3M Science. Applied to Life.™

Adhesive Solutions

Battle of the Bonds

Dentists put their current adhesives up against the universal contender:

3M™ Single Bond Universal Adhesive

See how the matches turned out.

Chapters

Stats for 3M™ Single Bond Universal Adhesive

- **Indications**
- **Features, benefits and advantages**

The main event: Battle of the Bonds

- **Protocol for testing bond strength**
- **The results**
- **Clinical evaluations**

During 33 Battle of the Bonds events held in the U.S., Europe and Brazil, 13 leading dental adhesives were put through the same bond strength test.

Find out which of these top-rated contenders fell short, which ones went the distance, and which one was consistently at the top of the rankings.

Indications

3M™ Single Bond Universal Adhesive is the first truly versatile universal adhesive.

It can be used in all application techniques:

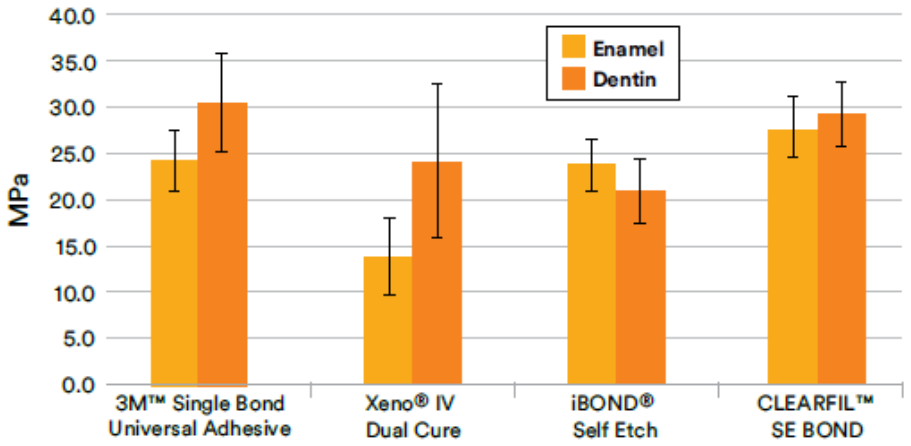
- **Total-etch**
- **Self-etch**
- **Selective-etch**

And it provides uncompromising performance in both direct and indirect procedures.

It can be used on all surfaces without any extra primer—and bonds to all surfaces, including enamel, dentin, glass ceramic, zirconia, noble and non-precious alloys, and composites.

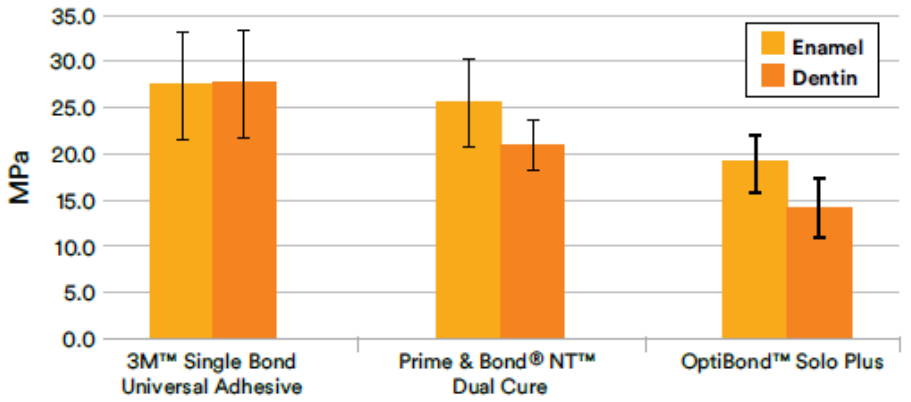
It is compatible with resin cements, core build-up materials and even self-cure composites (in combination with 3M™ Single Bond Universal DCA Dual Cure Activator).

Self-Etch Bond Strength
3M™ Single Bond Universal Adhesive vs. Competition



Source: 3M internal data

Total-Etch Bond Strength
3M™ Single Bond Universal Adhesive vs. Competition



Source: 3M internal data

Indications

Direct:

- Bonding light-cured composite or compomer for all classes of direct restorations
- Root surface desensitization
- Sealing of dentin prior to amalgam restorations
- Protective varnish for glass ionomer restorative materials
- Repair of composite or compomer restorations
- Bonding sealants

Indirect:

- Adhesive/primer when bonding zirconia, alumina, metal or glass ceramic restorations
- Bonding indirect restorations with 3M™ RelyX™ Ultimate Adhesive Resin Cement—without the need to light cure the adhesive
- Bonding self- or dual-cure core build-up materials and resin cements (with 3M™ Single Bond Universal DCA Dual Cure Activator)
- Bonding veneers when combined with a veneer cement
- Intraoral repair of existing indirect indications
- Sealing of dentin prior to temporization for indirect restoration placement

Versatility that allows dentists to simplify the bonding procedure without compromise.

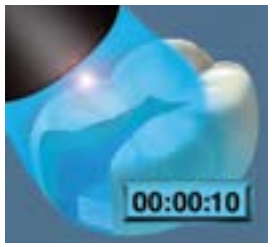
Features, benefits and advantages

Better performance in fewer steps!

- Combined total-etch, self-etch and selective-etch adhesive
- Consistent bond strength to both moist and dry etched dentin
- Virtually no post-op sensitivity
- High bond strength to all indirect surfaces (zirconia, alumina, glass ceramics and metals) without a separate primer
- Excellent marginal integrity for highly esthetic restorations
- One-step, one-coat adhesive application
- Self- and dual-cure material compatible with 3M™ Single Bond Universal DCA Dual Cure Activator
- No refrigeration needed—store at room temperature for two years
- Flip-top vial and unit-dose delivery
- Improved, easy-to-place etchant

Using the disposable applicator, apply adhesive to the entire tooth. Rub it in for 20 seconds.

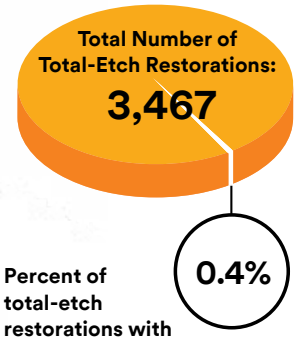
Gently air dry for about 5 seconds until it no longer moves and the solvent has evaporated completely.



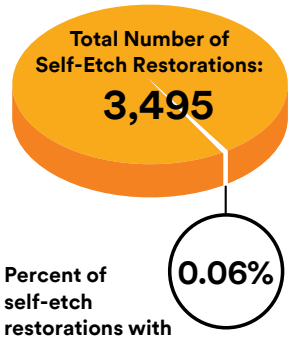
Light cure for 10 seconds. Complete restorative procedure as normal.

Prior to placement of the adhesive, the dentin and/or enamel may be acid etched depending on the dentist's preference.

Virtually no post-operative sensitivity in total-etch or self-etch applications



Percent of total-etch restorations with 3M Single Bond Universal Adhesive having post-op sensitivity.



Percent of self-etch restorations with 3M Single Bond Universal Adhesive having post-op sensitivity.

Source: 3M internal data

Contenders

In a hands-on, head-to-head competitive comparison, **658 dentists** put the pressure on these **13 dental adhesives.**

Adhesive	Number of dentists conducting hands-on tests
3M™ Single Bond Universal Adhesive (Total-etch to dentin)	148
3M™ Single Bond Universal Adhesive (Self-etch to dentin)	499
AdheSE® One F	31
BOND FORCE	10
CLEARFIL™ SE BOND Resin Based Dental Adhesive System	94
ExciTE®	9
Futurabond DC	9
G-BOND™	54
iBOND® Self Etch	54
OptiBond™ Solo Plus	68
OptiBond™ FL	243
Prime & Bond® NT™ Dual Cure	75
Syntac® Adhesive	135
Xeno® V+	44

Bond Strength Test Protocol

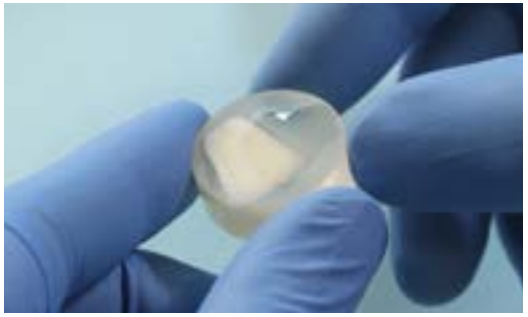
Part 1: Test Sample Preparation

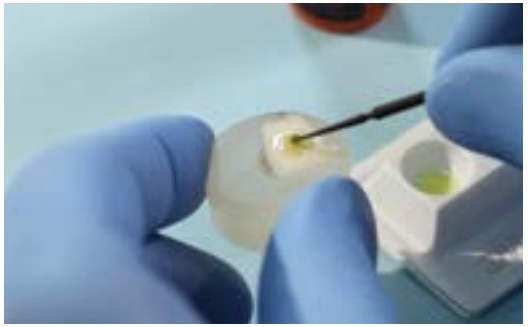
Dentists were given two lab-prepared test specimens of bovine teeth embedded in an acrylic cylinder and ground flat to expose the dentin surface: One to test their current adhesive, and one to test 3M™ Single Bond Universal Adhesive.

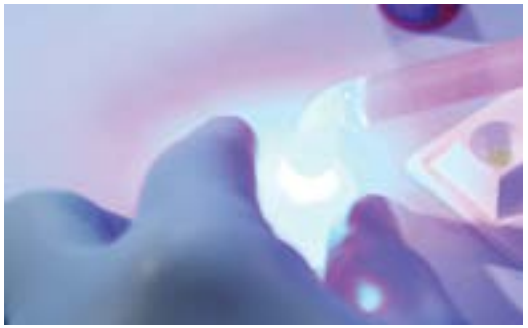
To create the test samples, dentists applied the adhesives to the exposed dentin areas following the manufacturers' Instructions for Use. For 3M Single Bond Universal Adhesive, the dentin/enamel surfaces may or may not have been etched with phosphoric acid prior to placing the adhesive, depending on the dentist's preference.

3M Single Bond Universal Adhesive was applied with a brush using a scrubbing motion for 20 seconds to assure uniform distribution across the surface and penetration into the dentin. It was gently air dried for 5 seconds to evaporate the solvent and produce a uniform film. Then it was light cured for 10 seconds.

Watch the video





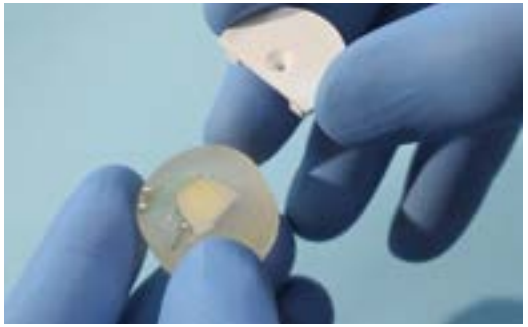


Bond Strength Test Protocol (cont.)

A mold was centrally placed on the cured adhesive and fixed into place with a clamp.

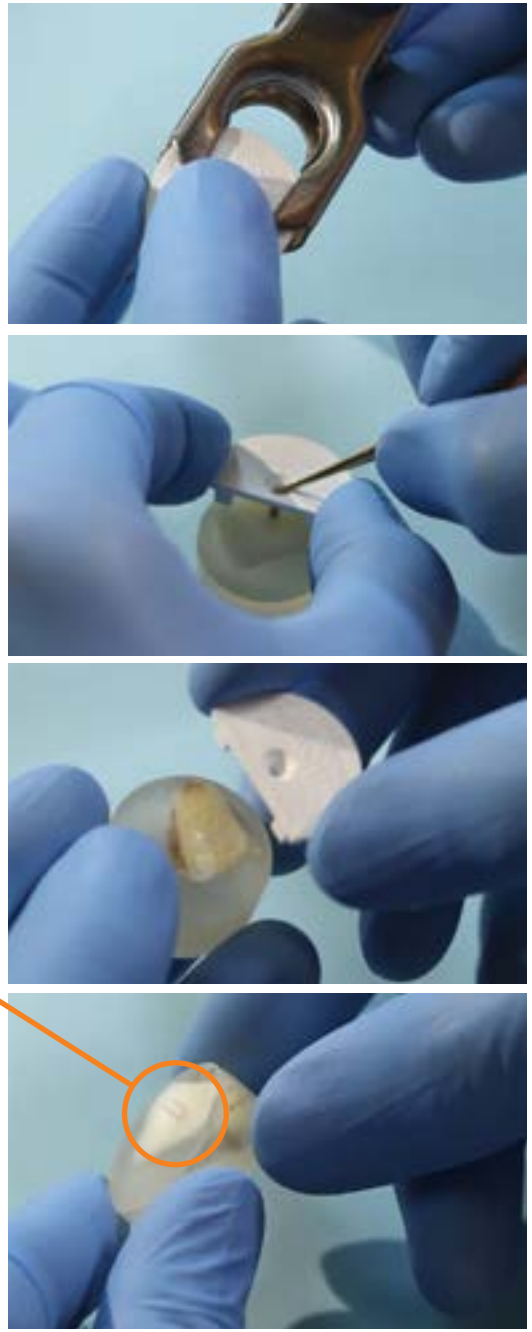
A hole in the mold was filled with composite and condensed down to create good contact with the tooth surface. Any excess material was removed.

The composite was then light cured for 20 seconds.



Bond Strength Test Protocol (cont.)

When the clamp and the mold were removed, the dentists had a test sample—a cured composite "cylinder" that was bonded directly onto the surface of the dentin.



Bond Strength Test Protocol (cont.)

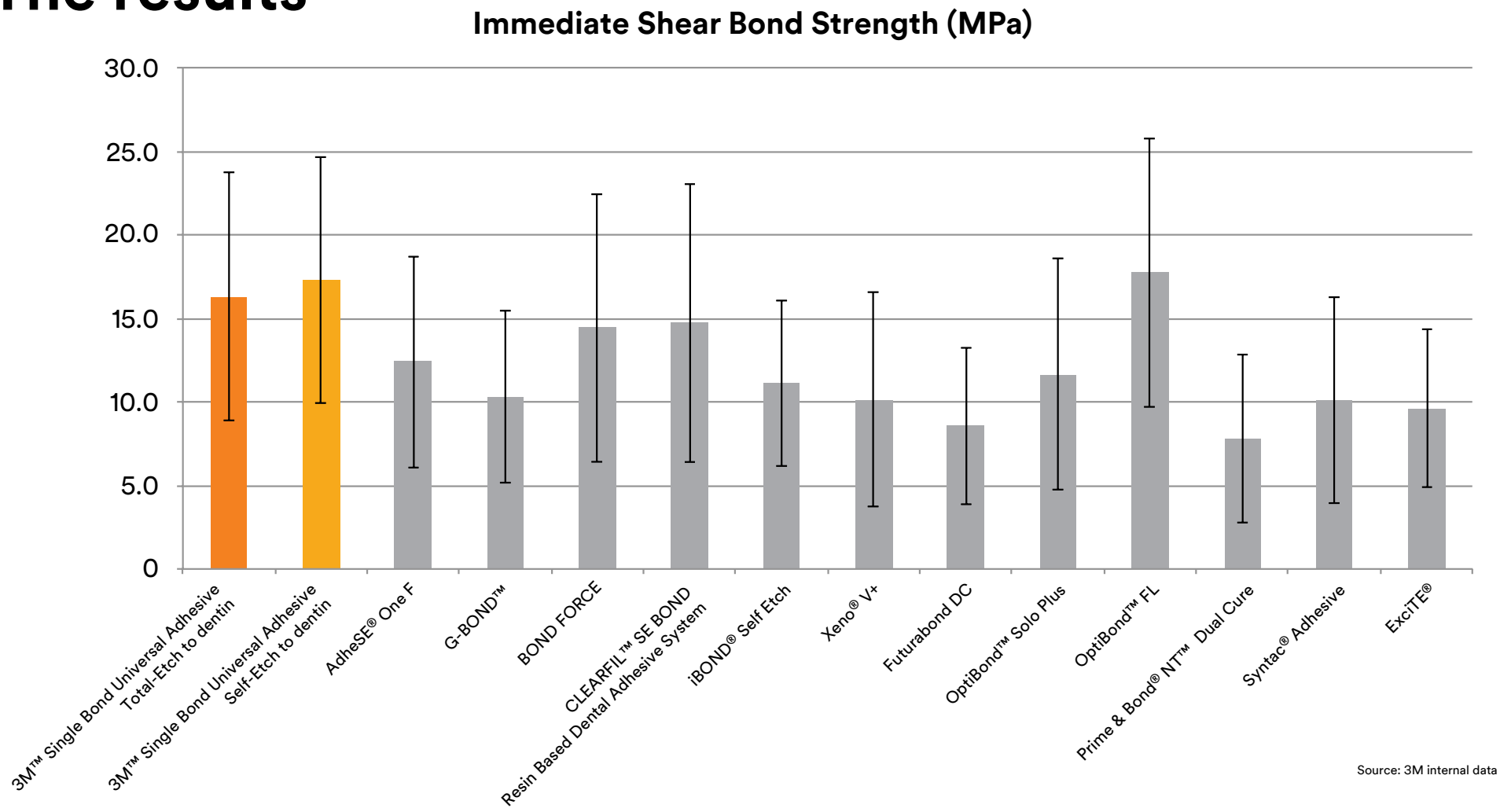
Part 2: Measurement

The sample was placed in a clamp and inserted into a portable shear bond tester. Dentists watched as the samples were tested. The wheel was slowly turned to bring the shearing mechanism into contact with the composite.

Once the test was started, the pressure was increased against the composite until it debonded from the tooth sample. At that point, the force was measured in Newtons and recorded, 83.7 in this example.

The Newton measurement was converted to megapascal (MPa) by dividing the displayed number by the surface area of the button in mm^2; in this case, 4.374. In this example, the calculated shear bond strength was 19.14 MPa.

The results



Source: 3M internal data

The adhesive is a very important part of what you do every day. As you can see, dentists proved that 3M™ Single Bond Universal Adhesive is as strong or stronger than the other 12 leading dental adhesives tested, and provides consistent results in both the total-etch and self-etch modes of use.

The main event

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658 dentists tested their current adhesives in a series of Battle of the Bonds events. When the final bell was rung, 3M™ Single Bond Universal Adhesive was proven to be as strong as or stronger than the other 12 leading dental adhesives tested. It's the truly versatile adhesive that can be used with any technique, for virtually any indication and on any surface—allowing dentists to simplify the bonding procedure without compromise.

More proof of performance

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Clinical Evaluation: 3M™ Single Bond Universal Adhesive

Performance compared to a trusted favorite

Class V restorations after 24 months and 114 restorations, % Alpha Rating

Lawson, N.C., Robles, A., Fu, C.C., Lin, C.P., Sawlani, K., & Burgess, J.O. (2015).
Two-year clinical trial of a universal adhesive in total-etch and self-etch mode in non-carious cervical lesions. *Journal of Dentistry, 43*, 1229–1234.

% Alpha Rating: Modified Cvar and Ryge Criteria

	3M™ Single Bond Universal (Total-Etch)	3M™ Single Bond Universal (Self-Etch)	3M™ Adper™ Scotchbond™ Multi-Purpose (Total-Etch)
Retention	100	94.7	92.1
Marginal discoloration	86.8	72.2	71.4
Marginal integrity	68.4	47.2	65.7
Secondary caries	97.4	94.4	97.1

Conclusion:

After 24 months, 3M™ Single Bond Universal adhesive in self- and total-etch modes performed similar to or better than 3M™ Adper™ Scotchbond™ Multi-Purpose Adhesive System.

More proof of performance

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Clinical Evaluation: 3M™ Single Bond Universal Adhesive

Performance across various methods of application

Non-carious Cervical Lesion NCCL Study, 36 months, 172 Restorations, 35 Patients

Loguercio, A.D., de Paula, E.A., Hass, V., Luque-Martinez, I., Reis, A., & Perdigao, J. (2015).
A new universal simplified adhesive: 36-Month randomized double-blind clinical trial. *Journal of Dentistry, 43*, 1083–1092.

% Good—Very Good: FDI Criteria				
	SBU ERm	SBU ERd	SBU SEt	SBU SE
Marginal staining	93.2	93.2	90.9	82.5
Retention/fractures	97.8	97.8	97.8	88.9
Marginal adaptation	93.2	93.2	93.2	82.5
No post-op sensitivity	100	100	100	100
No secondary caries	100	100	100	100

% Alpha Rating: USPHS Criteria				
	SBU ERm	SBU ERd	SBU SEt	SBU SE
Marginal staining	93.2	93.2	93.2	82.5
Retention/fractures	97.8	97.8	97.8	88.9
Marginal adaptation	84.1	88.6	86.4	75
No post-op sensitivity	100	100	100	100
No secondary caries	100	100	100	100

SBU = 3M Single Bond Universal Adhesive
ERm = Etch, Rinse, Leave Moist
ERd = Etch, Rinse, Dry
SEt = Selective Enamel Etch Only
SE = Self-Etch

Conclusion:

After 36 months, the reliable clinical success of 3M™ Single Bond Universal Adhesive fulfilled the ADA criteria for approval for all etching techniques.

Ordering Information

Item #	Product Information
41265	**3M™ Single Bond Universal Adhesive Intro Kit—Vial** Kit includes: 1 – 5ml adhesive vial; 50 disposable mixing wells; 50 disposable microbrushes; 1 – 3ml etchant syringe; 25 dispensing tips
41266	**3M™ Single Bond Universal Adhesive Refill** Includes: 1 – 5ml adhesive vial
41276	**3M™ Single Bond Universal Adhesive Intro Kit—Unit Dose 40** Kit includes: 40 unit dose; 1 – 3ml etchant syringe
41278	**3M™ Single Bond Universal Adhesive Unit Dose 100** Includes: 100 unit dose; 1 – 3ml etchant syringe
41268	**3M™ Single Bond Universal DCA Dual Cure Activator** Includes: 1 – 5ml vial
41263	**3M™ Scotchbond™ Universal Etchant Etching Gel** Includes: 2 – 3ml syringes; 50 dispensing tips

www.3M.com

3M Oral Care
2510 Conway Avenue
St. Paul, MN 55144-1000 USA

Phone 1-800-634-2249
Web 3M.com/dental

3M Deutschland GmbH
Location Seefeld
3M ESPE • ESPE Platz
82229 Seefeld • Germany
Info3MESPE@mmm.com
www.3MESPE.com