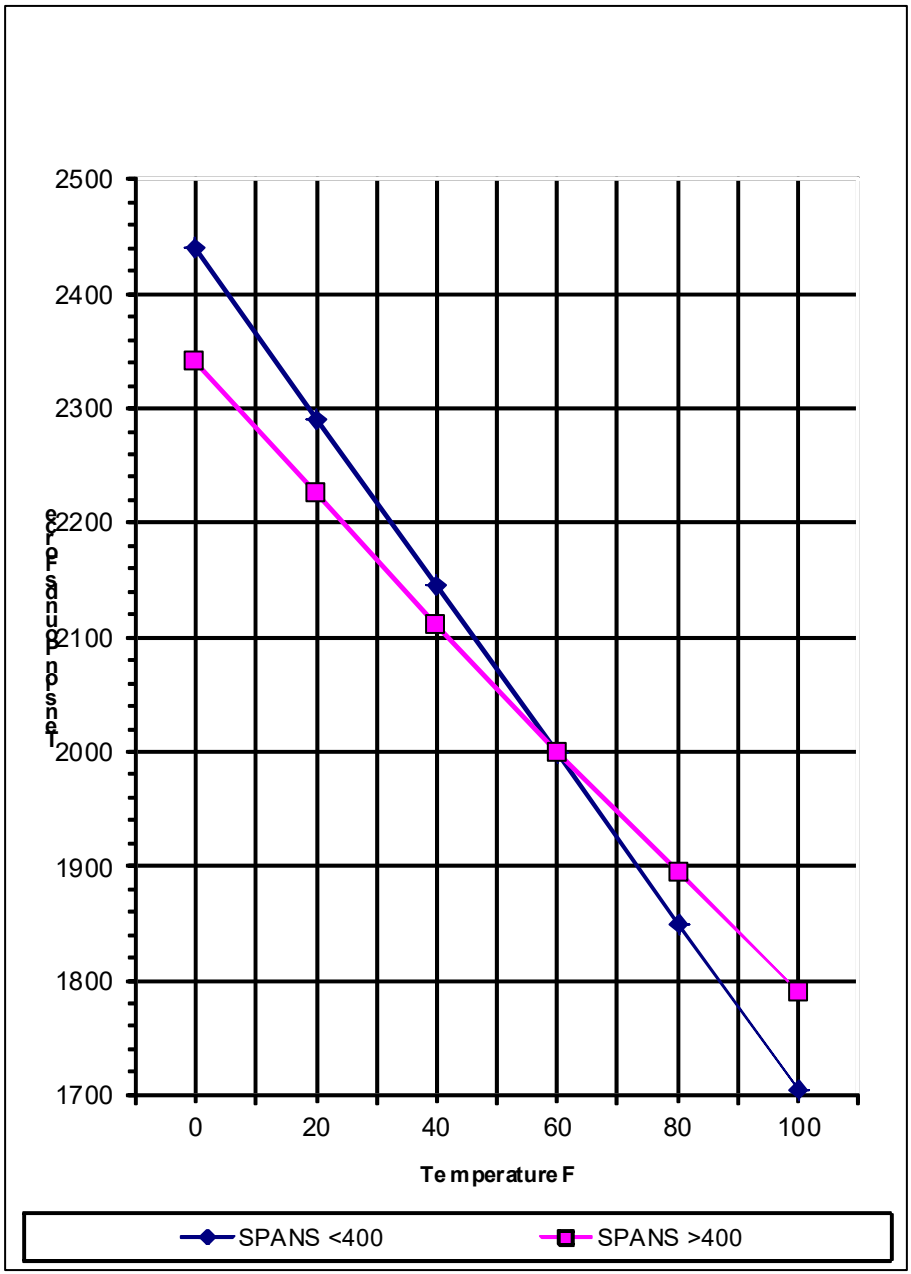
# 1/4” Extra High Strength
# Temperature Compensation Chart

Per GTEP 627-100-200 iss.2



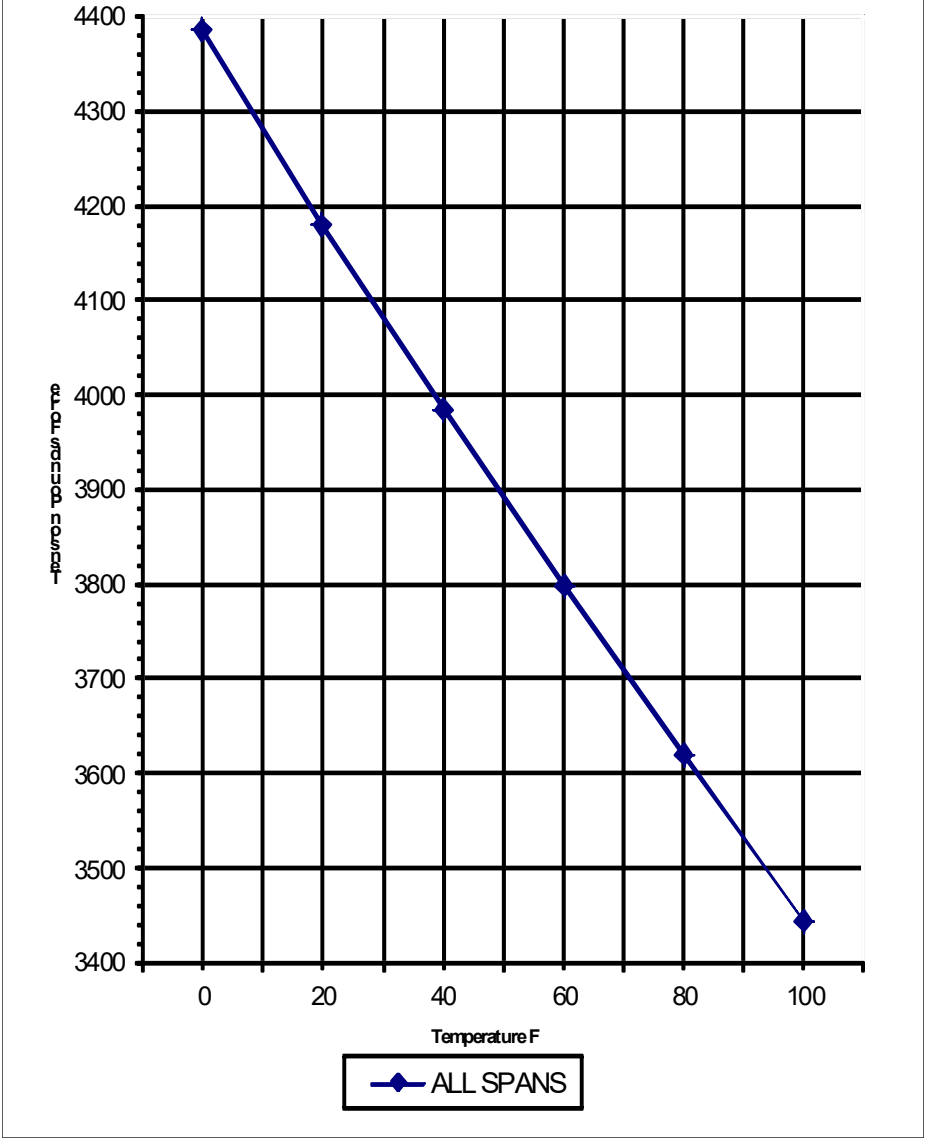
# 5/16” Extra High Strength
# Temperature Compensation Chart

Per GTEP 627-100-200 iss.2



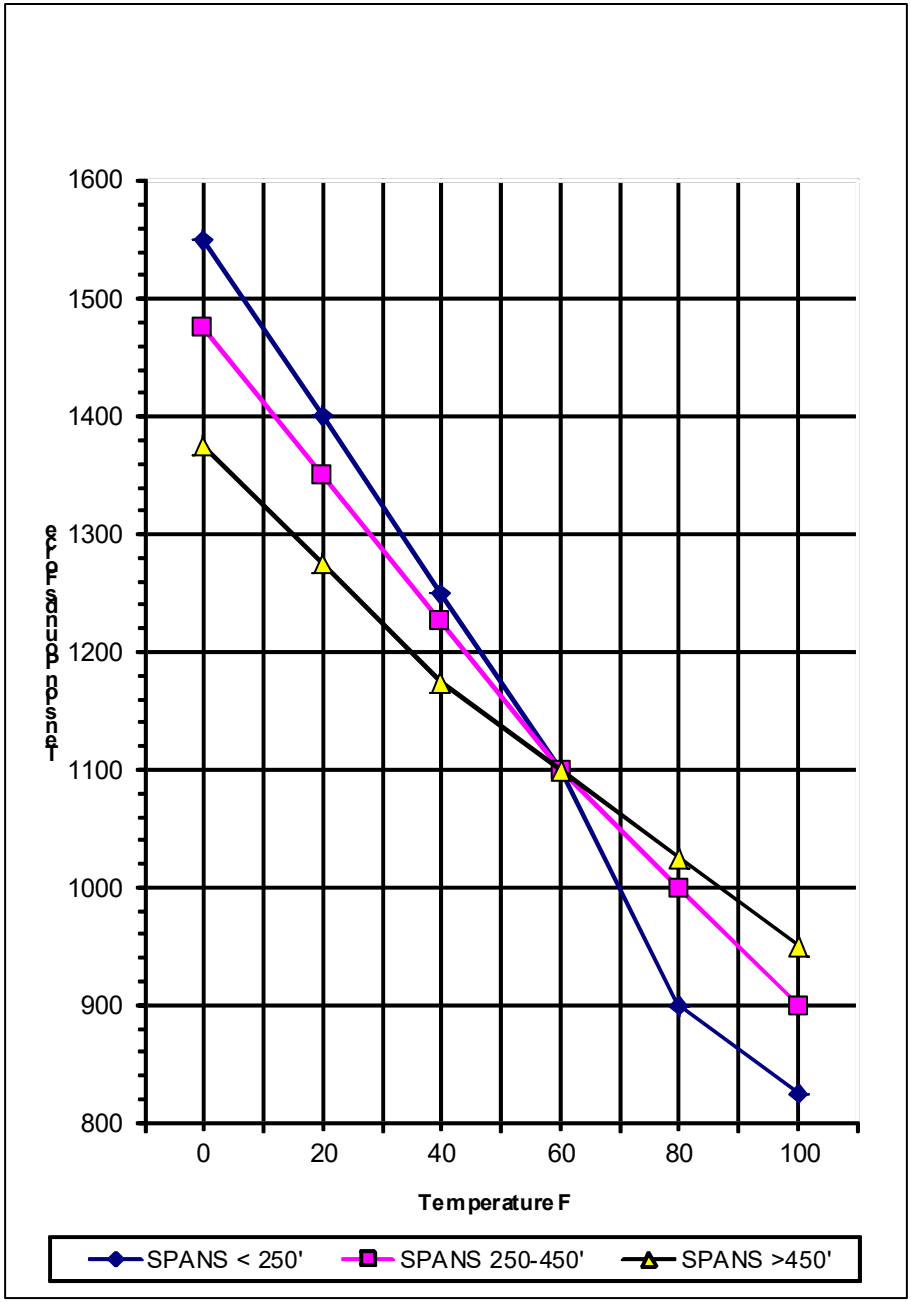
# 7/16” Extra-High Strength
# Temperature Compensation Chart

Per GTEP 627-100-200 iss.2



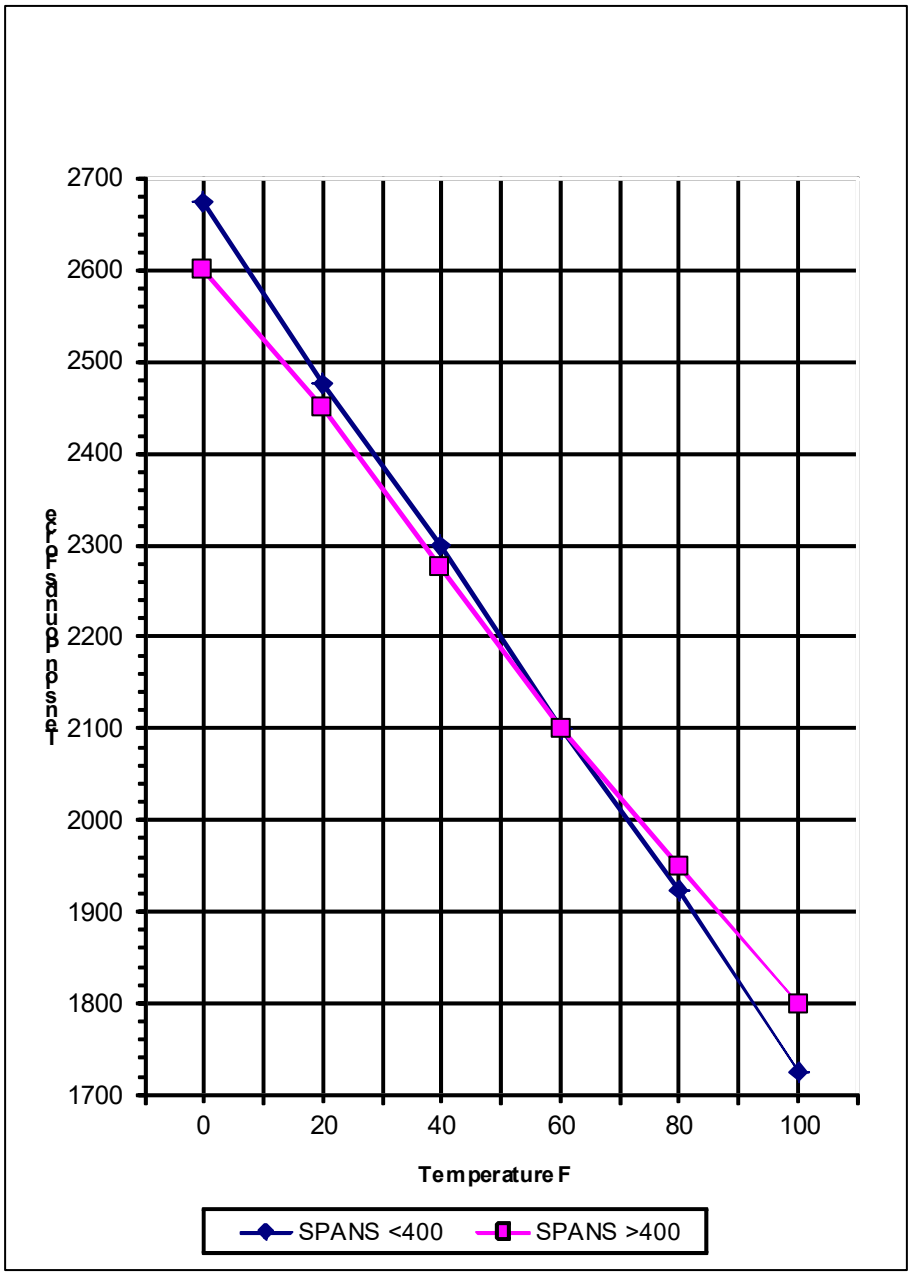
# 5/16” Utilities Grade
# Temperature Compensation Chart

Per BSP 627-210-018 iss. 1



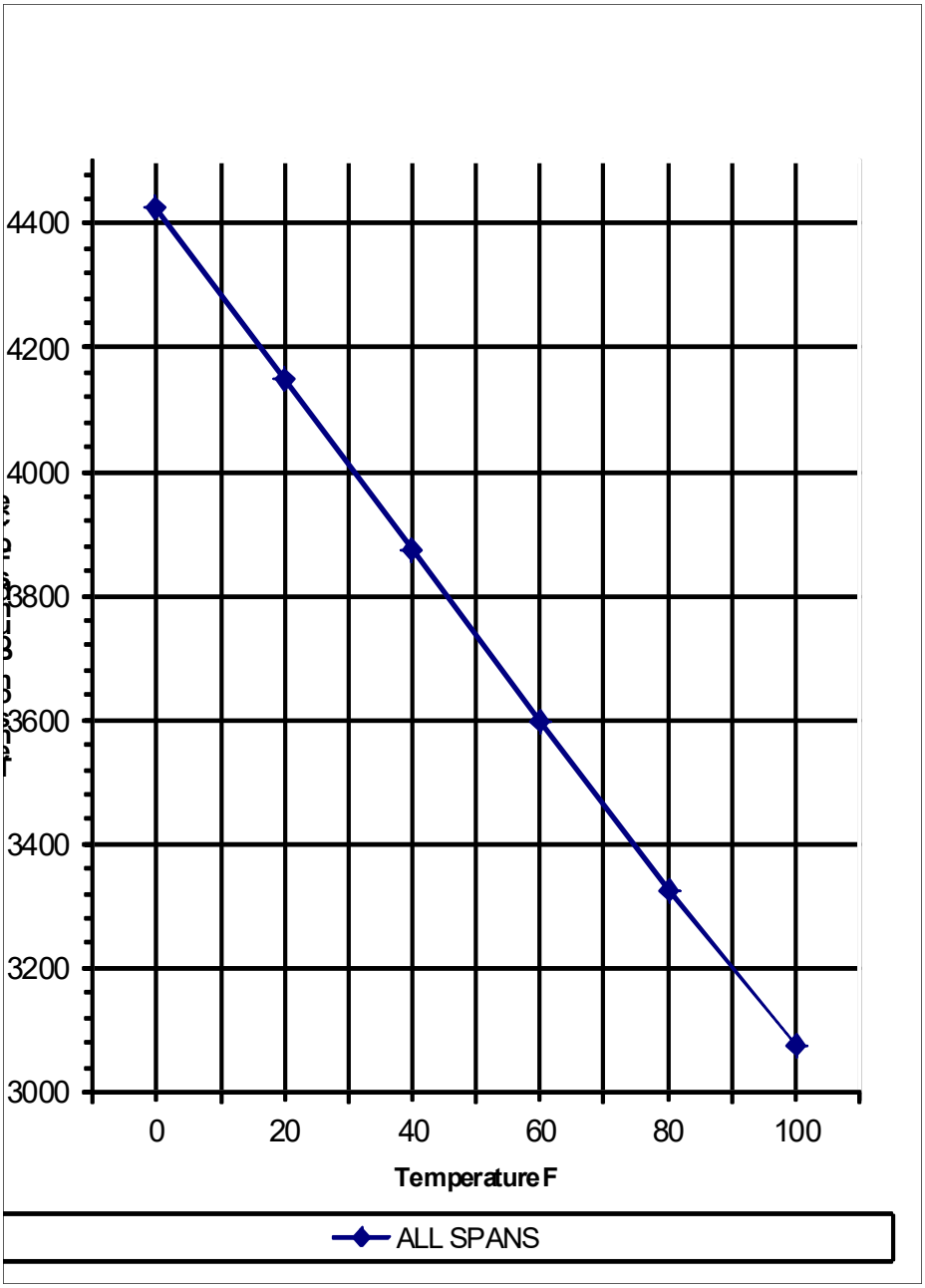
# 3/8” Utilities Grade
# Temperature Compensation Chart

Per BSP 627-210-018 iss. 1



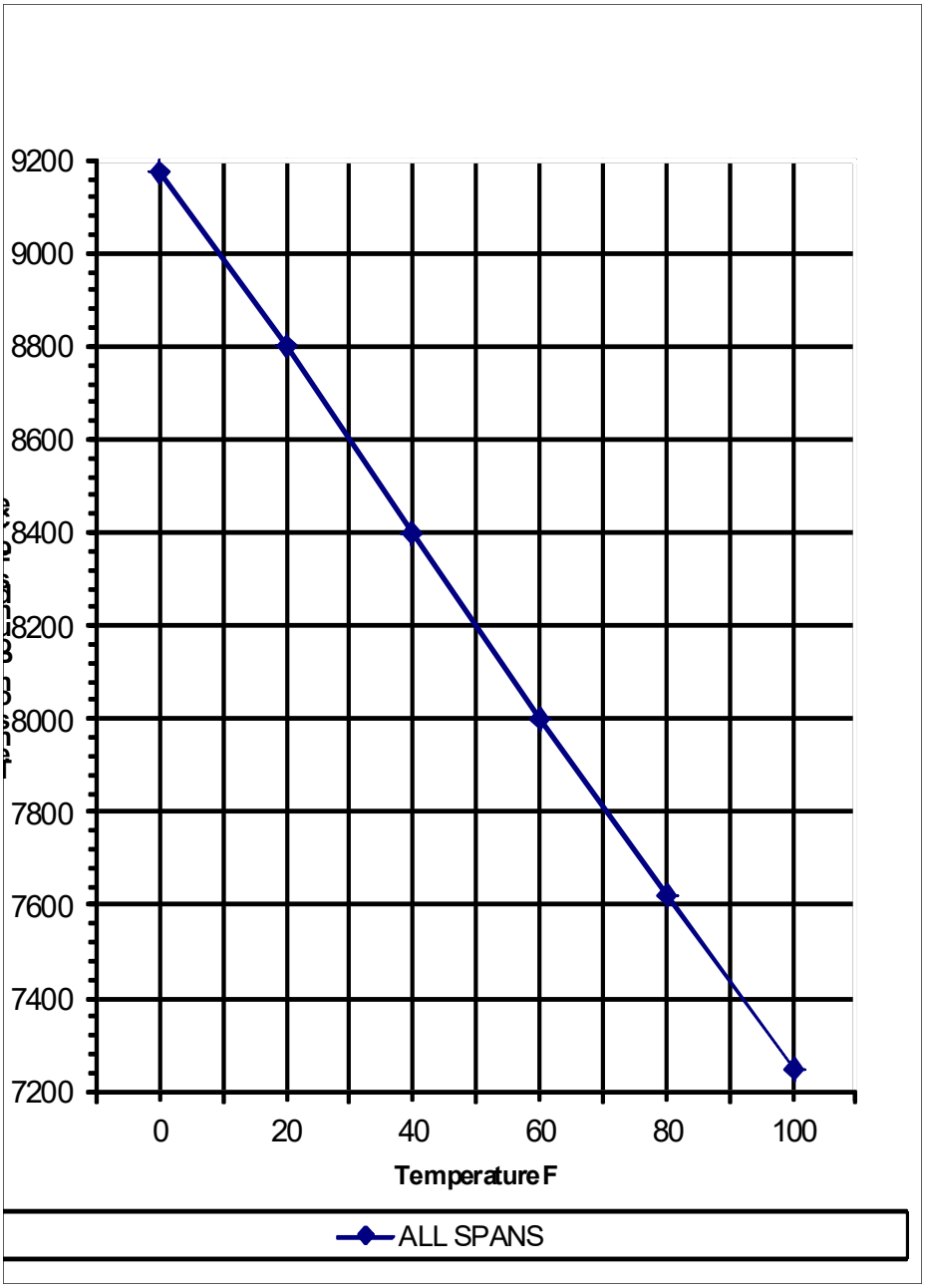
# 7/16” Utilities Grade
# Temperature Compensation Chart

Per BSP 627-210-018 iss. 1



# 1/2” Utilities Grade
# Temperature Compensation Chart

Per BSP 627-210-018 iss. 1



## Dial

The calibrated dial reads 0 to 100. The majority of recorded measurements will be within this range and are readjust as the graduation appears on the dial.

However, on high load measurements, it is possible for the needle to make one complete revolution past zero. For these readings, it is necessary to add 100 to the graduation indicated by the needle.

## Using the Tensionmeter

Accurate strand tension measurement requires that a section of strand be at least twenty feet long and free from damage or corrosion. If cable is in place, remove one ring or cable support or un-lash sufficiently to obtain about two feet of unobstructed strand.

Suspend the instrument on the strand by the hooks located at each end of the tension bar with the handle projecting downward.

With the unit in position, always check to make certain that the dial indicator reads zero. If the dial indicator does not read zero, loosen the slotted screw located in the dial shroud. Rotate the dial slightly until the dial indicator reads zero and re-tighten the screw. As an alternate to "re-zeroing" the unit each time the installed position of the Tensionmeter is changed, place the unit in the position in which it is to be used and note the number of graduations above or below the zero mark. Once the Tensionmeter is installed and set, add or subtract those graduations to/from the dial reading before referring to the chart.

## Using the Tensionmeter (continued)

Locate the column on the calibration chart for the grade and diameter of strand to be tested and note the correct handle position. (An asterisk alongside of the handle position number means that the accessory saddle must be used.* See the next section titled Accessory Saddle before proceeding.) Pull the handle down until the bottom edge of the cam plunger moves upward and stops at the correct position numbered on the cam case. The strand will be deflected between the suspension hooks when the handle engages into the detent at the correct numbered position. Read and record the dial indicator number.

**IMPORTANT: The calibrated dial reads 0 to 100. The majority of recorded measurements will be within this range and are read exactly as the number appears on the dial. On high load measurements, however, it is possible for the needle to make one complete revolution past zero. For these readings, it is necessary to add 100 to the number indicated by the needle.**

Take two additional readings moving the Tensionmeter approximately 1/4" along the strand for each reading. Read and record each dial indicator number.

Discard the high and low readings and use only the intermediate reading as the correct value. Refer to the calibration chart under the specific strand diameter and locate the dial reading closest to the observed reading. Move to the left column showing the corresponding amount of tension in pounds force.

* *on certain older design units*

## Accessory Saddle

Certain Strand Tensionmeters manufactured and sold between Jan. 1991 and July 1992 had cam plungers of a different design than either the AT&T units which preceded them or the current GMP design which follows them. These units bear serial numbers in the range 1700-2300 stamped on the handle. When checking the tension on 1/4", 5/16" or 3/8" diameter strand, a part called the accessory saddle block must be used to achieve dial indicator movement and a correct tension reading. This accessory saddle block is a rectangular steel block which mounts on top of the cam plunger and is held in place by two 7/16" head hex screws. The calibration charts furnished with these units have an asterisk (*) alongside the handle position numbers for the strand sizes where the accessory saddle must be used. A handle position number with no asterisk means that the accessory saddle must not be used. The accessory saddle applies *only* to the units described above and does not apply to AT&T units, nor does it apply to GMP units with 5 digit serial numbers.

## Re-calibration

To maintain optimum service, the Tensionmeter should be re-calibrated periodically. With moderate to heavy use, a calibration check should be performed every year. The initial calibration date is shown on each calibration chart. No attempt should be made to disassemble, repair or re-calibrate in the field. If a unit is not responding to normal use, it should be placed in the carrying case with the calibration chart and returned to General Machine Products (KT), LLC for service. Please supply a contact name, address, phone number and a reason for return.

## Calibration Dates

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