3DP™ Consumables Catalog

www.zprinter.de

www.zprinter.de

Contents

1 Introduction 3

1.1 Printers and Materials Compatibility 4

1.2 Available Sizes 4

2 High Performance Composite Materials 6

2.1 zp® 150 7

2.2 zp® 131 8

2.3 zp® 140 9

3 Metal Casting Materials 10

3.1 ZCast 501 10

3.2 zp® 14 11

4 Elastomeric Materials 11

4.1 zp 15e 11

5 Infiltration 12

5.1 How It Works 12

5.2 Mechanical Properties 12

5.3 Infiltration for Concept Modeling 14

5.4 Infiltration for Functional Modeling 16

5.5 Specialty Infiltration 17

6 Resources 18

1 Introduction

Z Corporation® offers several material systems to satisfy a variety of modeling needs. This guide is designed to give users an overview of the different types of powders, binder and infiltrants that can be used with 3D printers. The part numbers associated with each product are also listed.

These material choices allow you to tailor the properties of the finished models by selecting different infiltrants based on the application.

No matter which material you choose, you will always get the fast, high quality, and low material cost printing our machines are known for.

ZPrinter® 310 Plus
Monochrome, affordable, easy to use.

ZPrinter® 450
Full color, automated, office-friendly.

ZPrinter® 650
The Brand-New ZPrinter 650. Fastest print speed, largest color models and highest throughput.

1.1 Printers and Materials Compatibility

	High Performance Composite			Direct Metal Casting	Investment Casting	Elastomeric
	zp® 150	zp 131	zp 140	ZCast®	zp 14	zp 15e
Printers						
ZPrinter® 310 Plus	-	zb® 60	zb 60	zb 56	zb 51	zb 51
ZPrinter 450	zb 63	-	-	-	-	-
Spectrum Z® 510	-	zb 60	zb 60	zb 56	-	zb 58
ZPrinter 650	zb 61	zb 61	-	-	-	-
Infiltrants						
Z-Bond™ 101/ Z-Bond 90	√	√	√	-	-	-
Z-Max™ Epoxy	√	√	√	-	-	-
Wax	√	√	√	-	√	-
Z-Bond 11	-	-	-	-	√	-
Elastomer Kit	-	-	-	-	-	√
Salt Water	√	-	√	-	-	-

1.2 Available Sizes

Z Corporation powders and their compatible binders are available in a variety of sizes and packaging.

Powders			
Package	**Printed Parts Volume (Approx.)**	**Appearance**	**Notes**
Cartridge	400 in^3 6555 cm3		Compatible with automatic powder loading (Automated 3D Printers)

Pail	500 in^3 8194 cm3		
Eco-Drum	700 in^3 11471 cm3		Made from renewable resources and 100% recyclable
Drum	2000 in^3 32774 cm3		

Binders		
Package	**Fluid Volume**	**Appearance**
Cartridge (small)	10 oz./.3 L	
Cartridge (large)	34 oz./ 1.0 L	
Bottle (small)	.5 gal./1.9 L	
Bottle (large)	1 gal./3.8 L	

2 High Performance Composite Materials

The foundation of 3DP™ technology is the High Performance Composite Material. It consists of a highly engineered powder with numerous additives that maximize surface finish, feature resolution, and part strength. Each material, paired with its corresponding binder, produces high-definition parts that are fit for the most demanding 3D printing application.

High Performance Composite Materials Comparison				
		zp 150	zp 131	zp 140
Model Strength	Feature Resolution	***	***	**
	Green Strength	****	***	**
	Strength (Z-Bond)	****	****	**
Color & White	Addressable Colors	****	***	***
	Consistent Colors	****	***	***
	Whiteness	****	***	****
Ease of Use & Office Compatibility	Fast Drying	****	***	****
	Low Dustiness	****	****	***
	Salt Water Cure	√	✗	√

2.1 zp® 150

The zp 150 series includes zp150 powder as well as zb® 61 and zb 63 binders.

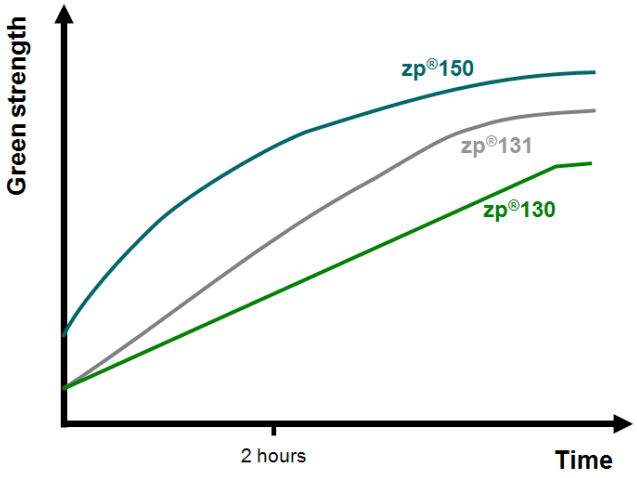
zp150 is a High Performance Plus material for making strong, high-definition parts. It features the highest green strength right out of the printer, improved final strength and because the material is so white, 3D models printed with zp150 feature vivid color.

Additionally, zp150 features a new Water Cure finishing option. Simply spray your 3D-printed model with a fine mist of water mixed with salt, dry it, and it's ready to be shown and touched.

zp150's performance improvements and the new Water Cure option truly expand the possibilities of your 3D printer. Use Water Cure for early concept iterations and ergonomics tests, and then finish your new designs with Z-Max™ for functional testing.

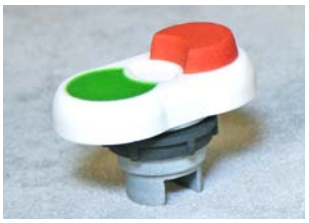
zp 150 Features

- Water cure finishing for both monochrome and color models
- Highest green strength and final strength
- Extremely bright white



Compatibility Check – zp 150

- ZPrinter 450 + zb 63
- ZPrinter 650 + zb 61



zp 150 product family			
Material	**Description**	**Unit of Measure**	**Part #**
Powder	zp 150 (cartridge)	8 kg	50407
	zp 150 (Eco-Drum)	14 kg	50367
Binder	zb 61 clear (cartridge)	34 oz./1 L	Z0170 (pkg. 2)
	zb 61 black (cartridge)	34 oz./1 L	Z0171 (pkg. 2)
	zb 61 cyan (cartridge)	10 oz./.3 L	Z0172 (pkg. 2)
	zb 61 magenta (cartridge)	10 oz./.3 L	Z0173 (pkg. 2)
	zb 61 yellow (cartridge)	10 oz./.3 L	Z0174 (pkg. 2)
	zb 63 clear (cartridge)	34 oz./1 L	Z0177 (pkg. 2)

2.2 zp® 131

The zp 131 series includes zp 131 powder and two available binders: zb® 60 and zb 61.

zp 131 is a High Performance Composite powder that will give you strong parts and good color accuracy. It is easy to use, produces great looking color parts with excellent dimensional accuracy, and has optimized infiltration characteristics making it easy to infiltrate with Z-Bond™.

zp 131 Features

- Strong parts
- Easy process
  - o High green strength
  - o Consistent infiltration when using Z-Bond
  - o Low dust during handling and printing
- Robust color accuracy
  - o Neutral white
  - o Large color gamut

Compatibility Check – zp 131

- ZPrinter 310 Plus + zb 60
- Spectrum Z510 + zb 60
- ZPrinter 650 + zb 61

Tech Tip

Powder that is not printed on is recyclable, but fresh powder must periodically be cut in to maintain optimum strength and dimensional accuracy.

zp 131 product family

Material	Description	Unit of Measure	Part #
Powder	zp 131 (pail)	22 lbs./10 kg	06930
	zp 131 (drum)	88 lbs./40 kg	06931
	zp 131 (cartridge)	18 lbs./8 kg	50307
Binder	zb 60 clear (jug)	1 gal./3.8 L	06932
	zb 60 cyan (jug)	.5 gal./1.9 L	06933
	zb 60 magenta (jug)	.5 gal./1.9 L	06934
	zb 60 yellow (jug)	.5 gal./1.9 L	06935
	zb 61 clear (cartridge)	34 oz./1 L	Z0170 (pkg. 2)
	zb 61 black (cartridge)	34 oz./1 L	Z0171 (pkg. 2)
	zb 61 cyan (cartridge)	10 oz./.3 L	Z0172 (pkg. 2)
	zb 61 magenta (cartridge)	10 oz./.3 L	Z0173 (pkg. 2)
	zb 61 yellow (cartridge)	10 oz./.3 L	Z0174 (pkg. 2)

2.3 zp® 140

The zp 140 series includes zp 140 powder and zb 60 binder.

zp 140 is a High Performance Plus powder system that sets new limits to how easy it is to print in 3D. It features a salt water cure process that makes it easy, fast and affordable to get from clicking "Print" to passing a model around at a meeting or in a classroom. zp140 is the material of choice for concept models.

A key advantage of the zp 140 is the salt water cure option. It has been specially engineered to allow parts to be post-processed by dipping them in salt water or spraying a fine mist on the surface. The reaction with water confers models additional strength and binds any remaining loose powder.

Because this material is so white, color 3D models printed with zp 140 feature extremely vivid color. This color can be maintained by infiltrating with standard infiltrants like Z-Bond™ or Z-Max™.

zb 60 binder is formulated to work specifically with both zp 131 and zp 140, making it easier to swap back and forth, should your application require it.

zp 140 Features:

- Salt Water cure post-processing – easiest and safest option available
- Low cost per in^3
- Bright whites
- Great for concept models

zp 140 product family			
Material	**Description**	**Unit of Measure**	**Part #**
Powder	zp 140 (pail)	22 lbs./10 kg	06936
	zp 140 (drum)	88 lbs./40 kg	06937
Binder	zb 60 clear (jug)	1 gal./3.8 L	06932
	zb 60 cyan (jug)	.5 gal./1.9 L	06933
	zb 60 magenta (jug)	.5 gal./1.9 L	06934
	zb 60 yellow (jug)	.5 gal./1.9 L	06935

Compatibility Check – zp 140

- ZPrinter 310 Plus + zb 60
- Spectrum Z510 + zb 60

Tech Tip

Water misting before soaking the parts helps preserve your 3D model's smallest features.

Architectural models benefit from using zp 140 infiltrated with water where true whiteness is desired.

Water Misting

Water Dipping

zp140 vs. zp130

3 Metal Casting Materials

If you need to work with metal casting, Z Corporation® has two options for you: direct metal casting with ZCast® or investment casting with zp® 14. Either way you get your cast parts quickly, with the accuracy of 3D printing directly from the CAD file.

3.1 ZCast 501

Direct Metal Casting

The ZCast 501 Direct Metal Casting process provides the ability to produce cast metal parts from a CAD file significantly faster and less expensively than traditional prototype casting methods. Printing molds and cores directly from digital data eliminates the pattern and core box production step used in traditional sand-casting processes. Metal is poured directly into the 3D printed molds. The technology allows engineers to prototype parts in metal that are costly and time consuming to produce using traditional methods.

Direct Casting Material can be used to create sand casting molds for non-ferrous metals. This material is a blend of foundry sand, plaster, and other additives that have been combined to provide strong molds with good surface finish. It is designed to withstand the heat required to cast non-ferrous metals.

After removal from the printer, printed molds must be baked in an oven at 375°F for 4-8 hours to remove excess moisture from the mold before metal is poured. ZCast 501 molds should never be infiltrated. Common foundry products such as core paste and refractory mold wash can be used to prepare the mold for pour as they have been designed to withstand the temperatures of the casting process. Refer to the ZCast Design Guide for more details on this process.

Compatibility Check – ZCast

- ZPrinter 310 Plus + zb 56
- Spectrum Z510 + zb 56

The ZCast Process

- Extremely fast turnaround from CAD file to prototype metal part
- Easily print complex molds and cores
- In-house mold-making capabilities for product manufacturers
- Simple metal-pouring process for foundries

Direct metal casting materials			
Material	**Description**	**Unit of Measure**	**Part #**
Powder	ZCast 501 (pail)	33 lbs. (15 kg)	06439
	ZCast 501 (drum)	132 lbs. (60 kg)	06438
Binder	zb 56 clear (jug)	1 gal. (3.8 l)	06312

3.2 zp® 14

Investment Casting

zp 14 Investment Casting Material can be used to quickly fabricate parts that can be dipped in wax to produce investment casting patterns. The material consists of a mix of cellulose, specialty fibers, and other additives that combine to provide an accurate part while maximizing the absorption of wax and minimizing residue during the burnout process.

Investment casting using zp 14 involves printing a male pattern, which is then infiltrated with wax and/or Z-Bond™ 11. Once infiltrated, the pattern is coated with an investment slurry, creating a mold. A cycle in the oven will burn out the printed pattern.

Compatibility Check – zp 14

- ZPrinter 310 Plus + zb 51

Tech Tip

Investment casting: Work with your local investment casting foundry to find the proper shrinkage factor for the metal alloy used for the pour.

Investment casting materials			
Material	**Description**	**Unit of Measure**	**Part #**
Powder	zp® 14 (pail)	11 lbs. (5 kg)	06127
	zp 14 (drum)	44 lbs. (20 kg)	06128
Binder	zb® 51	1 gal. (3.8 l)	05892
Infiltrant	Z-Bond 11	7.76 oz. (220 g)	15079
	Paraplast X-TRA™	17.6 lbs. (8 kg)	10434

4 Elastomeric Materials

4.1 zp 15e

Elastomeric material has been optimized for infiltration with an elastomer to create parts with rubber-like properties. The material consists of a mix of cellulose, specialty fibers, and other additives that combine to provide an accurate part capable of absorbing the elastomer, which gives the parts their rubber-like properties.

Compatibility Check – zp 15e

- ZPrinter 310 Plus + zb 51
- Spectrum Z510 + zb 58

Elastomeric Materials			
Category	**Description**	**Unit of Measure**	**Part #**
Powder	zp 15e pail	9.9 lbs. (4.5 kg)	06129
Binder	zb 51 clear	1 gal. (3.8 L)	05892
	zb 58 clear	1 gal. (3.8 L)	06660
	zb 58 cyan	.5 gal. (1.9 L)	06661
	zb 58 magenta	.5 gal. (1.9 L)	06662
	zb 58 yellow	.5 gal. (1.9 L)	06663

Infiltration Products

Z Corporation offers three families of infiltrants, with properties specifically optimized for different applications:

- Concept modeling
- Functional modeling
- Specialty infiltrants

The Guide below summarizes the performance of each of the infiltrants. More details about each family are provided in the sections that follow.

infiltrant guide

Product	Description	Application Method	Infiltrant Color/ Part Color	Mix Ratio	Penetration Depth (mm)	Working time	Cure Time @ 70°F/ 21°C	Cure Time @ 160°F/ 71°C
Concept Infiltrants								
Z-Bond™ 101 Premium	Instant Cure	Dip Drizzle	Clear/ Color	-	0.5-3	-	5-10 min	-
Z-Bond 90 Economy	Instant Cure	Dip Drizzle	Clear/ Color	-	0.5-3	-	15-30 min	-
Paraplast X-TRA™ Wax	Seal & protect Low strength	Dip ZW4	Clear/ Color	-	Up to 100%	-	15-30 min Cool down	-
Salt Water Cure	Chemical-free Low strength	Mist Dip	Clear/ Color	-	Up to 100%	-	Variable	Variable
Functional Infiltrants								
Z-Max™ High Strength	Maximum Strength Heat resistant	Brush Spray	Slightly yellow/ Color	100: 37 by weight	5-10	35 min	24 h	2 h
Specialty Infiltrants								
Por-A-Mold® Elastomer	Tough Flexible	Brush	Slightly yellow/ Color	1:1 by volume	2-5	15 min	24 h	-
Z-Bond 11 Investment Casting	Instant Cure For zp 14 only	Dip Drizzle	Clear/ Mono-chrome	-	2-3	-	15-30 min	-

Notes: Working time is the time during which the resin can be applied, before the curing reaction starts. Cure time is the point in time when the infiltrated part is cured and has achieved full strength. The ZW4 is a waxer available from Z Corporation authorized resellers.

5.3 Infiltration for Concept Modeling

Concept Modeling Infiltrants are great for applications ranging from design iterations, product mock-ups, design & ergonomics review, and proof of concept to sales/marketing tools, teaching tools or movie props.

Z-Bond™ 101/Z-Bond 90

Z-Bond 101 is an extremely fast-curing infiltrant, designed to rapidly strengthen 3D-printed parts. Z-Bond 101 is a low odor formulation and is easy to apply. With Z-Bond 101 Premium Instant infiltrant, you can enjoy strong, vividly colored models in as little as 5 minutes.

Z-Bond 101 is the strongest and fastest concept modeling infiltrant and also one of the most lightfast, under office-type lighting.

Z-Bond 101 is also available in a Dipping Kit. This convenient kit has everything you need to easily and cleanly dip your parts. It includes two bottles of Z-Bond 101, a dipping container, funnel, safety glasses and gloves - all for the price of just the Z-Bond 101.

Z-Bond 90 is a fast-curing infiltrant for 3D-printed parts. It is a low odor formulation that makes strong and very colorful models.

Z-Bond 90 is the best value instant infiltrant and a great choice for many concept modeling applications.

Z-Bond 90 is available in a Dipping Kit as well. As with Z-Bond 101, the kit has everything you need including three bottles of Z-Bond 90, two dipping containers, funnel, safety glasses and gloves.

Paraplast X-TRA™ Wax

One of the most cost-effective infiltrant options for concept models is Paraplast X-TRA wax. Dipping the printed models in melted wax quickly enhances colors and fills the pores, for a smoother surface finish.

Paraplast X-TRA melts at a low temperature of 50°C (122°F) and will readily infuse the printed model and confer it some additional strength.

Paraplast X-TRA can be used with Z Corporation's ZW3 waxer and ZW4 automated waxer.

Salt Water Cure

Salt Water Cure is the safest and greenest way to infiltrate 3D-printed models. Simply mist your model (or dip it) using a salt water solution. Salt Water Cure is the lowest cost infiltration option and delivers the brightest white 3D models.

Concept Modeling Infiltrant Characteristics

- Easy and cost effective to use
- Seals and smoothes part surface
- Enhances color vibrancy
- Strengthens part for handling

Tech Tip

A little sanding goes a long way in improving the appearance of your models.

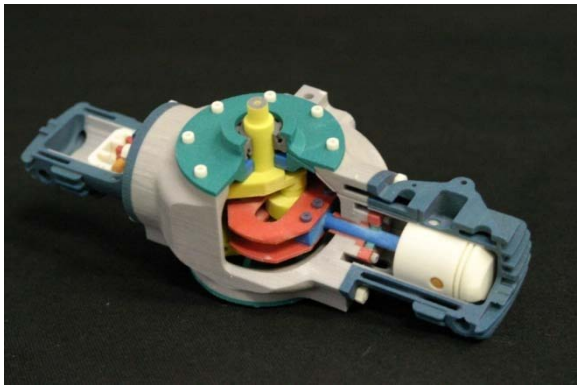
Before infiltration, take a minute to lightly sand away unevenness in the color of the part.

Once infiltrated the colors of the parts will be brighter and more uniform in appearance.

Infiltration Products for Concept Modeling

Our concept modeling infiltrants include Z-Bond™ 90 and 101, as well as Paraplast X-TRA™ wax and the new Epsom salt option.

concept modeling infiltrants		
Description	**Unit of Measure**	**Part #**
Z-Bond™ 101 Premium (small)	100 g (3.53 oz.)	15078
Z-Bond 101 Premium (large)	454 g (16 oz.)	15077
Z-Bond 90 Economy	454 g (16 oz.)	Z0096 (pkg. 2)
Z-Bond 90 Economy (large)	2 kg (4.4 lb)	50349
Z-Bond 101 Dipping Kit	2x 454 g (1 lb.) Dipping container Gloves, towels, funnel	50301
Z-Bond 90 Dipping Kit	3x 2 kg (3 x 4.4 lb.) Dipping container (2) Gloves, towels, funnel	50392
Paraplast X-TRA	1 kg (2.2 lb.)	10434 (pkg. 8)
Epsom Salt	0.6 kg (22 oz.)	16743



Z-Bond 101 and Z-Bond 90

Z-Bond 101 Dipping Kit

Z-Bond 90 Large

5.4 Infiltration for Functional Modeling

Functional Infiltrants are great for more demanding applications such as fit testing, functional testing, tooling or molding.

Z-Max™

Z-Max is the infiltrant of choice for the user that needs prototyping functionality from their parts. A part infiltrated with Z-Max allows engineers and designers to quickly test design iterations without the cost and time associated with waiting for molded plastic parts. Once infiltrated, parts can easily be machined, tapped, sanded, and painted. Z-Max will give you a very hard, very rigid, and very strong part.

Z-Max is a high strength infiltrant. This product was formulated to support needs not met by any product currently on the market. The primary factors are convenience and performance.

Convenience: Z-Max has 35 minutes of working time, which is plenty of time to apply it and will cure without the need for an oven.

Performance: Z-Max is a low viscosity formulation, 120 cP, which means deeper, quicker penetration. The result is very strong models, up to 43 MPa of flexural strength and up to 98 MPa of compression strength. Parts made with Z-Max are hard and rigid so they don't deform under load. Z-Max also has good temperature resistance, with a Heat Deflection Temperature (HDT @ 66 psi) of 115°C. *

Z-Max is a two-part system. In the package, both parts of the resin are supplied simply requiring mixture before use. Two sizes are available: a 250 gram pre-measured kit and a bulk .7 gallon kit.

After infiltration, Z-Max infiltrated parts cure at room temperature in 12-24 hours. The use of an oven for the cure cycle reduces the cure time to just 2 hours, producing consistently strong parts quickly.

Parts treated with Z-Max High Strength infiltrant can be sanded, drilled, tapped or machined, as needed.

* Source: Independent A2LA-accredited laboratory.

Functional infiltrants		
Description	**Unit of Measure**	**Part #**
Z-Max small	250 g (8.8 oz.) Pre-weighed kit	14516
Z-Max large	2.86 kg (0.7 gal.)	14505

Functional Modeling Infiltrant Characteristics

- Easy and cost effective to use
- Seals part surface
- Strengthens part
- Resistant to temperature and humidity

Tech Tip

When applying Z-Max, a heat gun is a good tool to use to retain fine feature detail.

When heat is applied to an area of the part the viscosity of the epoxy drops locally, allowing it to more easily wick in. This helps to preserve the quality of the part.

Z-Max Small

Z-Max Large

5.5 Specialty Infiltration

Por-A-Mold® Elastomer

Por-A-Mold elastomer is used to give parts printed with zp® 15e powder their elastomeric properties. This two-part urethane is mixed and then brushed onto the part, until it is infused completely. The part must then cure at room temperature for 24 hours. This will produce a very flexible part, yielding a Shore A Hardness of 28±2.

Z-Bond™ 11

Z-Bond 11 can be used instead of wax to prepare parts printed with zp 14 before the process of investment casting or lost wax. Dipping a 3D-printed part into a hot wax bath may introduce deformation. Z-Bond 11 reacts at room temperature, to preserve the geometrical accuracy of the model and lends the pattern significantly more strength and integrity than wax would.

Note: Paraplast X-TRA™ can be used after infiltration with Z-Bond 11 to make the pattern's surface smoother.

specialty infiltrants		
Description	**Unit of Measure**	**Part #**
Por-A-Mold Elastomer	1.9 L (2 qt.)	20093
Z-Bond 11	220 g (7.76 oz.)	15079

Tech Tips for Elastomeric Urethane

- Mix the material in small batches
- Apply the first coat very liberally
- Additional coats should be lighter
- Be ready to dab off excess material
- Once a part has been infiltrated, be careful not to leave the part sitting in a puddle of material, as it will be difficult to cut off afterwards.

Por-A-Mold