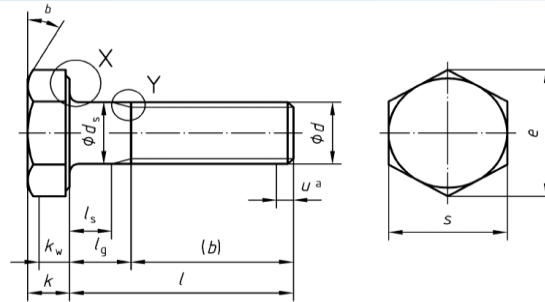


## EN14399-4 PRELOADED FRICTION GRIPS BOLTS CLASS 10.9 ASSEMBLIES

### INTRODUCTION

Preloaded bolted assemblies are very sensitive to differences in manufacture and lubrication. Therefore it is important that the assembly is supplied by one manufacturer who is always responsible for the function of the assembly.



### USED ASSEMBLIES

In some cases, connections are disassembled. In these circumstances, the assembly should not be re-used, because some of the bolt's (limited) elongation will have been irreversibly used. Preloading an assembly for a second time may take the assembly to (or very close to) its breaking point.

| EN 14399-4 BOLT DIMENSIONS (HV) |       |       |       | COMPARED TO DIN 931 / 933 HEAD DIMENSIONS |       |       |
|---------------------------------|-------|-------|-------|-------------------------------------------|-------|-------|
| Thread Size <b>d</b>            | M16   | M20   | M24   | M16                                       | M20   | M24   |
| <b>P</b> pitch of thread        | 2     | 2.5   | 3     |                                           |       |       |
| <b>b</b> min.                   | 28    | 33    | 39    |                                           |       |       |
| <b>c</b> min.                   | 0.4   | 0.4   | 0.4   |                                           |       |       |
| <b>c</b> max.                   | 0.6   | 0.8   | 0.8   |                                           |       |       |
| <b>ds</b> nom.                  | 16    | 20    | 24    |                                           |       |       |
| <b>ds</b> min.                  | 15.30 | 19.16 | 23.16 |                                           |       |       |
| <b>ds</b> max.                  | 16.70 | 20.84 | 24.84 |                                           |       |       |
| <b>e</b> min.                   | 29.56 | 35.03 | 45.2  | 26.75                                     | 33.53 | 39.98 |
| <b>e</b> nom.                   | 10    | 13    | 15    | 10                                        | 12.5  | 15    |
| <b>k</b> min.                   | 9.25  | 12.1  | 14.1  | 9.82                                      | 12.28 | 14.78 |
| <b>k</b> max.                   | 10.75 | 13.9  | 15.9  | 10.18                                     | 12.72 | 15.22 |
| <b>kw</b> min.                  | 6.47  | 8.47  | 9.87  |                                           |       |       |
| <b>s</b> min.                   | 26.16 | 31    | 40    | 23.67                                     | 29.67 | 35.38 |
| <b>s</b> max.                   | 27    | 32    | 41    | 24                                        | 30    | 36    |

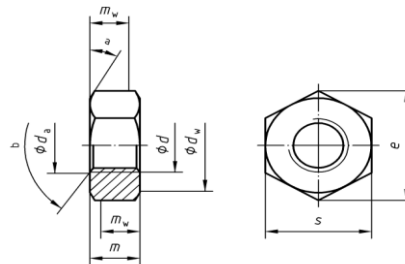
| EN 14399-4 BOLT LENGTH AND THREAD TOLERANCES (HV) |        |        |        |        |        |        |        |        |        |
|---------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Thread Size <b>d</b>                              |        |        | M16    |        | M20    |        | M24    |        |        |
| nom                                               | min    | max    | ls min | lg max | ls min | lg max | ls min | lg max | lg max |
| 50                                                | 48.75  | 51.25  | 16     | 22     |        |        |        |        |        |
| 55                                                | 53.5   | 56.5   |        |        | 14.5   | 22     |        |        |        |
| 60                                                | 58.5   | 61.5   |        |        | 19.5   | 27     |        |        |        |
| 65                                                | 63.5   | 66.5   |        |        | 24.5   | 32     |        |        |        |
| 70                                                | 68.5   | 71.5   |        |        | 29.5   | 37     |        |        |        |
| 75                                                | 73.5   | 76.5   |        |        | 34.5   | 42     |        |        |        |
| 80                                                | 78.5   | 81.5   |        |        | 39.5   | 47     | 32     | 41     |        |
| 90                                                | 88.25  | 91.75  |        |        | 49.5   | 57     | 42     | 51     |        |
| 100                                               | 98.25  | 101.75 |        |        | 59.5   | 67     | 52     | 61     |        |
| 110                                               | 108.25 | 111.75 |        |        |        |        | 62     | 71     |        |

| EN 14399-4 MECHANICAL PROPERTIES 10.9 BOLTS (HV) |                |                      |                       |     |
|--------------------------------------------------|----------------|----------------------|-----------------------|-----|
| Bolt thread dia.                                 | Proof Load min | Tensile Strenght min | Hardness Rockwell HRC |     |
|                                                  | kN             | Mpa                  | min                   | max |
| M16                                              | 130            | 1040                 | 32                    | 39  |
| M20                                              | 203            | 1040                 | 32                    | 39  |
| M24                                              | 293            | 1040                 | 32                    | 39  |

| EN 14399-4 TORQUE DATA (2 STEPS) |                           |                        |                        |      |
|----------------------------------|---------------------------|------------------------|------------------------|------|
| Bolt thread dia.                 | 1st Step: Tightening (Nm) | 2nd Step Rotational(°) | 2nd Step Rotational(°) |      |
|                                  |                           | Bolt Length            | Bolt Length            |      |
| M16                              | 238                       | ≤ 50                   | 90°                    |      |
| M20                              | 464                       | ≤ 55                   | 60°                    | ≥ 65 |
| M24                              | 800                       |                        |                        | ≥ 80 |

| EN 14399-4 NUT DIMENSIONS (HV) |       |       |       | COMPARED TO DIN 934 NUT DIMENSIONS |       |       |
|--------------------------------|-------|-------|-------|------------------------------------|-------|-------|
| Thread Size <b>d</b>           | M16   | M20   | M24   | M16                                | M20   | M24   |
| <b>P</b> pitch of thread       | 2     | 2.5   | 3     |                                    |       |       |
| <b>Mw</b> min.                 | 9.84  | 11.92 | 14.96 |                                    |       |       |
| <b>dw</b> min.                 | 24.9  | 29.5  | 38.0  |                                    |       |       |
| <b>e</b> min.                  | 29.56 | 35.03 | 45.2  | 26.75                              | 32.95 | 39.55 |
| <b>m</b> nom = max.            | 13    | 16    | 20    | 13                                 | 16    | 19    |
| <b>m</b> min.                  | 12.3  | 14.9  | 18.7  | 12.3                               | 14.9  | 17.7  |
| <b>s</b> max.                  | 27    | 32    | 41    | 24                                 | 30    | 36    |
| <b>s</b> min.                  | 26.16 | 31    | 40    | 23.67                              | 29.16 | 35    |

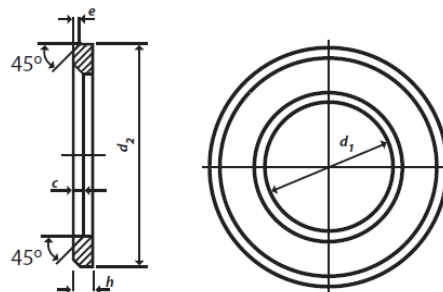
The maximum value of **dw** shall not exceed the actual width across flats



| EN 14399-4 PROOF LOAD VALUES AND HARDNESS (HV) |                          |                 |              |        |
|------------------------------------------------|--------------------------|-----------------|--------------|--------|
| Nut thread Dia.                                | Stress Area Test Mandrel | Property Class  |              |        |
|                                                |                          | 10              |              |        |
|                                                |                          | Tolerance class | Rockwell HRC |        |
|                                                | mm²                      | Proof Load kN   | min          | max    |
| M16                                            | 157                      | 182.1           | 26 HRC       | 36 HRC |
| M20                                            | 245                      | 284.2           | 26 HRC       | 36 HRC |
| M24                                            | 353                      | 409.5           | 26 HRC       | 36 HRC |

| EN 14399-6 WASHER DIMENSIONS (H) |  |       |       |       |
|----------------------------------|--|-------|-------|-------|
| Nominal Size <b>d</b> a)         |  | M16   | M20   | M24   |
| <b>d<sub>1</sub></b> min.        |  | 17    | 21    | 25    |
| <b>d<sub>1</sub></b> max.        |  | 17.27 | 21.33 | 25.33 |
| <b>d<sub>2</sub></b> min.        |  | 29.48 | 36.38 | 43.38 |
| <b>d<sub>2</sub></b> max.        |  | 30    | 37    | 44    |
| <b>d<sub>2</sub></b> nom         |  | 4     | 4     | 4     |
| <b>h</b> min.                    |  | 3.7   | 3.7   | 3.7   |
| <b>h</b> max.                    |  | 4.3   | 4.3   | 4.3   |
| <b>e</b> nom = min               |  | 0.75  | 0.75  | 0.75  |
| <b>e</b> max                     |  | 1.5   | 1.5   | 1.5   |
| <b>c</b> min                     |  | 1.6   | 2.0   | 2.0   |
| <b>c</b> max                     |  | 1.9   | 2.5   | 2.5   |

a) Nominal thread diameter of associated bolts



| EN 14399-6 MECHANICAL PROPERTIES WASHER (H) |                       |     |
|---------------------------------------------|-----------------------|-----|
| Nominal Size                                | Vickers Hardness (HV) |     |
|                                             | min                   | max |
| M16                                         | 300                   | 370 |
| M20                                         | 300                   | 370 |
| M24                                         | 300                   | 370 |