

# Combined Method

The combined method uses a form of calibrated wrench to the snug a connection and turn of nut as the tensioning method. While combining these operations may seem straightforward, the combined method is the most expensive and complicated method within the AISC/RCSC specification. The method requires additional weekly wrench testing in addition to standard pre-installation verification (PIV) testing. Unlike calibrated wrench, that does not specify tool accuracy, combined method tools must have a certified accuracy of at least  $\pm 10\%$ .

Since the combined method includes a more rigorous testing protocol and relies on turn of nut as the way to develop tension, whenever possible, the combined method should be abandoned in favor of turn of nut.

However, the combined method is the only acceptable method for ASTM F3148 bolts. Since ASTM F3148 bolts are proprietary fasteners and only available from a single manufacturing source, their installation, inspection, and verification, will not be covered here.

While ASTM F3148 bolts are proprietary 144ksi fasteners, the latest AISC/RCSC also permits nonproprietary 144ksi fasteners, to be added to the ASTM F3125 structural bolt specification, eventually. When nonproprietary 144ksi bolts are added to ASTM F3125, they can be installed, inspected, and verified using any of the tensioning methods described by the AISC/RCSC specification. Only ASTM F3148 fasteners are limited to the combined method.