

RotaBolt fitting guide

Achieving and maintaining the correct clamping force, or bolt tension, is essential in assuring bolted joint integrity. 85% - 90% of all bolted joint failures are caused by insufficient bolt tension at installation. When a standard bolt is traditionally tightened, the bolt tension being achieved is completely unknown because it is the tightening force (torque) that is being measured, not bolt tension. RotaBolt fasteners are measuring devices - highly accurate indicators of clamping force or tension.

Pre-assembly

Pictured are 8 RotaBolt all thread studs. 1.1/8" diameter by 1/4" long, 16 nuts and washers. The studs were calibrated at manufacture with 12 tonnes pre-load. RotaBolt studs have been used rather than RotaBolts to give a detailed illustration of correct stud assembly and tightening. When using either RotaBolts 1, 2 or the RotaBolt Vision, the assembly process would be simplified.



Assembly of studs

A washer is put over the 'top' of the first stud and a nut is threaded on leaving three threads visible above the nut. This is the standard height setting for a RotaBolt stud. If the washer being used has a raised face on one side, it should be positioned with the raised face towards the nut.

The assembly of stud, nut and washer is inserted into the first flange hole. This is repeated for each RotaBolt stud assembly.

A washer and nut is now threaded onto the bottom of the first stud and hand tightened. This is repeated for each RotaBolt stud.

Checking studs

Before the preliminary and main tightening cycles, each stud is checked again to see that 3 threads are showing above the top of each nut.

The height can be adjusted by loosening both nuts and turning the stud until the correct height is achieved, before re-tightening by hand.

An alternative option is to check by measuring. From the base of the nut to the top of the stud should be 1.3/8". This represents 1" for the nut and 3/8" for three threads (1 thread = 1/8").



Numbering studs

To ensure that the flange is tightened properly, the studs have to be tightened in a set diagonal sequence. Each stud is numbered to reflect the order of the sequence to be followed. Each stud number is then chalked onto the outward face of the flange where it can be seen easily. See the images below for the stud numbering sequence.



Calculating tightening

It is the air gap technology built-in to each fastener that will provide the accurate measurement during the tightening process. The fastener will measure the tension (or clamping force) being achieved across the joint.

Each RotaBolt stud has been load test calibrated at manufacture with a pre-load of 12 tonnes to achieve the desired tension across this particular flange. It will be when the RotaCap on top of each RotaBolt stud locks that the correct tension is achieved. However, it is still necessary to estimate the tightening force (torque) that needs to be used, so that the tightening tool selected has sufficient torque power capacity and for any pre-set requirement.

Tightening cycles

To uniformly bed-in the RotaBolt studs, a manual torque wrench (in this case set to 40 Newton Metres) is used to tighten the first stud in the sequence, with a spanner applied to the bottom nut to prevent turning. The same tightening is then done to each stud following the correct numbered sequence. For this flange assembly, two tightening cycles were completed using a hydraulic torque wrench. In the first cycle the torque wrench was set to 75% of the desired torque and the studs tightened in the correct sequence.

In the second tightening cycle, the hydraulic wrench was set to 100% of the estimated torque. Each stud was tightened in number sequence until the RotaCap on top of each stud locked, indicating that the correct tension had been achieved.



Safety

Throughout all bolt assembly and tightening processes it is essential to follow standard safety procedures and instructions on any equipment. Protective safety clothing should be worn at all times.