Eyesight astigmatism is one of the most baffling vision errors for the layperson to understand. Although common nearsightedness (myopia) and farsightedness (hyperopia) intuitively describe the state of the eye’s focus error, clearly the word “astigmatism” does not. Astigmatism originates from the Greek language, meaning without (“a”) a point (“stigma”). Whereas eyes that have simple and near-and-farsightedness can achieve a point focus through either eye-refocusing or moving the subject to the proper distance for sharpness, eyes that have an astigmatism defect actually manifest a defocus error in two different planes, or meridians. Think of a “plus” (+) sign placed in front of your eye. In this example, the vertical meridian would have one focal power, and the horizontal meridian (90º away) would have a different focal power. In eyeglasses and contact lenses, it is the difference in power between these two principal meridians that is referred to as the astigmatism power. For example:

The Vertical meridian has a dioptric power of 2.00D
The Horizontal meridian has a dioptric power of 2.50D
The Astigmatism would be the difference between these two powers (2.50D – 2.00D) = 0.50D.
This eye would then said to have an astigmatism of ½ diopter (0.50D).

When an eye’s astigmatism has its principal meridians placed at 90º and 180º, it is said to be orthogonal astigmatism. When the principal meridians line up at orientations other than 90º and 180º (say, 45º and 135º), the astigmatism is said to be oblique.

The system that has been developed to describe the orientation of an astigmatism’s principal meridians is a simple degree circle. Imagine a common protractor centered in front of your eye, with the “0” degree marking placed at the left-side of each eye’s field of view. This “degree” reference is what is used in eyeglass and contact lens prescriptions to describe the orientation of the principal meridians of an astigmatism correction. However, an additional term has also been defined and is used to describe the orientation of an eye’s astigmatism. This is called the axis, and is defined as the meridian in an astigmatic eye that has the least power. In the above example, the vertical meridian has the lowest power (2.00D vs. 2.50D), and would be defined as this eye’s astigmatism axis. In this case, the axis would be “90º.”

Remembering that eyeglass astigmatism is really the difference in powers between the principal focal meridians, you will also encounter the term cylinder power on a standard eyeglass Rx. The cylinder power (often abbreviated “cyl”) is the actual difference in power for a particular eye, and is also interchangeable with the term astigmatism power.

The reason that eyesight astigmatism is described as “cylinder” power relates to the shape of a simple cylinder. For this discussion, let’s think of a can of hairspray as the physical example of a cylinder. The shape of the can could be described a having two meridians. The “vertical” meridian is the height dimension of the can, and its shape is absolutely straight, or flat. This meridian would be said to have “0” (zero) power. The horizontal meridian, 90º away from the height, is the can’s width. It is this meridian that possesses the most shape curvature, or power. The difference between these two meridians (from flat to sharply curved) would be a description of the object’s “astigmatism.” Since, in this hairspray-can example, this “cylinder” has its flattest (lowest power) meridian oriented vertically, the “axis” of this “cylinder” would be 90º.

It is not hard to imagine that a person looking through an astigmatic eyeglass lens (with its variable surface power) may experience perceptual side effects. This is especially true for the first-time wearer of an astigmatic correction. Even though vision testing can show that the introduction of a small-to-moderate amount of astigmatism correction would significantly improve acuity, the accompanying unpleasant perceptual side effects that often make it unwearable for many people. This is particularly true if the eyeglasses are not worn regularly. This is often the case with prescriptions given for driving and/or night-driving. Because of these perceptual side effects, doctors often employ professional discretion, and remove small (and sometimes even moderate) amounts of astigmatism in their prescriptions.

It is for this reason that no observer should confidently conclude that the lack of a written correction for astigmatism means that they have none. Astigmatism correction really may be warranted, waiting for Tele Vue DIOPTRX to deliver you sharper viewing.