

Support Materials, Removal Fluids and Residue Control for VPP Manufacturing

Compatibility of build resin, support, removal chemistry and final surface without automatic biological claims

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Highlights

- Support materials are temporary manufacturing constituents intended for removal before service.
- Monomer-free is a formulation attribute and does not establish biological safety.
- Removal is validated for the exact build resin, support, fluid, geometry and sequence.
- Purification or residue reduction is not called detoxification without analytical and toxicological evidence.
- Biological evaluation belongs to the finished device and its risk assessment.

Abstract

Support materials and removal fluids can affect residue, surface chemistry and downstream performance even though the support is not intended to remain in the finished article.

The controlled workflow identifies exact build resin, support, removal fluid, geometry, contact conditions, rinse, drying and acceptance method. Product labels do not substitute for residue evidence.

Monomer-free, Bio or absence of selected SDS pictograms cannot be converted into biocompatibility or universal safety. Finished-device biological evaluation remains use- and risk-specific.

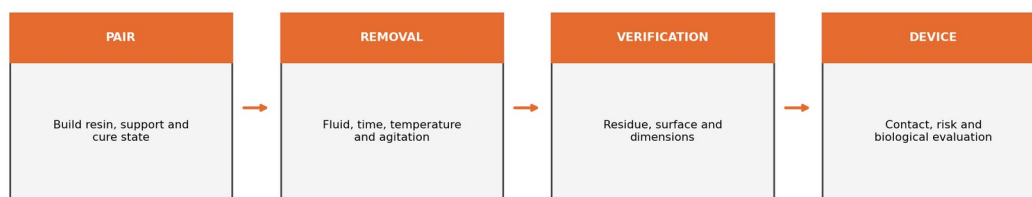
Keywords support material · removal fluid · residue · surface condition · VPP manufacturing

Source use. Product evidence and workflow control are in [1–2]; biological/chemical methods in [3–6].

1. Material-system compatibility

Compatibility is demonstrated for the exact build resin/support pair, printer and cure state. Swelling, cracking, surface change and dimensional effects are measured.

- Record formulation and batch.
- Challenge enclosed and high-area geometries.
- Treat substitutions as process changes.



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

Figure 1. WP-31 evidence gates from controlled material description to final acceptance.

2. Removal and residue verification

The protocol controls fluid identity, concentration, time, temperature, agitation, renewal, rinse and drying. Residue claims require a named analytical method and acceptance criterion.

- Use purification/residue reduction language.
- Do not infer detoxification.
- Verify surface and mechanical effects.

3. Biological boundary

Support and cleaner attributes do not establish final-device biological safety. ISO 10993 endpoint selection follows finished-device risk assessment.

4. Minimum controlled evidence before release

Control field	Required record	Release interpretation
Pair	Build resin, support and cure state	Catalogue description only until evidence is linked
Removal	Fluid, time, temperature and agitation	Control process variables and change triggers
Verification	Residue, surface and dimensions	Report method, result, uncertainty and limits
Device	Contact, risk and biological evaluation	Apply final acceptance and responsibility boundary

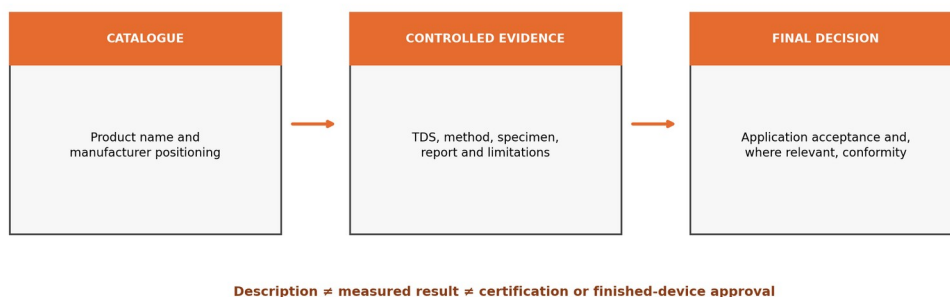


Figure 2. WP-31 separates catalogue positioning, measured evidence and final application decisions.

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

- Support is removed but can affect residues.
- Monomer-free is not biocompatibility.
- SDS classification is separate from biological safety.
- No fixed ISO 10993 test hierarchy applies.
- Current product documents control composition statements.

6. Conclusions

- Support materials are temporary manufacturing constituents intended for removal before service.
- Monomer-free is a formulation attribute and does not establish biological safety.
- Biological evaluation belongs to the finished device and its risk assessment.
- This corrected candidate remains local and on HOLD until series-wide scientific, metadata and visual release checks are complete.

Revision note

Version 5.2 removes built-in biocompatibility, detoxification, safe-formulation and fixed ISO-panel language and adds exact material-system residue control.

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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 support, flusher and cleaner TDS/SDS/IFU and residue reports.
- [2] 3Dresyns WP-06. Post-Processing Control for VPP Printed Parts, corrected candidate.
- [3] ISO 10993-1:2025. Biological evaluation of medical devices—Part 1.
- [4] ISO 10993-10:2021. Tests for skin sensitization.
- [5] ISO 10993-23:2021. Tests for irritation.
- [6] ISO 10993-18:2020. Chemical characterization of medical-device materials.