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The Nail Integrity Method: A Nail Plate Assessment Protocol and Comparative Testing of Base Gel Flexibility and Acidity

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Abstract

Gel nail services are often performed with one standard base and preparation routine for every client, although natural nail plates differ in moisture behavior, thickness, and flexibility, and commercial base gels differ in cured flexibility and acidity in ways their labels do not reveal. This paper describes the Nail Integrity Method, a protocol developed by the author in professional practice and teaching, and reports preliminary comparative tests of commercial base gels. The method separates nail plate type (dry, normal, or moist), current condition, and the final assessment, which ends in one of three decisions: proceed, modify the service, or postpone and refer. Type is recognized from practical observations, including whitening of the periungual skin under the dehydrating cleanser, rapid return of surface moisture, e-file clogging, and a history of pinpoint micro-lifting. Base gels are classified on three independent axes (cured flexibility, consistency, and acidity) using a standardized bending test and a two-stage acidity assessment: ingredient analysis followed by a comparative indicator test of aqueous samples. In twelve commercial bases, indicator results ranged from approximately 2–3 to 6, and three products fell below the method's working limit; one product marketed for oily nails and extreme lifting read near 6, showing that adhesion cannot be inferred from acidic response alone. For each plate type the method specifies base acidity and flexibility, the preparation sequence, auxiliary liquids, structural gel properties, and layer placement, with the lowest sufficient level of adhesion as the governing principle. The method has not yet been evaluated in a controlled study; directions for evaluation are proposed.

Keywords: nail plate, nail typing, gel manicure, base gel, acidity, pH indicator, adhesion, onycholysis prevention, nail technician education

1. Introduction

The nail plate is a keratinized structure whose mechanical behavior depends strongly on its water and lipid content. Reviews of nail microstructure describe how reduced hydration makes the plate brittle and prone to splitting, while excess hydration softens it and weakens its resistance to delamination [1]. Dermatological reviews of nail cosmetics also document that adverse outcomes of artificial coatings, including onycholysis, plate thinning, and allergic contact dermatitis, depend not only on the product but on how it is applied and removed [2, 3, 4].

Published work on nail cosmetics concentrates largely on product chemistry and on adverse effects such as contact allergy, onycholysis, and plate thinning [2, 3, 4, 5]. Less attention has been given to how a technician should assess the plate before application, and how the result of that assessment should change the choice of base, preparation, and structural material in everyday salon practice.

In practice, the gap is significant. In the author's fifteen years of professional work and teaching in Ukraine and the United States, the most common reason for premature lifting or plate damage has not been the gel system itself but a mismatch between the plate and the protocol: an acid-containing base used on an already dehydrated plate, or a neutral base used on a plate that keeps releasing moisture after preparation. Technicians frequently respond to lifting by adding stronger primers, which increases chemical exposure without addressing the cause.

The Nail Integrity Method was developed to close this gap. Its premise is that the plate is assessed first and the materials are chosen second, with the preservation of the natural nail as the priority. This paper describes the method's assessment indicators, the resulting nail plate types, the protocol for each type, and the material testing step. It is intended for practicing technicians and educators, and as a basis for future controlled evaluation.

2. The Method: Assessment of the Nail Plate

2.1. Principles

The method rests on four principles. First, the natural structure of the nail unit is understood and preserved: the dorsal layer is prepared, not thinned, and living tissue is not removed. Second, the plate's type and its current condition are assessed before any product is chosen. Third, the lowest level of adhesion that the plate actually needs is used, so acidity and auxiliary liquids are added only when the plate requires them. Fourth, every material is tested before it reaches the client, because products of the same category vary in flexibility and acidity regardless of their names.

2.2. Type, condition, and assessment are separate

The method distinguishes three things that are often merged in salon practice.

- Type describes the general moisture behavior of the natural plate: dry, normal (balanced), or moist (moisture-rich). These are professional observation categories, not medical diagnoses or laboratory measurements. Type is not shape: a flat, arched, narrow, or upward-growing nail describes form, not moisture behavior.
- Condition describes what is happening to the plate now: intact, overfiled or thinned, peeling after lifting or removal, chemically or thermally irritated, deformed, or affected by onycholysis. Any type can have any condition.
- Assessment combines both with the client's history and ends in a decision about the service.

Type tells the technician how the nail generally behaves; condition tells what it can safely tolerate today. Moisture type, thickness, density, and flexibility are evaluated separately: a dry nail is not necessarily thin, and a moisture-rich nail is not necessarily weak or poorly adhering. Moisture behavior is also not the same as surface pH, which cannot be judged by eye or touch; the method therefore assigns no pH value to nail types.

2.3. Recognizing the type

The type is assessed on a clean, dry plate that has not just been soaked, washed, or kept under occlusive gloves, since these temporarily raise moisture. The client's history of previous product wear is considered together with what is observed.

Observation	Dry	Normal (balanced)	Moist (moisture-rich)
Surface	Matte or slightly chalky; free edge may be brittle, peeling, or splitting	Even, moderate natural appearance	More visible natural shine
Response to gentle pressure	Firm, limited flexibility	Balance of firmness and flexibility	Often softer and more pliable
Surrounding skin and cuticle	Dry, rough, or flaky (supporting sign only)	Skin moisturized; cuticle may still be relatively dry	Moisturized skin; some clients have increased perspiration or hyperhidrosis
During preparation	Periungual skin turns visibly white immediately after the dehydrating cleanser	No marked change	Cleansed surface loses its matte look quickly; moisture returns around the folds; e-file bit clogs during cuticle work
History of wear	Brittleness, white spots after more acidic products	Stable wear	Lifting; pinpoint micro-lifting visible when a transparent coating is removed

The cleanser-whitening sign, the pinpoint micro-lifting history, and e-file clogging are practical observations from the author's work, used as supporting evidence rather than as tests. Peeling alone does not prove a dry type, because it can be a current condition caused by damage.

2.4. Assessing condition and deciding

The assessment follows a fixed sequence: observe the clean, dry plate; assign the type; assess thickness, density, flexibility, surface texture, attachment to the nail bed, sensitivity, and the surrounding tissue; separate natural type from current damage; review history (previous lifting or breakage, pain during wear or curing, allergies or reactions, usual length, occupation, hand use). It ends in one of three decisions:

1. Proceed normally when the plate is intact and there are no warning signs.
2. Modify the service when damage is superficial and stable, without pain, inflammation, active separation, or suspected infection: gentler preparation, shorter length, reduced mechanical load, or a different product system. An already thinned plate is never filed further to gain adhesion, and lifting is never answered simply with a more aggressive product.
3. Postpone and refer when there is active or unexplained onycholysis, pain, inflammation, swelling, blistering, bleeding, discharge, unusual odor, concerning discoloration, suspected infection, a new unexplained deformation, or signs of irritant or allergic reaction [2, 4, 5, 6]. A separated area is not cleaned underneath, filed, or covered to make the nail look normal; the technician describes what is visible but does not diagnose.

The technician's responsibility is not to diagnose or treat nail disease, but to recognize when a nail is outside the safe scope of a cosmetic service.

3. Protocol by Nail Plate Type

Table 1 summarizes how the plate type changes the main decisions of the service: base acidity and flexibility, alcohol preparation, auxiliary bonding liquids, use of talc, and the flexibility of the structural gel. All other steps of the gel service (dry manicure, full curing according to the manufacturer's instructions, removal with

an electric file down to the base layer without peeling or scraping) are part of the author's standard protocol and do not change with plate type.

Table 1. Nail Integrity Method: protocol by nail plate type

Decision	Dry	Normal	Oily/moist
Base acidity (low / medium / high)	Low	Medium (low on a borderline-dry plate)	Medium to high; high (indicator reading about 3, the working maximum) only for marked moisture, hyperhidrosis, or recurrent lifting, and with caution. Products reading about 1–2 are not used for any type
Base flexibility	Flexible base under hard gel	Flexible base under hard gel; medium-flexibility or rubber base as the leveling layer under gel polish	Flexible base; never a hard base directly on a soft, pliable plate
Alcohol preparation	One pass	Two passes	Two passes, always; one nail at a time, base applied immediately after cleansing each nail
Auxiliary liquids	None	Usually none	Dehydrator and/or primer applied to the free edge only, when lifting history is present
Talc (drying powder) during e-file cuticle work	Not needed	Useful to dry the cuticle area	Needed; absorbs moisture quickly and may need to be reapplied
Structural gel	Firmer; avoid overly flexible gels that let the dry plate bend under the coating	Medium	Slightly softer; avoid brittle gels that crack on a pliable plate

3.0. Three independent properties of a base

The method separates three properties of a base gel that are often confused in salon practice and in product marketing:

1. Behavior after polymerization: flexible, medium-flexibility, or strong/hard.
2. Consistency before polymerization: liquid, medium, or thick.
3. Acidity and level of adhesion: low, medium, or high, as practical comparative grades.

These properties vary independently. A thick base is not necessarily hard, a liquid base is not necessarily flexible, and labels such as "rubber", "strong", or "hard" say nothing about acidity. "Rubber base" in particular is not a rigidity category: it usually describes a viscous, self-leveling base, and two rubber bases may behave very differently once cured. Each property is therefore chosen for the plate type separately, and each product is classified by testing rather than by its label (Section 4.1).

In the author's system, the base provides adhesion to the natural plate and the hard gel provides architecture and mechanical support. The base is applied as a complete, even layer, neither structural in thickness nor

applied with an almost dry brush. When a hard base is used as the leveling layer under gel polish, a thin layer of flexible base is applied first so that the connection with the natural plate remains elastic.

3.1. Dry plate

The priority is to avoid further dehydration. Acid-containing bases and primers draw additional moisture from the plate and increase its tendency to bend and split, so the most neutral base available is used. A single alcohol pass is sufficient because the surface already has little moisture or oil.

3.2. Normal plate

A normal plate usually achieves adequate adhesion without extra measures. A neutral or medium-acidity base and two alcohol passes are used. Talc (drying powder) is helpful mainly to dry the cuticle area during e-file work, not for adhesion.

3.3. Oily/moist plate

The challenge is that the plate continues to release moisture and lipids after preparation. Two measures address this. First, each nail is cleansed twice with alcohol and the base is applied to that nail at once, before moving to the next one, so the plate has no time to release moisture under the base. Second, adhesion is raised in steps: a medium-acidity base first, a high-acidity base for marked moisture, hyperhidrosis, or recurrent lifting, and a dehydrator or a primer limited to the free edge when lifting persists. A low-acidity base is not used on this type, because it typically fails to hold. A high-acidity base is not a poor material; it is a tool for a specific plate. Its working limit is an indicator reading of about 3, used only on oily/moist plates and with caution; products reading about 1–2 are too aggressive for professional use in this method. The governing principle is the lowest level of adhesion that the plate actually needs.

3.4. Base coat layer

For all types, the base is applied in a thin layer and must be elastic. It acts as a cushion between the natural plate and the harder structural gel, absorbing the plate's movement and reducing stress at the interface.

3.5. Layer placement

The method also defines where each layer begins, because starting every layer at the same point creates unnecessary thickness near the cuticle and brings product into contact with the skin.

- Base: covers the entire natural plate in a thin, even layer and is fully cured.
- Structural (hard) gel: begins about 0.5 mm farther from the cuticle than the base, so that it is always fully supported by the base.
- Color and top coat: applied thinly and slightly closer to the cuticle.
- No uncured product may touch the skin.

After the structural gel is fully cured, the natural free edge is removed from underneath the enhancement. This reduces movement between the natural nail and the coating, which the author considers a common source of separation, while the hyponychium and sidewall support are left intact.

4. Material Testing

4.1. Testing materials before use

Because labels do not reliably describe a product's cured behavior, the method requires a comparative bending test for every new base before it is used on clients. The procedure is as follows:

1. Apply each base to a smooth test surface or a nail form in an equal working layer up to 1 mm thick, close to the thickness used in an actual service. Keep length, width, and thickness of all samples as consistent as possible, since a thicker sample will resist bending more and distort the comparison.
2. Cure each sample fully in a compatible lamp for the manufacturer's recommended time.
3. Leave the samples until the next day. Immediately after curing, the material is still warm and more flexible; testing after all samples have cooled to room temperature gives a consistent comparison.
4. Bend each sample and record how easily it bends, how much resistance it provides, how far it bends before visible changes appear, and whether white stress lines, cracks, or a complete break occur.

A flexible base bends easily with minimal resistance. A medium-flexibility base bends with somewhat more resistance. A strong or hard base resists noticeably and holds its shape; if it is brittle, strong bending produces stress lines, cracks, or a break. The result places the product in one of the three flexibility categories and determines which plate types it suits. The acidity grade of each base is assessed separately (Section 4.2). Structural gels are tested in the same way.

4.2. Assessing acidity: ingredient analysis and comparative indicator test

The acidity grade of a base is assessed in two stages, followed by observation during wear.

Stage 1: ingredient analysis

The ingredient list is sorted into six groups: free acids; acid-functional (polymerizable) monomers; standard acrylate and methacrylate monomers; oligomers and polymers; photoinitiators; and supporting ingredients. Free acids (for example, acrylic or phosphoric acid) and acid-functional monomers (for example, phosphate methacrylates) are potential sources of acidity, as are trace residual acids in raw materials. Methacrylate esters such as HEMA or HPMA are monomers, not free acids, and the number of monomers listed does not indicate acidity. The label is therefore only the first stage.

Stage 2: comparative indicator test

Because base gels are non-aqueous, an aqueous sample is prepared for each product in the same way: the product is applied to a test surface in a normal working layer, the thickness used on a natural nail, and left uncured; one drop of distilled water is placed on it, and a standard commercially available universal pH indicator strip is applied to the drop. The color is read within 2–3 seconds, before the water is absorbed or evaporates. Twelve commercially available bases were tested on 5 August 2026; eight were tested twice and four once. All products are prepared under identical conditions, so the result is a relative comparison of acidic response between products, not a pH measurement of the gel itself or of its effect on the nail.

Table 2. Preliminary comparative indicator results for twelve commercial base gels (author's tests, 5 August 2026; eight products tested twice, four once; - = not repeated). Figure 1 shows the test setup.

Product (as labeled)	Test 1	Test 2	Working grade
PNB ExtraPRO Base	~6	~6	Low
LINTO Base Frame	~6	~6	Low
Akzentz Prescription Base Super-Bond	~6	~6	Low (by indicator)
Fzanest colored cover base	~6	—	Low
LINTO colored cover base, white	~6	—	Low
GelPoint base	~4–5	~4	Medium
KOKOIST Mega Stick	~4	~4	Medium
American Creator Base Gel	~3–4	~3	Medium, upper range
Neo Base Gel	~3	—	High (working maximum)
KOKOIST Platinum Filler Base	~2–3	~2–3	Excluded from the author's practice
In.Hype Base	~2–3	~2–3	Excluded from the author's practice
The Master base gel	~2–3	—	Excluded from the author's practice

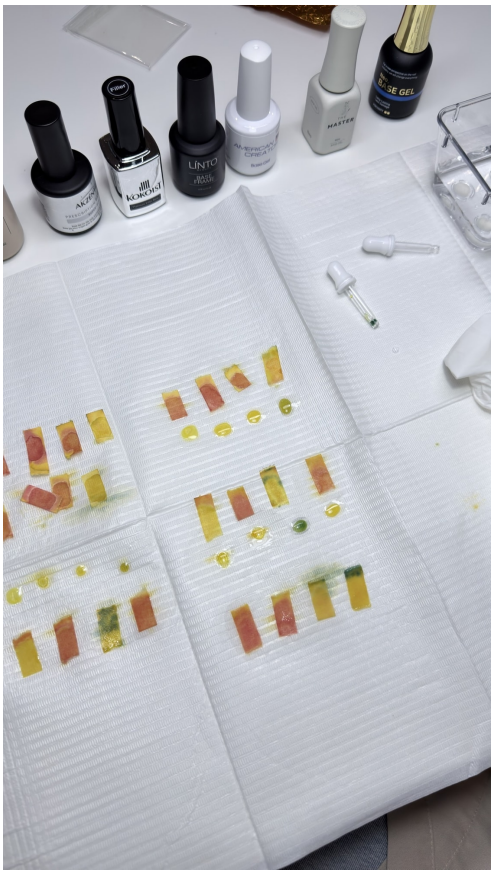


Figure 1. Comparative indicator test of base gels, 5 August 2026: tested products (top) and indicator strips with aqueous samples (one drop of distilled water on uncured base).

The Akzentz result illustrates why the indicator test is not used alone. The product is marketed for oily nails and extreme lifting and lists acrylic acid and maleic anhydride, yet its aqueous sample read near 6. Adhesion depends on the whole system: adhesive monomers, the polymer base, wetting of the nail surface, and chemical interaction with the plate, while the indicator reflects only what migrates into water. The final grade of a product is therefore assigned from the ingredients, the manufacturer's intended use, the indicator result, the

cured behavior (Section 4.1), and the client's wear results. The author also gives preference to products with complete labeling, an available Safety Data Sheet, and clear curing instructions.

5. Discussion

The Nail Integrity Method moves the main decision of a gel service from the product to the plate. Its practical value lies in two effects. It reduces unnecessary chemical exposure, because acidity and auxiliary liquids are used only on the plate type that needs them. It also gives technicians a structured response to lifting: instead of escalating to stronger primers, the technician re-examines the plate type and the preparation sequence.

In the Nail Integrity Method, acid-free or lowest-acidity products remain the default for dry and normal plates. Higher-acidity bases and a primer limited to the free edge are reserved for oily/moist plates with marked moisture or a history of lifting, where repeated lifting and re-application would otherwise cause more cumulative damage than a limited, targeted increase in acidity. Products whose aqueous sample reads about 1–2 on the indicator are considered too aggressive and are excluded for all types; a reading of about 3 is the working maximum.

The method is also suited to teaching. Its indicators are observable without instruments, and the decision table can be learned in a single session. The author teaches it in in-person courses at her academy and presented its application protocol for liquid hard gel, including the layer placement rules in Section 3.5, in a hands-on class with a printed guide at Utah Nail Expo (Provo, Utah) in September 2026.

5.1. Limitations

This paper describes a protocol derived from professional experience and does not report a controlled clinical study. The type indicators are qualitative and depend on the technician's judgment; inter-rater agreement has not been measured. The indicator results in Table 2 are preliminary: universal strips give approximate values, the sample volume (one drop) and reading time are small and were not measured precisely, each product was tested at most twice, the aqueous extraction reflects only components that migrate into water, and the results describe a relative comparison between products, not the pH of the cured gel or its effect on the nail plate. Product formulas may change between batches. The interpretation of pinpoint micro-lifting as moisture released under the coating is a practitioner hypothesis that requires verification.

5.2. Directions for further research

Four studies would test the method: repetition of the comparative acidity test with a calibrated pH meter, a standardized extraction protocol, and more products; an agreement study in which several trained technicians type the same clients independently; a prospective comparison of lifting rates and plate condition over 8–12 weeks between clients served with the method and with a single standard protocol; and an evaluation of whether training in the method changes technicians' product choices.

6. Conclusion

The Nail Integrity Method offers technicians a simple sequence: assess the plate's type and current condition, decide whether to proceed, modify the service, or postpone it, and then choose base acidity and flexibility, preparation, auxiliary liquids, and structural gel accordingly, using only products whose behavior has been tested. The preliminary indicator tests show that commercial bases differ widely in acidic response and that marketing claims do not predict it, which supports testing each product rather than relying on its label.

Controlled evaluation is the next step.

Declarations

Acknowledgments. An AI writing assistant (Claude, Anthropic) was used to help structure and edit the English text of this manuscript, based on the author's own description of the method. The author reviewed all content and takes full responsibility for it.

Conflict of interest. The author is the owner of Tory Pro Nails Studio and Academy, where the method is taught, and a brand ambassador of GelPoint professional nail materials. One GelPoint base was included in the comparative tests (Table 2) and was tested under the same conditions as all other products. The author has no financial relationship with the manufacturers of the other products tested.

Ethics statement. This study did not involve human participants or animals. It describes the author's professional protocol and reports comparative tests performed on commercially available products; no client data were collected. Ethical approval was therefore not required.

Data availability. The original records of the indicator tests (photographs and the author's dated notes of 5 August 2026) are available from the author on reasonable request.

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