

Water-Soluble and Water-Swellable Sacrificial IM-WS Materials

Selection by the complete injection, geometry and removal process window rather than HDT alone

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Highlights

- The five IM-WS grades are candidates differentiated by mechanical/thermal behaviour and dissolution- or swelling-dominated removal.
- HDT is a screening input; actual mould temperature, pressure, duration, wall thickness, support and deformation criteria decide suitability.
- Water-removal conditions must come from the current grade-specific IFU/TDS.
- Printer power or colour does not establish universal resolution or removal performance.
- Regulated final products require a residue-specific method and acceptance criterion.

Abstract

Sacrificial injection moulding and indirect additive manufacturing require a printed insert that survives the complete injection event and can then be removed from the intended geometry. Melt temperature and HDT alone do not define that operating window.

The IM-WS portfolio contains dissolution-dominated and swelling-dominated routes. Grade selection requires the actual mould and feedstock temperatures, injection pressure and duration, geometry, support, dimensional criterion and the permitted water-removal procedure.

For medical, food-contact or pharmaceutical final products, the sacrificial material is not the finished article. Users must validate removal, residues and any interaction with the final material under the applicable product requirements.

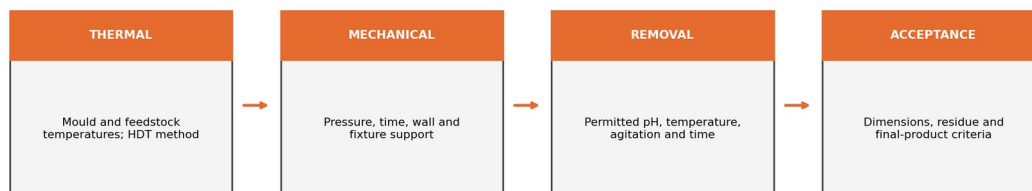
Keywords IM-WS · sacrificial mould · water removal · injection moulding · HDT · residue · process validation

Source use. Grade-specific evidence is controlled in [1]; thermal and mechanical methods in [2–3]; process background in [4–5]; additive-manufacturing terminology in [6].

1. Grade-selection inputs

Current product records identify IM-HDT-WS, IM-UHR-WS, IM-UHT-WS, IM-HT-WS and IM-SF-WS. Historical feedstock-to-grade mappings are candidate starting points only and must not be published as universal compatibility rules.

- Measure actual mould temperature rather than using melt temperature as a proxy.
- Record pressure, residence time, wall thickness, support and deformation.
- Confirm the current grade-specific HDT method and condition.



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

Figure 1. WP-12 evidence gates from controlled material description to final acceptance.

2. Removal-process control

Temperature, pH, agitation, solution renewal, exposure time, geometry and mechanical assistance can alter removal. Permitted limits, neutralisation and disposal instructions must come from the current IFU/TDS; no generic alkaline-water or temperature instruction is retained.

- Define dissolution or swelling mechanism by grade.
- Measure residue with an application-relevant method.

- Document solution management and material compatibility.

3. Resolution and final-article boundary

Feature clearing depends on viscosity, irradiance, exposure, orientation, drainage and geometry. Colour and printer power may be evaluated experimentally but are not universal resolution predictors. The final product manufacturer owns residue acceptance and application conformity.

4. Minimum controlled evidence before release

Control field	Required record	Release interpretation
Thermal	Mould and feedstock temperatures; HDT method	Catalogue description only until evidence is linked
Mechanical	Pressure, time, wall and fixture support	Control process variables and change triggers
Removal	Permitted pH, temperature, agitation and time	Report method, result, uncertainty and limits
Acceptance	Dimensions, residue and final-product criteria	Apply final acceptance and responsibility boundary



Description ≠ measured result ≠ certification or finished-device approval

Figure 2. WP-12 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

- HDT does not demonstrate survival of an injection cycle by itself.
- Published feedstock mappings are not specifications without grade-specific validation.
- Water-removal instructions must not exceed the current IFU/TDS.
- Sacrificial-material removal does not automatically establish regulated final-product compliance.

6. Conclusions

- The five IM-WS grades are candidates differentiated by mechanical/thermal behaviour and dissolution- or swelling-dominated removal.
- HDT is a screening input; actual mould temperature, pressure, duration, wall thickness, support and deformation criteria decide suitability.
- Regulated final products require a residue-specific method and acceptance criterion.
- This corrected candidate remains local and on HOLD until series-wide scientific, metadata and visual release checks are complete.

Revision note

Version 5.5 removes universal feedstock mappings, HDT-only selection, generic alkaline-water instructions and unqualified printer-power/colour resolution rules; it adds complete process-window and residue acceptance controls.

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

References

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