



Area Industrial Arazuri - Orcoyen
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TABLE OF PRELOADS AND TIGHTENING APPROXIMATE VALUES

| METRIC | mm allen | mm hex. | mm coarse thread | resistant section mm ² | friction coefficient | COARSE THREAD | | | | | |
|--------|----------|---------|------------------|-----------------------------------|----------------------|---------------|-----------|-------------|-----------|-------------|-----------|
| | | | | | | 8.8 | | 10.9 | | 12.9 | |
| | | | | | | PRELOAD N | TORQUE Nm | PRELOAD N | TORQUE Nm | PRELOAD N | TORQUE Nm |
| M2 | 1,5 | 4 | 0,40 | 2,07 | 0,10 | 976,9 | 0,51 | 1.373,6 | 0,43 | 1.648,6 | 0,52 |
| | | | | | 0,14 | 899,0 | 0,57 | 1.284,3 | 0,52 | 1.517,1 | 0,63 |
| M2,5 | 2 | 5 | 0,45 | 3,39 | 0,10 | 1.627,0 | 0,63 | 2.288,0 | 0,88 | 2.745,6 | 1,05 |
| | | | | | 0,14 | 1.499,8 | 0,77 | 2.109,1 | 1,08 | 2.531,0 | 1,30 |
| M3 | 2,5 | 5,5 | 0,50 | 5,03 | 0,10 | 2.439,9 | 1,09 | 3.431,0 | 1,53 | 4.117,2 | 1,84 |
| | | | | | 0,14 | 2.251,9 | 1,84 | 3.186,7 | 1,88 | 3.800,0 | 2,26 |
| M3,5 | | 6 | 0,60 | 6,78 | 0,10 | 3.276,4 | 1,68 | 4.607,5 | 2,38 | 5.528,9 | 2,84 |
| | | | | | 0,14 | 3.022,8 | 2,05 | 4.250,6 | 2,88 | 5.100,7 | 3,47 |
| M4 | 3 | 7 | 0,70 | 8,78 | 0,10 | 4.230,6 | 2,30 | 5.849,6 | 3,52 | 7.139,5 | 4,22 |
| | | | | | 0,14 | 3.901,9 | 3,08 | 5.487,0 | 4,30 | 6.584,4 | 5,16 |
| M5 | 4 | 8 | 0,80 | 14,20 | 0,10 | 6.923,1 | 4,83 | 9.735,7 | 6,93 | 11.682,8 | 8,82 |
| | | | | | 0,14 | 6.393,7 | 6,04 | 8.991,1 | 8,50 | 10.769,3 | 10,20 |
| M6 | 5 | 10 | 1,00 | 20,10 | 0,10 | 9.748,4 | 8,47 | 13.710,1 | 11,92 | 16.452,2 | 14,80 |
| | | | | | 0,14 | 8.998,2 | 10,37 | 12.653,7 | 14,59 | 15.184,4 | 17,51 |
| M7 | | 11 | 1,00 | 28,90 | 0,10 | 14.269,1 | 13,94 | 20.065,9 | 19,60 | 24.079,1 | 23,52 |
| | | | | | 0,14 | 13.199,2 | 17,21 | 18.561,4 | 24,20 | 22.273,6 | 29,04 |
| M8 | 6 | 13 | 1,25 | 36,60 | 0,10 | 17.894,2 | 20,41 | 25.163,7 | 28,70 | 30.196,5 | 34,44 |
| | | | | | 0,14 | 16.531,2 | 25,07 | 23.247,0 | 35,26 | 27.896,5 | 42,31 |
| M10 | 8 | 16 | 1,50 | 58,00 | 0,10 | 28.489,0 | 40,22 | 40.052,7 | 56,58 | 48.075,3 | 67,87 |
| | | | | | 0,14 | 28.334,6 | 49,52 | 37.033,3 | 59,64 | 44.439,9 | 83,58 |
| M12 | 10 | 18 | 1,75 | 84,30 | 0,10 | 41.533,2 | 68,86 | 58.406,1 | 98,63 | 70.087,3 | 116,20 |
| | | | | | 0,14 | 38.408,0 | 84,84 | 54.011,2 | 119,31 | 64.813,5 | 143,17 |
| M14 | 12 | 21 | 2,00 | 115,00 | 0,10 | 56.779,6 | 109,59 | 79.846,6 | 154,03 | 95.816,0 | 184,84 |
| | | | | | 0,14 | 52.522,4 | 135,13 | 73.859,6 | 190,02 | 88.631,5 | 226,03 |
| M16 | 14 | 24 | 2,00 | 157,00 | 0,10 | 76.484,3 | 170,29 | 110.388,5 | 228,47 | 132.442,2 | 207,36 |
| | | | | | 0,14 | 72.728,5 | 211,81 | 102.274,4 | 297,55 | 127.729,3 | 357,09 |
| M18 | 14 | 27 | 2,50 | 192,00 | 0,10 | 95.066,1 | 254,96 | 133.686,7 | 320,41 | 160.424,1 | 386,49 |
| | | | | | 0,14 | 87.972,3 | 290,32 | 123.711,0 | 402,28 | 148.453,2 | 489,82 |
| M20 | 17 | 30 | 2,50 | 245,00 | 0,10 | 122.476,0 | 332,17 | 172.231,9 | 476,11 | 206.678,2 | 580,64 |
| | | | | | 0,14 | 113.494,2 | 412,78 | 159.601,2 | 680,47 | 181.521,5 | 698,56 |
| M22 | 17 | 34 | 2,50 | 303,00 | 0,10 | 152.610,4 | 454,43 | 214.608,3 | 838,05 | 257.530,0 | 766,85 |
| | | | | | 0,14 | 141.583,7 | 567,58 | 189.102,1 | 798,16 | 238.922,5 | 957,80 |
| M24 | 19 | 35 | 3,00 | 353,00 | 0,10 | 176.464,9 | 574,31 | 248.153,7 | 807,53 | 297.784,4 | 989,15 |
| | | | | | 0,14 | 163.523,6 | 713,88 | 229.855,1 | 1.003,51 | 275.946,1 | 1.204,83 |
| M27 | 19 | 41 | 3,00 | 459,00 | 0,10 | 231.557,6 | 840,08 | 325.627,9 | 1.181,38 | 390.753,4 | 1.417,88 |
| | | | | | 0,14 | 214.883,0 | 1.030,16 | 302.179,2 | 1.478,79 | 362.615,0 | 1.722,16 |
| M30 | 22 | 46 | 3,50 | 561,00 | 0,10 | 281.999,0 | 1.145,85 | 396.561,1 | 1.611,08 | 475.873,4 | 1.933,29 |
| | | | | | 0,14 | 261.541,2 | 1.428,87 | 367.792,3 | 2.009,48 | 441.350,8 | 2.411,38 |
| M33 | 24 | 50 | 3,50 | 694,00 | 0,10 | 351.236,2 | 1.548,31 | 493.925,8 | 2.178,72 | 592.711,0 | 2.614,46 |
| | | | | | 0,14 | 326.115,9 | 1.940,88 | 458.600,5 | 2.729,93 | 550.320,6 | 3.275,19 |
| M36 | 27 | 55 | 4,00 | 817,00 | 0,10 | 412.163,5 | 1.907,19 | 579.604,8 | 2.808,55 | 695.525,8 | 3.370,28 |
| | | | | | 0,14 | 382.483,6 | 2.498,81 | 537.867,6 | 3.511,14 | 645.441,1 | 4.213,37 |
| M39 | | 60 | 4,00 | 976,00 | 0,10 | 495.039,9 | 2.582,03 | 696.149,8 | 3.883,23 | 835.379,6 | 4.350,80 |
| | | | | | 0,14 | 459.805,2 | 3.241,82 | 646.601,0 | 4.558,96 | 775.921,3 | 5.470,76 |
| M42 | 32 | 65 | 4,50 | 1.120,00 | 0,10 | 556.449,9 | 3.202,61 | 796.570,1 | 4.503,53 | 955.884,2 | 5.404,23 |
| | | | | | 0,14 | 525.878,0 | 4.010,93 | 739.516,0 | 5.840,37 | 887.419,2 | 6.788,44 |
| M45 | | 70 | 4,50 | 1.310,00 | 0,10 | 685.503,0 | 4.011,02 | 935.863,6 | 5.840,30 | 1.123.036,0 | 6.788,60 |
| | | | | | 0,14 | 616.303,6 | 5.038,08 | 889.489,3 | 7.086,23 | 1.043.387,0 | 6.503,47 |
| M48 | 38 | 75 | 5,00 | 1.470,00 | 0,10 | 744.856,6 | 4.813,03 | 1.047.457,0 | 8.768,32 | 1.256.949,0 | 8.121,98 |
| | | | | | 0,14 | 691.725,8 | 6.038,23 | 972.739,4 | 8.468,45 | 1.157.287,0 | 10.188,14 |
| M52 | | 80 | 5,00 | 1.760,00 | 0,10 | 896.217,8 | 8.199,81 | 1.280.306,0 | 8.716,63 | 1.512.388,0 | 10.462,38 |
| | | | | | 0,14 | 832.998,0 | 7.801,04 | 1.171.404,0 | 10.970,21 | 1.405.684,0 | 13.164,25 |
| M56 | 41 | 85 | 5,50 | 2.030,00 | 0,10 | 1.032.405,0 | 7.876,29 | 1.451.821,0 | 10.794,78 | 1.742.185,0 | 12.963,72 |
| | | | | | 0,14 | 859.368,8 | 9.848,80 | 1.349.110,0 | 13.588,83 | 1.618.931,0 | 18.262,36 |
| M60 | | 90 | 5,50 | 2.360,00 | 0,10 | 1.204.997,0 | 9.508,28 | 1.694.527,0 | 13.372,43 | 2.033.432,0 | 18.048,81 |
| | | | | | 0,14 | 1.120.535,0 | 11.885,42 | 1.575.752,0 | 16.854,49 | 1.890.903,0 | 20.225,39 |
| M64 | 46 | 95 | 6,00 | 2.680,00 | 0,10 | 1.366.678,0 | 11.492,34 | 1.921.892,0 | 16.181,10 | 2.306.271,0 | 19.383,82 |
| | | | | | 0,14 | 1.270.800,0 | 14.470,27 | 1.766.781,0 | 20.348,82 | 2.144.137,0 | 24.322,36 |
| M68 | | 100 | 6,00 | 3.060,00 | 0,10 | 1.565.600,0 | 13.879,28 | 2.201.625,0 | 19.817,74 | 2.641.950,0 | 23.547,51 |
| | | | | | 0,14 | 1.456.404,0 | 17.516,48 | 2.048.068,0 | 24.832,55 | 2.457.681,0 | 26.358,12 |



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TABLE OF PRELOADS AND TIGHTENING APPROXIMATE VALUES

| METRIC | mm allen | mm hex. | mm fine thread | resistant section mm ² | friction coefficient | FINE THREAD | | | | | |
|--------|----------|---------|----------------|-----------------------------------|----------------------|-------------|-------------|-------------|-------------|-------------|-----------|
| | | | | | | 8.8 | | 10.9 | | 12.9 | |
| | | | | | | PRELOAD N | TORQUE Nm | PRELOAD N | TORQUE Nm | PRELOAD N | TORQUE Nm |
| M8 | 6 | 13 | 1,00 | 39,20 | 0,10 | 19.596,1 | 21,75 | 27.557,1 | 30,69 | 33.058,5 | 36,70 |
| | | | | | 0,14 | 18.159,1 | 27,05 | 25.536,2 | 38,04 | 30.643,4 | 45,86 |
| M10 | 8 | 16 | 1,25 | 61,20 | 0,10 | 30.593,8 | 42,26 | 43.022,5 | 58,42 | 51.627,0 | 71,30 |
| | | | | | 0,14 | 26.350,1 | 62,55 | 39.867,3 | 73,89 | 47.840,6 | 88,87 |
| M10 | 8 | 16 | 1,00 | 64,50 | 0,10 | 32.767,2 | 44,25 | 46.078,8 | 62,23 | 55.294,6 | 74,67 |
| | | | | | 0,14 | 30.443,3 | 55,61 | 42.610,8 | 78,20 | 51.373,0 | 93,84 |
| M12 | 10 | 18 | 1,50 | 88,10 | 0,10 | 44.041,4 | 71,67 | 61.933,2 | 100,78 | 74.319,8 | 120,84 |
| | | | | | 0,14 | 40.811,6 | 89,08 | 57.391,3 | 125,24 | 68.869,5 | 160,23 |
| M12 | 10 | 18 | 1,25 | 92,10 | 0,10 | 46.667,4 | 74,51 | 65.626,1 | 104,78 | 78.751,3 | 125,74 |
| | | | | | 0,14 | 43.338,4 | 83,41 | 60.944,6 | 131,36 | 73.133,5 | 157,83 |
| M14 | 12 | 21 | 1,50 | 125,00 | 0,10 | 63.220,0 | 118,09 | 88.903,1 | 188,06 | 106.683,7 | 198,27 |
| | | | | | 0,14 | 56.691,9 | 147,85 | 82.535,4 | 207,81 | 99.042,5 | 249,48 |
| M16 | 14 | 24 | 1,50 | 167,00 | 0,10 | 85.162,5 | 178,58 | 119.759,8 | 252,91 | 143.711,8 | 303,02 |
| | | | | | 0,14 | 79.175,5 | 226,12 | 111.340,6 | 317,88 | 133.608,7 | 381,57 |
| M18 | 14 | 27 | 2,00 | 204,00 | 0,10 | 102.914,4 | 248,06 | 144.723,3 | 348,83 | 173.668,0 | 418,59 |
| | | | | | 0,14 | 95.503,3 | 310,05 | 134.301,6 | 438,00 | 161.161,8 | 523,20 |
| M18 | 14 | 27 | 1,50 | 218,00 | 0,10 | 110.830,3 | 260,35 | 155.855,1 | 366,12 | 187.026,1 | 439,34 |
| | | | | | 0,14 | 103.155,2 | 328,35 | 145.062,1 | 463,15 | 174.074,5 | 556,77 |
| M20 | 17 | 30 | 2,00 | 258,00 | 0,10 | 131.068,3 | 347,45 | 184.314,8 | 488,60 | 221.177,8 | 586,32 |
| | | | | | 0,14 | 121.772,4 | 438,84 | 171.242,5 | 613,61 | 205.491,0 | 736,83 |
| M20 | 17 | 30 | 1,50 | 272,00 | 0,10 | 140.229,3 | 383,15 | 197.197,5 | 510,68 | 236.637,0 | 612,82 |
| | | | | | 0,14 | 130.838,1 | 481,10 | 183.709,9 | 648,42 | 220.451,9 | 778,10 |
| M22 | 17 | 34 | 2,00 | 318,00 | 0,10 | 162.441,5 | 473,78 | 228.433,4 | 686,23 | 274.120,1 | 799,48 |
| | | | | | 0,14 | 151.067,6 | 597,49 | 212.439,1 | 840,22 | 254.927,0 | 1.008,27 |
| M22 | 17 | 34 | 1,50 | 333,00 | 0,10 | 172.328,5 | 492,05 | 242.337,0 | 691,84 | 290.604,3 | 830,33 |
| | | | | | 0,14 | 160.663,6 | 626,62 | 225.933,2 | 881,46 | 271.119,6 | 1.057,75 |
| M24 | 18 | 35 | 2,00 | 364,00 | 0,10 | 197.031,1 | 617,12 | 277.075,0 | 687,83 | 332.490,0 | 1.041,40 |
| | | | | | 0,14 | 183.365,5 | 780,67 | 257.887,3 | 1.087,62 | 309.484,8 | 1.317,98 |
| M24 | 36 | 1,50 | 401,00 | 0,10 | 206.158,7 | 639,23 | 292.723,2 | 898,92 | 351.267,9 | 1.078,71 | |
| | | | | 0,14 | 194.192,1 | 818,24 | 273.082,6 | 1.147,04 | 327.699,1 | 1.377,41 | |
| M27 | 19 | 41 | 2,00 | 496,00 | 0,10 | 255.844,7 | 896,87 | 359.781,6 | 1.281,22 | 431.737,9 | 1.513,48 |
| | | | | | 0,14 | 238.370,1 | 1.139,34 | 335.207,9 | 1.602,20 | 402.249,5 | 1.922,84 |
| M30 | 22 | 46 | 2,00 | 621,00 | 0,10 | 321.365,0 | 1.247,60 | 452.299,2 | 1.754,43 | 542.759,0 | 2.105,82 |
| | | | | | 0,14 | 299.914,0 | 1.690,28 | 421.754,2 | 2.236,34 | 505.105,0 | 2.603,81 |
| M33 | 24 | 50 | 2,00 | 761,00 | 0,10 | 395.433,6 | 1.571,82 | 556.076,8 | 2.350,72 | 667.294,5 | 2.820,87 |
| | | | | | 0,14 | 388.980,2 | 2.138,49 | 518.878,4 | 3.004,43 | 622.654,0 | 3.805,32 |
| M36 | 27 | 55 | 3,00 | 855,00 | 0,10 | 443.833,5 | 2.096,29 | 624.140,9 | 2.947,91 | 748.969,0 | 3.537,49 |
| | | | | | 0,14 | 413.097,8 | 2.852,26 | 580.918,9 | 3.729,74 | 697.102,7 | 4.475,68 |
| M39 | 60 | 3,00 | 1.030,00 | 0,10 | 530.439,3 | 2.703,41 | 754.930,2 | 3.801,67 | 895.116,2 | 4.562,00 | |
| | | | | 0,14 | 494.054,1 | 8.430,30 | 694.783,5 | 4.283,86 | 833.716,1 | 5.788,63 | |
| M42 | 32 | 65 | 3,00 | 1.210,00 | 0,10 | 625.058,5 | 9.419,04 | 878.966,6 | 4.808,02 | 1.054.786,0 | 5.789,82 |
| | | | | | 0,14 | 562.537,4 | 4.349,18 | 819.193,3 | 8.116,04 | 983.031,9 | 7.335,24 |
| M45 | 70 | 3,00 | 1.400,00 | 0,10 | 725.103,5 | 4.237,03 | 1.019.677,0 | 5.958,83 | 1.223.612,0 | 7.148,89 | |
| | | | | 0,14 | 676.135,5 | 5.401,43 | 950.815,6 | 7.595,77 | 1.140.979,0 | 9.114,92 | |
| M48 | 36 | 75 | 3,00 | 1.600,00 | 0,10 | 830.558,0 | 5.163,37 | 1.167.972,0 | 7.260,99 | 1.401.567,0 | 8.713,18 |
| | | | | | 0,14 | 774.830,6 | 8.594,93 | 1.089.606,0 | 9.274,12 | 1.307.527,0 | 11.128,94 |
| M52 | 80 | 3,00 | 1.900,00 | 0,10 | 988.810,4 | 6.598,28 | 1.390.515,0 | 9.278,85 | 1.668.618,0 | 11.134,80 | |
| | | | | 0,14 | 922.965,3 | 8.445,25 | 1.297.920,0 | 11.676,13 | 1.557.504,0 | 14.251,38 | |
| M56 | 41 | 85 | 4,00 | 2.140,00 | 0,10 | 1.105.477,0 | 8.016,61 | 1.554.577,0 | 11.278,22 | 1.665.492,0 | 13.527,87 |
| | | | | | 0,14 | 1.030.274,0 | 10.195,69 | 1.448.823,0 | 14.337,98 | 1.738.588,0 | 17.205,57 |
| M60 | 90 | 4,00 | 2.460,00 | 0,10 | 1.284.470,0 | 8.800,49 | 1.606.285,0 | 13.922,56 | 2.167.544,0 | 18.707,07 | |
| | | | | 0,14 | 1.197.728,0 | 12.616,02 | 1.664.304,0 | 17.744,10 | 2.021.165,0 | 21.292,92 | |
| M64 | 46 | 95 | 4,00 | 2.850,00 | 0,10 | 1.479.433,0 | 12.078,14 | 2.080.452,0 | 16.984,88 | 2.498.543,0 | 20.981,88 |
| | | | | | 0,14 | 1.380.169,0 | 15.421,52 | 1.940.852,0 | 21.588,51 | 2.329.034,0 | 28.023,81 |
| M68 | 100 | 4,00 | 3.240,00 | 0,10 | 1.685.177,0 | 14.528,62 | 2.369.870,0 | 20.428,05 | 2.643.736,0 | 24.513,68 | |
| | | | | 0,14 | 1.572.760,0 | 18.577,96 | 2.211.694,0 | 26.125,28 | 2.654.033,0 | 31.350,31 | |