

Photocurable Binder Materials for Lithography-Based Metal Manufacturing

Composition, print, debinding and sintering controls without safety-pictogram shortcuts

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Highlights

- Current supplied-formulation classification is checked in the applicable SDS.
- Absence of CLP pictograms is not described as absence of toxicity or universal safety.
- Bio-content, monomer-free, ash, melt-out and burnout claims require current controlled evidence.
- Binder performance is evaluated through printing, debinding, residues and sintered-part results.
- Dental or medical suitability belongs to the finished component and legal manufacturer.

Abstract

Photocurable binders are temporary manufacturing constituents in lithography-based metal manufacturing.

Workplace chemical-classification and control requirements are taken from the current SDS and risk assessment, not a safety-pictogram budget. Composition and thermal claims require current TDS and reports.

Final-part properties depend on feedstock, shaping, binder removal, residual chemistry, density, porosity, impurities and sintering validation.

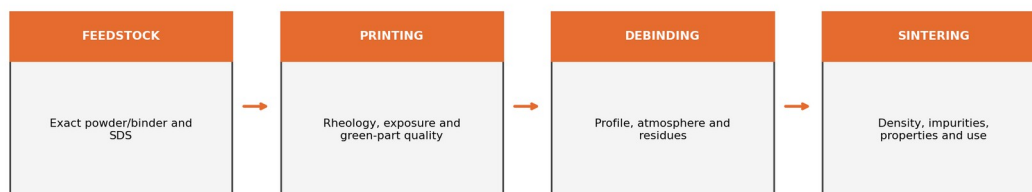
Keywords LMM · metal manufacturing · binder · debinding · sintering · SDS classification

Source use. Product evidence is in [1]; AM and shaping context in [2–4]; chemical and medical legal scope in [5–6].

1. Supplied-material control

The record identifies binder/feedstock composition, batch, SDS classification, rheology, exposure and storage.

- Do not translate no pictogram into no toxicity.
- Verify bio-content and monomer-free claims.
- Document workplace controls.



Release requires traceable evidence at every gate; a catalogue label cannot bypass the chain.

Figure 1. WP-35 evidence gates from controlled material description to final acceptance.

2. Debinding and sintering

Thermal or solvent removal profiles require mass, geometry, atmosphere, ramp/hold and residue criteria. Sintered density, porosity, impurities and properties are measured.

- Verify ash and mass-loss data.
- Define residual acceptance.
- Challenge thick sections.

3. Finished-component boundary

Binder attributes do not determine dental, medical or other regulated suitability. The final component and manufacturing route require application-specific evidence.

4. Minimum controlled evidence before release

Control field	Required record	Release interpretation
Feedstock	Exact powder/binder and SDS	Catalogue description only until evidence is linked
Printing	Rheology, exposure and green-part quality	Control process variables and change triggers
Debinding	Profile, atmosphere and residues	Report method, result, uncertainty and limits
Sintering	Density, impurities, properties and use	Apply final acceptance and responsibility boundary



Description ≠ measured result ≠ certification or finished-device approval

Figure 2. WP-35 separates catalogue positioning, measured evidence and final application decisions.

KEY INSIGHT

Precise product or application language is retained only when the exact formulation, method, processed specimen and controlled evidence can be traced.

5. Limitations

- SDS classification is not universal safety.
- No safety-pictogram budget is used.
- Composition and thermal numbers require reports.
- Binder evidence does not transfer to the final component.
- LMM products are made to order and compatibility is validated per system.

6. Conclusions

- Current supplied-formulation classification is checked in the applicable SDS.
- Absence of CLP pictograms is not described as absence of toxicity or universal safety.
- Dental or medical suitability belongs to the finished component and legal manufacturer.
- This corrected candidate remains local and on HOLD until series-wide scientific, metadata and visual release checks are complete.

Revision note

Version 5.3 replaces toxic-free and safety-pictogram-budget language with SDS-based classification and adds controlled binder-removal and final-component boundaries.

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Disclosure. Dr. Juan Segurola is founder and Scientific Director of 3Dresyns by Resyner Technologies S.L., the supplier of the materials discussed.

References

- [1] 3Dresyns. Current LMM made-to-order binder/feedstock TDS/SDS and controlled process reports.
- [2] ISO/ASTM 52900:2021. Additive manufacturing—Fundamentals and vocabulary.
- [3] German, R. M. (2014). Injection Molding of Metals and Ceramics. Metal Powder Industries Federation.
- [4] ISO 22068:2021. Sintered-metal injection-moulded materials—Specifications.
- [5] Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures.
- [6] Regulation (EU) 2017/745 on medical devices, current consolidated version.