

APP MATERIAL DATA SHEET – BIOIMPLANTABLE ALLOYS*

As a leader in metal injection molding for the last 20 years, we pride ourselves on our material expertise. This guide walks you through typical material properties for Bioimplantable Alloys. Bioimplantable Alloys are a family of Cobalt-chromium alloys commonly used for the implantation of MIM components in the medical device and orthopedic industry. Need help choosing the best option? Let our application experts take a closer look.. Call us at [814-342-5898](tel:814-342-5898) or email us at engineer@4-app.com

FEATURES AND APPLICATIONS

| Grade | Hardness | Alloy Features | Applications |
|-------------------|----------|--|---|
| F-75 (ASTM F2886) | 25 HRC | High strength, superior corrosion resistance, non-magnetic, biocompatibility | Prosthetic replacements (hips, knees, etc.) bone plates, screws, rods, heart valves |
| MP35N (ASTM F562) | 8 HRC | | |

ALLOY COMPOSITION

| Alloy | C | Mn | Si | Cr | W | V | Ni | Mo | Co | Cu | Fe |
|-----------|-----------|----------|----|-------|---|---|----------|--------|-----|----|----------|
| MIM F-75 | 0.35 Max | 1.00 max | - | 27-30 | - | - | 0.50 Max | 5-7 | Bal | - | 0.75 Max |
| MIM MP35N | 0.025 Max | 0.15 Max | - | 19-21 | - | - | 33-37 | 9-10.5 | Bal | - | 1.00 max |

TYPICAL MATERIAL PROPERTIES

| Material | Density (g/cm ³) | YS (MPa) | UTS (MPa) | Elongation (%) | Unnotched Charpy impact energy (J) | Macro Hardness | Young's modulus (GPa) |
|-------------------|------------------------------|----------|-----------|----------------|------------------------------------|----------------|-----------------------|
| MIM F-75 - Hipped | 7.8 | 520 | 1000 | 40 | - | 25 HRC | 190 |
| MIM MP35N | 8.3 | 400 | 900 | 10 | - | 8 HRC | - |

COMPARISON OF MIM F75 AND CAST F75

| Material | YS (MPa) | UTS (MPa) | Elongation (%) | Reduction in Area (%) | Macro Hardness |
|------------------------------|----------|-----------|----------------|-----------------------|----------------|
| MIM F-75 | 520 | 1000 | 40 | 25 | 25 HRC |
| MIM F-75 Minimum(ASTM F2886) | 480 | 825 | 10 | 10 | - |
| Cast F-75 Typical | 550 | 880 | 16 | 18 | 25-35 HRC |
| Cast F-75 Minimum | 450 | 665 | 8 | 8 | 25-35 HRC |

Donald F. Heaney, Powder Injection Molding of Implantable Grade Materials, Proceedings of MSEC:2006 ASME International Conference on Manufacturing Science and Engineering, October 8-11, 2006, Ypsilanti, MI, paper no. MSEC2006-21049.

John L. Johnson and Donald F. Heaney, Metal Injection Molding of Co-28Cr-6Mo, Medical Device Materials III , ASM, 2006.

*Handbook of Metal Injection Molding , 2nd ed. 2019. D.F. Heaney, founder and CEO of Advanced Powder Products. ISBN:9780081021521