

Material data sheet: 17-4 PH

Manufacturing process: Metal Binder Jetting - Desktop Metal Shop System

Physical properties ($\pm 1\sigma$)

| | As sintered | H900 | HIP |
|---|------------------|------------------|------------|
| Density ⁽¹⁾ (g/cm ³) | 7.67 \pm 0.025 | 7.67 \pm 0.054 | 7.77 (avg) |

Mechanical properties ($\pm 1\sigma$)

| | As sintered | H900 | HIP | HIP+H900 | H1150 |
|------------------------------|----------------|-----------------|----------------|-----------------|----------------|
| Yield strength Rp 0.2% (MPa) | 718 \pm 36.5 | 1091 \pm 43.9 | 722 \pm 12.5 | 1158 \pm 10.7 | 707 \pm 12.4 |
| Tensile strength Rm (MPa): | 934 \pm 37.3 | 1230 \pm 54.4 | 980 \pm 50.2 | 1276 \pm 14.8 | 917 \pm 11.3 |
| Elongation at break (%) | 9 \pm 2.3 | 12 \pm 3.1 | 13 \pm 0.7 | 13 \pm 3.0 | 12 \pm 2 |
| Young Modulus (GPa): | 192 \pm 1.3 | 201 \pm 0.7 | 198 \pm 1.3 | 187 \pm 1.5 | |

Geometrical data:

| | | | |
|--------------------------------------|--------------------------|----------|---|
| Layer thickness available | 50 μ m, 75 μ m | | |
| Typical part accuracy ⁽²⁾ | after first print/sinter | \pm 3% | Part accuracy is highly dependent on part design and is typically improved through the application development phase. |
| | after 2 to 3 iterations | \pm 1% | |

| Impact test | As sintered | H900 | H1150 |
|------------------------|---------------|---------------|----------------|
| Charpy V-Notch KV8 (J) | 8.9 \pm 1.1 | 4.4 \pm 0.2 | 30.6 \pm 1.0 |

Surface roughness

| | As sintered | Sandblasted |
|---------------|-------------|--------------|
| Ra (μ m) | 9 \pm 1.6 | 6 \pm 0.8 |
| Rz (μ m) | 54 \pm 7 | 40.5 \pm 6 |

| Hardness ($\pm 1\sigma$) | As sintered | H900 | H1150 |
|----------------------------|---------------|---------------|---------------|
| Vickers Hardness (HV) | 302 \pm 8.6 | 415 \pm 3.0 | 292 \pm 0.8 |

Chemical analysis data (based on Aidro testing campaigns)

| Condition | C | S | N | O | H | Al |
|-------------|-------|-------|--------|-------|--------|-------|
| AS SINTERED | 0.023 | 0.004 | <0.002 | 0.009 | 0.0002 | 0.010 |
| H900 | 0.020 | 0.004 | <0.002 | 0.002 | 0.0001 | 0.010 |

| Condition | Cr | P | Mn | Mo | Ni | Cu |
|-------------|-------|------|------|------|------|------|
| AS SINTERED | 16.61 | 0.03 | 0.49 | 0.22 | 4.31 | 3.89 |
| H900 | 16.64 | 0.03 | 0.50 | 0.24 | 4.33 | 3.92 |

| Condition | Si | Ti | V |
|-------------|------|-------|------|
| AS SINTERED | 0.58 | <0.01 | 0.05 |
| H900 | 0.59 | 0.01 | 0.05 |

Notes:

⁽¹⁾ Archimede's density according to ASTM B311.

⁽²⁾ Reference values only. In MBJ applications, part accuracy is improved through an iterative approach aiming at fine tuning scaling factors and calibrating distortion compensation. Please reach to Aidro team to know more about part accuracy that can be reached via Metal Binder Jetting.