MARCO POLO

# MARINE GRADE
# FULL MORTISE BUTT HINGE

MARCO POLO
Architectural Hardware

# SUPERIOR QUALITY

## Stainless steel
## grade 316


GRADE 316 STAINLESS STEEL IS A SUPERIOR CORROSION AND OXIDATION RESISTANCE MATERIAL OF ARCHITECTUAL APPLICATION IN HIGHLY CORROSIVE ENVIRONMENTS.

MARCO POLO ARCHITECTUAL HARDWARE LAUNCHES GRADE 316 HINGE SINCE 2014, MAJORITY FOR THE BUILDINGS LOCATED IN WHERE NEAR SEA COAST, SWIMMING POOL OR WITH SEASONAL EXTREMELY WEATHER.

| | |
|---|---|
| FIRE TESTED : | PSB / WARRINGTON 120 MINUTES. |
| PERFORMANCE TESTED : | COMPLIED WITH BS EN1935 |

MATERIAL STRENGTH

Stainless steel grade 316 is an improved of 304, with the additional of molybdenum and a higher nickel content. The molybdenum gives 316 much increased corrosion resistance in many aggressive, particularly higher resistance to pitting and crevice corrosion in chloride environments such as sea water or acetic acid vapours. It offers higher strength and better creep resistance at high temperatures. The austenitic structure also gives excellent toughness even if down to cryogenic temperatures.

**Chemical Composition** (ASTM A 240)

| | C | Mn | P | S | SI | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|---|
| Grade 316 | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 16.00 | 10-14 | 2.00 |
| Grade 304 | 0.08 | 2.00 | 0.05 | 0.03 | 1.00 | 18.00 | 8-9.2 | - |

| **Room Temperature** | Grade 316 | | Grade 304 | |
|---|---|---|---|---|
| | Typical | Min. | Typical | Min |
| Tensile Strength, Mpa | 580 | 515 | 600 | 515 |
| Proof Stress (0.2% offset) Mpa | 310 | 205 | 310 | 205 |
| Elongation (Percent in L=5.65S) | 55 | 40 | 60 | 40 |
| Hardness (Brinell) | 165 | - | 170 | - |
| Erichsen Cupt Test Value mm | 8-10 | - | | - |
| Endurace (fatigue) limit, Mpa | 260 | - | 240 | - |

**Elevate Temperature**

| | | | | | | |
|---|---|---|---|---|---|---|
| Temperature, C | | 600 | 700 | 800 | 900 | 1000 |
| Strength, Mpa | Grade 316 | 460 | 320 | 190 | 120 | 70 |
| | Grade 304 | 380 | 270 | 170 | 90 | 50 |

**Creep Data**

| | | | | | | |
|---|---|---|---|---|---|---|
| Temperature, C | | 550 | 600 | 650 | 700 | 800 |
| Strength, Mpa | Grade 316 | 150 | 120 | 90 | 60 | 20 |
| | Grade 304 | 120 | 80 | 50 | 30 | 10 |

| **Maximum Service Temperature** | Grade 316 | Grade 304 |
|---|---|---|
| Continuous Service | 925ºC | 925ºC |
| Intermittent Service | 870ºC | 850ºC |

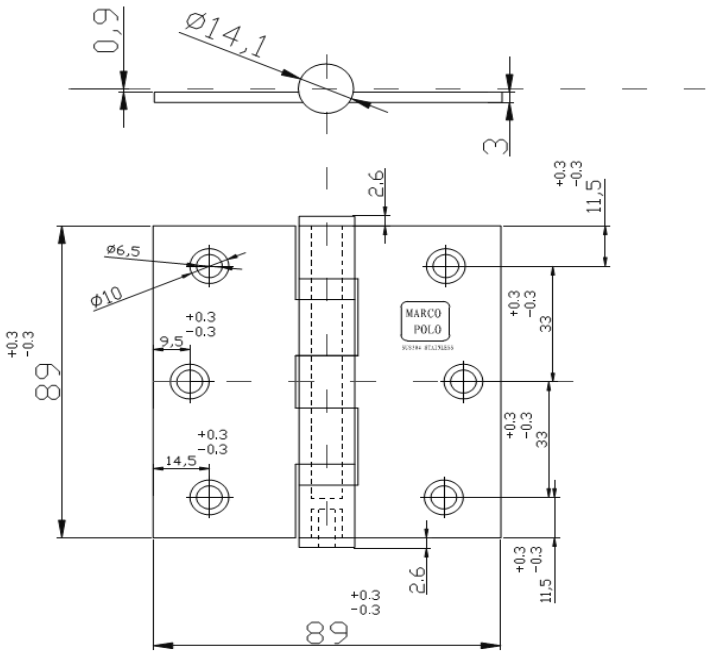

**Corrosion Resistance - Pure acid wated mixture**

| | Temperature ºC - : 20 / 80 | | | Grade 316 | | |
|---|---|---|---|---|---|---|
| Concentration (-% by mass) | 10 | 20 | 40 | 60 | 80 | 100 |
| Sulphuric Acid | 0/2 | 1/2 | 2/2 | 2/2 | 1/2 | 0/2 |
| Nitric Acid | 0/0 | 0/0 | 0/0 | 0/0 | 0/1 | 1/2 |
| Phosphoric Acid | 0/0 | 0/0 | 0/0 | 0/0 | 1/1 | 2/2 |
| Formic Acid | 0/0 | 0/0 | 0/1 | 1/1 | 1/1 | 0/0 |

| | Temperature ºC - : 20 / 80 | | | Grade 304 | | |
|---|---|---|---|---|---|---|
| Concentration (-% by mass) | 10 | 20 | 40 | 60 | 80 | 100 |
| Sulphuric Acid | 2/2 | 2/2 | 2/2 | 2/2 | 1/2 | 0/2 |
| Nitric Acid | 0/0 | 0/0 | 0/0 | 0/0 | 2/1 | 0/2 |
| Phosphoric Acid | 0/0 | 0/0 | 0/0 | 0/0 | 0/1 | 2/2 |
| Formic Acid | 0/0 | 0/1 | 0/2 | 0/2 | 0/1 | 0/0 |

| Key : | | |
|---|---|---|
| | 0 = resistant | Corrosion rate less than 100µm/year |
| | 1 = partly resistant | Corrosion rate 100 - 1,000µm/year |
| | 2 = non resistant | Corrosion rate over 1,000µm/year |

| **Hot working** | Grade 316 | Grade 304 |
|---|---|---|
| Stress relieving | ~200 to 400ºC | 450 - 600ºC |
| Initial forging & pressing | 1150 - 1200ºC | 1150 - 1200ºC |
| Finishing temperature | over 900ºC | over 900ºC |
| Upsetting operation, forgings | 930 - 980ºC | 930 - 980ºC |

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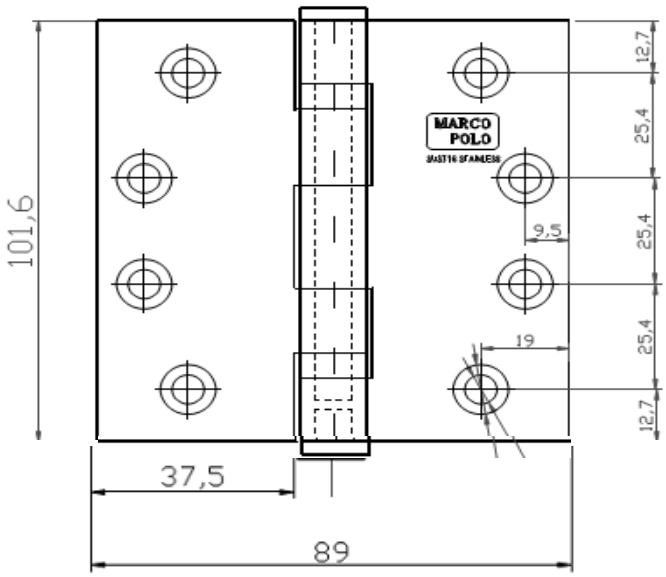
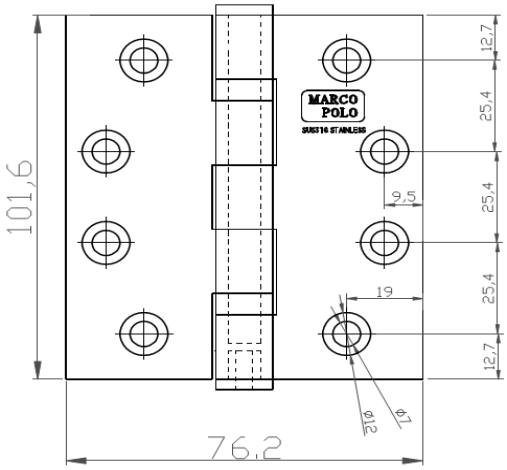



M01-SH30435-316SS/2BB (4 x 3-1/2")

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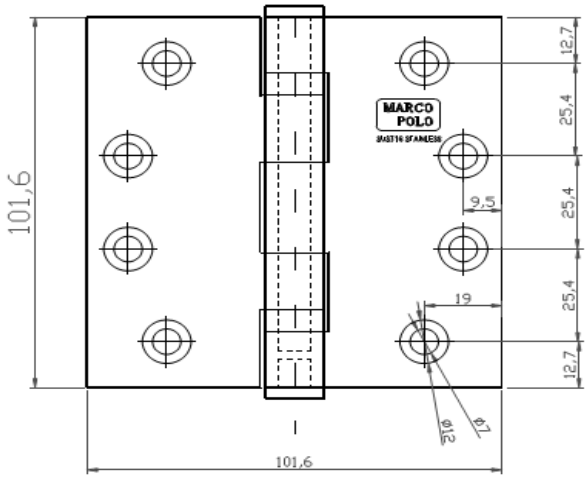


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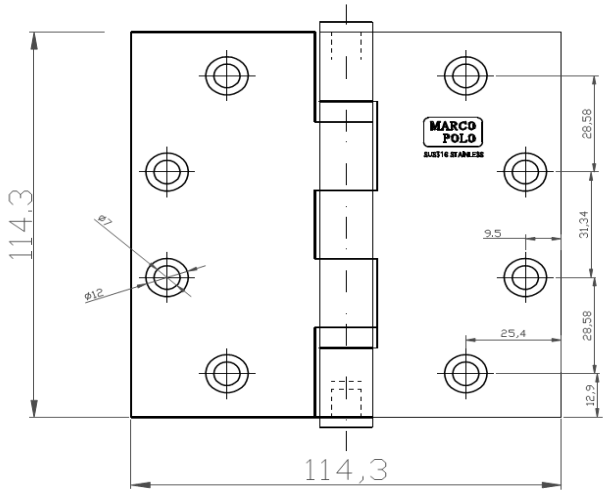


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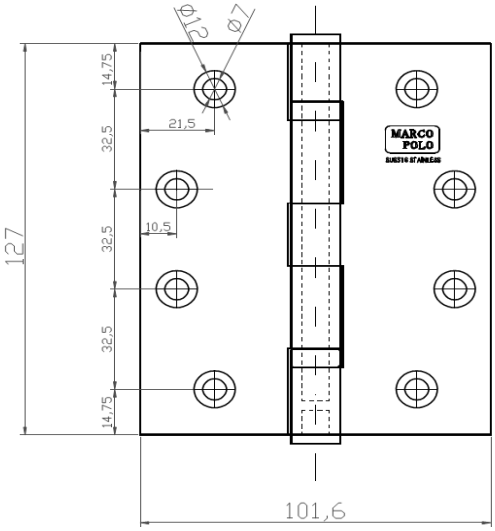


M01-SH3054-316SS/2BB (5 x 4")

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