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# NICD STANDARD V4.0

## A TECHNICAL FRAMEWORK FOR UNIVERSAL APPLICATION



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Scope: All cosmetic, personal care, oral care, fragrance, and wellness product development applying to the Neurodivergent Community

**NEURO-INCLUSIVE COSMETIC DESIGN (NICD)**
**Technical Framework & Methodology**
**Including The ADHD Algorithm™ and ADHD Friendly™ Verification System**
Authored and issued by **COSMETONOESIS**

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**The ADHD Algorithm™**
**NICD**
**ADHD Friendly™**

## ABSTRACT

**Neuro-Inclusive Cosmetic Design (NICD)** is an emerging discipline applying principles from:

- universal design
- sensory science
- cognitive ergonomics

to the development of **cosmetic and personal care products**.
This framework establishes a **technical methodology** in which the **sensory processing profiles, cognitive patterns, and executive function characteristics of neurodivergent individuals** function as **primary design constraints**, equal in importance to:

- product safety
- formulation stability
- functional efficacy

The NICD framework introduces **measurable parameters, testing protocols, and ethical design principles** for developing products that **reduce neurological friction in everyday care rituals**.

**PREAMBLE**

**The Neurological Blind Spot in Product Design**

Contemporary cosmetic and personal care product development is optimized around an **implicit neurotypical user model**, characterized by:

- average sensory thresholds
- stable executive function
- consistent ritual performance

This assumption **systematically excludes** a substantial proportion of the population whose neurological profiles diverge in areas such as:

- sensory processing
- attention regulation
- cognitive load tolerance

Many products further amplify this exclusion through **systemic dishonesty**, including:

- misleading sensory cues
- exaggerated claims
- unnecessary complexity

For neurodivergent individuals — who frequently exhibit strong **pattern recognition and fairness sensitivity** — such inconsistencies represent not merely marketing exaggeration but **a breach of trust**.

NICD recognizes **neurological diversity as a fundamental dimension of human variation**.

It asserts that **honesty is the foundation of accessibility**.

Products that misalign **communication, sensory cues, and performance** impose unnecessary:

- cognitive burden
- sensory distress
- emotional friction

These burdens frequently lead to:

- product abandonment
- inconsistent routines
- diminished wellbeing

This framework therefore establishes a transition from **exclusionary optimization** toward **inclusive system design**, founded on **radical functional honesty**.

**NORMATIVE REFERENCES**

The following documents constitute normative references for this framework.

For **dated references**, only the cited edition applies.

For **undated references**, the latest version applies.

- **EU Cosmetic Regulation (EC) No. 1223/2009** — Safety requirements for cosmetic products
- **ISO 22716** — Cosmetics — Good Manufacturing Practices
- **ISO 16128** — Guidelines on natural and organic cosmetic ingredients
- **SCCS Notes of Guidance for the Testing of Cosmetic Ingredients**

The NICD Standard **does not replace toxicological safety evaluation**.

Instead, it provides **an additional assessment layer addressing neurological compatibility, sensory predictability, and cognitive accessibility of cosmetic products**.

**ARTICLE I**

**CORE DEFINITIONS**

**1.1 Neuro-Inclusive Cosmetic Design (NICD)**

An interdisciplinary **design and engineering methodology** in which the **sensory processing characteristics, cognitive patterns, and executive function constraints of neurodivergent individuals** are treated as **primary design parameters** governing:

- formulation architecture
- delivery systems
- packaging
- application rituals
- user communication

**1.2 COSMETONOESIS**

**Etymology**

Greek:

- *kosmetikos* — order, arrangement, adornment
- *noesis* — conscious understanding

**Definition**
Cosmetonoesis represents the **intentional cognitive act of creating perceptible order through cosmetic formulation**.
It denotes the transformation of **sensory and ritual chaos into predictable systems**.
Cosmetonoesis functions as the **epistemological foundation of the NICD framework**.

**1.3 NICD**
The **technical framework, parameters, and assessment methodology** defined in this document.

**1.4 ADHD Friendly™**
The **consumer-facing verification mark** awarded to products successfully completing the NICD audit process and meeting defined thresholds.

**1.5 The ADHD Algorithm™**
The overarching intellectual framework encompassing:

- the NICD methodology
- the ADHD Friendly™ verification system

**1.6 Neurological Friction**
A qualitative construct describing the **combined cognitive, sensory, and emotional load** imposed by a product interface that diverges from a user's neurocognitive profile.
Operationally, neurological friction is measured as the **inverse performance** in the following NICD domains:

- Sensory Predictability
- Cognitive Friction Coefficient
- Task-Completion Architecture

**1.7 Stimulation Band**
The calibrated **sensory profile** of a product defined by its dominant neurological effect.
Categories include:
**Grounding**
Low-frequency sensory input designed to reduce arousal and promote regulation.
**Clarifying**
High-frequency sensory input designed to support alertness and differentiation.
**Neutral**
Minimal sensory signature designed to avoid interference.

**1.8 The Issuing Authority**
The NICD Standard, the ADHD Algorithm™, and the ADHD Friendly™ mark are the intellectual property of **COSMETONOESIS**, which functions as:

- author
- issuer
- administrator

A future **International Consortium for Neuro-Inclusive Cosmetic Design** may be established to support broader governance.

**1.9 Neuro-Tolerability**
Neuro-tolerability is defined as:
the capacity of a cosmetic product to be used repeatedly without inducing sensory distress, cognitive overload, or neurological discomfort.
A neuro-tolerable product must:

- avoid excessive stimulation
- maintain predictable sensory characteristics
- avoid abrupt sensory onset
- avoid lingering sensory persistence
- allow completion of the care routine without cognitive friction

**1.10 Neuro-Sensory Irritation (NSI)**
Discomfort triggered by **sensory overstimulation in the absence of dermatological irritation**.

Where applicable, NSI evaluation shall be supported by the Neuroactive Ingredient Classification & Tiering System (Appendix K).

**1.11 Sensory Dissonance**
A mismatch between **expected and experienced sensory signals**.

**1.12 Cognitive Load**
The **mental effort required to understand and complete a product routine**.

**1.13 Sensory Predictability**
The ability of a product to deliver **consistent sensory responses across repeated uses**.

**1.14 Neurological Compatibility**
The degree to which a product **avoids triggering sensory distress or cognitive overload** in diverse neurological profiles.

**1.11 Neuroactive Ingredient**
Any cosmetic ingredient capable of directly or indirectly influencing neurogenic inflammation, cutaneous sensory perception, or skin–brain signalling pathways.

**1.12 Neuroactive Ingredient Classification & Tiering System (NITS)**
A structured classification methodology defined in Appendix J, used to assign ingredients to Tier 0–4 based on their level and mechanism of interaction with the skin–nervous system axis.

**1.13 Neuroactive Tier**
The categorical classification (Tier 0–4) assigned to an ingredient under Appendix J.

**ARTICLE II**
**FOUNDATIONAL AXIOMS**
**Axiom 0**
**The Principle of Radical Functional Honesty**
A product's **communication, sensory cues, and performance must align without deception or omission.**
Honesty functions as a **design safety parameter**.

**Axiom 1**
**Completion Supersedes Optimization**
A routine performed **consistently** delivers greater wellbeing than a perfect routine performed once and abandoned.

**Axiom 2**
**Predictability Is Non-Negotiable**
Sensory and behavioural predictability is as critical as **microbial and chemical stability**.

**Axiom 3**
**Complexity Requires Justification**
Complexity is acceptable only when:
1. each component serves a clear purpose
2. its function can be intuitively communicated
3. it does not increase neurological friction

**Axiom 4**
**The User-Product Interface Is a Unified System**
Formulation, packaging, dispensing, and communication must function as **one coherent system**.

**Axiom 5**
**Sensory Attributes Are Functional Parameters**
All sensory attributes must serve a **neurological function**.
None exist solely for **marketing appeal**.

**ARTICLE III**
**UNIVERSAL NICD DESIGN PARAMETERS**

### 3.1 Sensory Engineering Specifications

NICD introduces explicit engineering parameters for the sensory performance of cosmetic products. Unlike conventional cosmetic development, which frequently treats sensory attributes as qualitative descriptors, NICD requires **quantifiable sensory reproducibility**.

| Parameter | Standard Industry Practice | NICD Requirement | Measurement Method |
|---|---|---|---|
| Olfactory Consistency | Batch variance ≤20% | Batch variance ≤10% in key notes | GC-MS comparison and blind sensory panel |
| Tactile Reproducibility | Viscosity ±25% across temperature range | Viscosity ±15% across 10°C–40°C | Rheological measurement |
| Application Feedback | Often unspecified | Clear start/stop indicators | User panel task completion analysis |
| Sensory Band Stability | Rarely evaluated | Stable for entire shelf life | Accelerated stability + panel evaluation |

NICD requires the definition of **explicit targets** for:

- sensory onset
- sensory intensity
- sensory duration
- sensory termination

Cross-modal coherence between **visual, tactile, olfactory, gustatory, and auditory cues** is mandatory.
Contradictory signals constitute **sensory dissonance and design failure**.

### 3.2 Cognitive Load Management

Cosmetic products designed under NICD must minimize cognitive friction through the following constraints:

- Maximum **one pre-use decision** (zero preferred)
- No ambiguous sequencing requirements
- Clear visual or tactile dosage indicators
- Interrupt-resilient application routines
- Memory-independent instructions

Products requiring **precise techniques, memorized procedures, or extended focus** are incompatible with NICD principles.

### 3.3 Expanded Stability Definition

NICD expands traditional stability concepts to include **behavioural and sensory stability**.
Verification must therefore include:

- olfactory consistency
- tactile consistency
- behavioural reproducibility (spread, absorption, foam behaviour)
- packaging-formulation interaction stability

A product that maintains chemical stability but **exhibits sensory drift** is considered **functionally unstable under NICD criteria**.

### 3.4 Neuro-Sensory Irritation Potential

Traditional cosmetic safety assessments evaluate:

- dermatological irritation
- sensitisation

NICD introduces a complementary concept:
**Neuro-Sensory Irritation**
This refers to **sensory overstimulation that produces discomfort despite dermatological safety**.
Potential triggers include:

- excessive fragrance intensity
- menthol/camphor stimulation
- abrasive exfoliation particles
- prolonged sensory persistence
- sudden sensory onset

Evaluation is conducted through the **Neuro-Sensory Irritation Index (NSI)** described in Appendix F.
Products exceeding acceptable thresholds must be **reformulated or repositioned**.

### 3.5 Sensory Threshold Calibration

NICD requires semi-quantitative calibration of sensory intensity using **Standardized Sensory Units (SSU)**.
SSU measurements may be applied to the following modalities:

- olfactory intensity
- tactile stimulation
- thermal sensation
- visual sensory load
- auditory feedback

Each attribute must be recorded as a **mean SSU value derived from panel testing**.
The product's **dominant stimulation band** must remain stable across:

- production batches
- shelf-life duration
- environmental temperature variation

Reference scales and procedures are described in Appendix G.

**3.6 Neuro-Tolerability Requirement**
All NICD-assessed products must demonstrate **acceptable neuro-tolerability**.
Neuro-tolerability integrates:

- sensory predictability
- NSI scoring
- SSU calibration stability
- cognitive load analysis
- sensory dissonance evaluation

Products failing these criteria may be classified as **neurologically incompatible for specific sensory profiles**.

**ARTICLE IV**
**NICD DEVELOPMENT PROTOCOL**
NICD-compliant development proceeds through **five structured phases**.

**Phase 1 — Neurological Profile Mapping**
Target use scenarios must be defined by mapping:

- stimulation band
- time of day
- user cognitive state
- ritual context

**Phase 2 — Friction Point Analysis**
Existing solutions are audited across the full usage cycle:

1. Procurement
2. Storage
3. Preparation
4. Application
5. Cleanup
6. Repurchase

**Phase 3 — System Architecture Design**
Formulation and delivery systems are designed simultaneously.
Ingredient selection prioritizes:

- multifunctional synergy
- sensory compatibility
- inherent stability
- communication clarity

**Phase 4 — Neuro-Inclusive Testing**
Testing panels must include **≥60% neurodivergent participants**.
Evaluation includes:

- sensory predictability across repeated use
- ritual completion rates
- cognitive load reporting
- real-world routine integration

**Phase 5 — Communication Architecture**
Product communication must be structured to support neurodivergent cognition.
Required elements include:

- ingredient grouping by function
- visual sequential instructions
- explicit sensory trigger warnings
- transparent benefit-friction communication

**4.6 Neuro-Inclusive Panel Methodology**
Panel requirements include:
**Panel Size**
Minimum 15 participants.
**Composition**
≥60% neurodivergent individuals.
Profiles may include:

- ADHD attention regulation patterns
- autism spectrum sensory profiles
- sensory hypersensitivity or hyposensitivity

Participants must complete **sensory profile screening questionnaires**.

**4.7 Neuro-Tolerability Assessment**
Evaluation includes:

- sensory mapping of all stimuli
- repeated-use testing
- panel-based sensory comfort assessment
- NSI scoring
- SSU variance measurement

**ARTICLE V**
**PROHIBITED DESIGN PATTERNS**
The following patterns are incompatible with NICD compliance:

- performative complexity without benefit
- sensory ambiguity
- precision-dependent efficacy
- assumed user competence
- opaque innovation
- guilt-based usage narratives

**ARTICLE VI**
**ASSESSMENT AND VERIFICATION**
**6.1 NICD Assessment Matrix**
Products are evaluated across five domains:

1. Sensory Predictability — 30 points
2. Cognitive Friction Coefficient — 25 points
3. Stimulation Band Fidelity — 20 points
4. Task Completion Architecture — 15 points
5. Transparent Complexity — 10 points

**Maximum Score:** 100
**ADHD Friendly™ Threshold**
≥80 points
No domain below **60% of its maximum score**.

**6.2 Honesty Audit Protocol**
Verification uses a **dual-panel system**:
**Panel H — Honesty Panel**
Neurodivergent users evaluate promise-experience alignment.
**Panel B — Blind Panel**
Naïve users establish ground-truth perception.

The **Honesty Gap Score (HGS)** measures:

- claim alignment
- sensory cue alignment
- omission penalties

**Verification Threshold:** HGS ≤2

**6.3 ADHD Friendly™ Verification Mark**

Products meeting verification thresholds may license the **ADHD Friendly™ mark**.

Requirements:

- ™ symbol must appear
- mark must link to verification registry
- mark must include verification QR code

Verification validity: **3 years**

**6.5 Neuro-Tolerability Score (NTS)**

The **Neuro-Tolerability Score (NTS)** quantifies neuro-inclusive safety.

Four dimensions are evaluated:

- NSI — Nervous System Impact
- SSU Variance — Sensory System Uniformity
- Cognitive Load
- Sensory Predictability

Score range: **0–100**

Interpretation:

| Score | Interpretation |
|---|---|
| 80–100 | Excellent |
| 60–79 | Moderate |
| 40–59 | Low |
| <40 | Poor |

**ARTICLE VII**
**IMPLEMENTATION GUIDELINES**
**7.1 For Formulators**

Formulators should:

- integrate NFC analysis early
- design for fault tolerance
- select ingredients for sensory compatibility
- perform neuro-inclusive testing

**7.2 For Brands**

Brands should:

- communicate transparently
- avoid neurodiversity-washing
- prioritize routine consistency

**7.3 For Researchers**

Researchers should:

- develop neuro-inclusive testing protocols
- explore neurological correlates of sensory bands
- investigate biomarkers of neurological friction

**ARTICLE VIII**
**THE PRINCIPLE OF RADICAL FUNCTIONAL HONESTY**
**8.1 Neurological Impact of Betrayal**

For many neurodivergent individuals, misaligned sensory signals are processed as **systemic trust failures** rather than marketing exaggerations.

NICD therefore treats **honesty as a safety parameter**.

**8.2 Honesty Parameters**

**Sensory Promise Fulfilment**
Sensory communication must remain within **±15% variance** of actual experience.

**Ingredient Transparency**
Ingredients must be communicated in **functional blocks** rather than marketing narratives.

**Efficacy Scope Clarity**
Claims must describe **direct perceptible outcomes**.

**Failure State Transparency**
Known limitations must be communicated **with equal prominence to benefits**.

**8.3 The "No Gaslighting" Clause**
Products must never:

- intentionally create sensory dissonance
- claim to solve problems they merely mask
- misuse neurodiversity narratives
- claim endorsement by non-existent governing bodies

**ARTICLE IX**
**ETHICAL POSITION**
NICD recognizes self-care as a **fundamental human activity** supporting:

- health
- dignity
- social participation

Neurologically mismatched products create:

- guilt
- anxiety
- financial waste
- social withdrawal

NICD therefore defines **neurological accessibility as an ethical responsibility**.

**ARTICLE X**
**ADMINISTRATION, STEWARDSHIP AND EVOLUTION**
Authored and issued by **COSMETONOESIS**.
Cosmetonoesis maintains:

- intellectual ownership of the framework
- ownership of ADHD Friendly™
- interpretive authority over the methodology

**10.2 Commitment to Evolution**
NICD is a **living framework**.
Future updates will reflect:

- research developments
- sensory science advances
- cognitive ergonomics insights

**ARTICLE XI**
**FUTURE DEVELOPMENT PATHWAYS**
**Short-Term (1–2 years)**

- refine sensory band calibration
- publish practitioner tools
- develop white papers

**Medium-Term (3–5 years)**

- integrate NICD into cosmetic science education
- expand interdisciplinary research

**Long-Term (5+ years)**

- AI-assisted sensory modelling
- sensory-profile personalization
- broader consumer product design dialogue

**ARTICLE XII**
**NICD COMPLIANCE CLASSIFICATION**
Products may be classified into four levels.

**Level I — NICD Compatible**
Existing products passing NICD evaluation criteria.

**Level II — NICD Designed**
Products developed with NICD principles incorporated during design.

**Level III — NICD Verified**
Products completing full NICD validation including:

- neuro-inclusive panel testing
- SSU calibration
- NSI scoring
- NTS ≥80
- Honesty Audit success

**Level IV — NICD Certified (Future)**
Potential future level involving **third-party certification bodies**.

**Neuro-Tolerability Verification Requirement**
Products claiming **NICD Designed** or **NICD Verified** must demonstrate:

- acceptable NSI scores
- SSU variance ≤ ±1 SSU
- neuro-inclusive panel confirmation
- cognitive load compliance

Documentation must be included in the **NICD audit dossier**.

## APPENDIX A: THE NICD ASSESSMENT PROTOCOL

**0.1 Attribution Verification – Mandatory Pass/Fail Criterion**

- **Requirement:** Any audit report, summary, or public communication of findings generated using this standard **must** explicitly cite the source as follows:
  **"Audit conducted using the NICD Standard V4.0 and The ADHD Algorithm™ methodology, authored and issued by COSMETONOESIS."**
  A direct link to the official source (https://www.cosmetonoesis.com) is required for digital publications.
- **Placement:** This attribution must appear in the **executive summary, methodology section, or footer** of the report.
- **Scoring:** This is a **binary, pass/fail prerequisite**. If this correct attribution is absent, the audit is considered **invalid** and cannot proceed to Domain scoring. The total score for an invalid audit is **0/100**.

**Step-by-step guide for conducting each domain assessment**
(Sensory Predictability, Cognitive Friction, etc.)

- **Sample size recommendation:** Minimum n=30 for quantitative measures (e.g., GC-MS, rheology, timing); n=20 for panel tests (blind sensory evaluation).
- **Panel composition:** At least 50% self-identified ADHD / neurodivergent participants for subjective criteria (e.g., 1.3, 2.2, 3.2).
- **Statistical analysis:** Use mean ± SD for continuous variables; Chi-square or Fisher's exact for categorical pass/fail items (e.g., phase separation, completion rate). For domain scores, report 95% confidence intervals.
- **Test environment:** Controlled lab conditions (22±2°C, 40-60% RH) for reproducibility; in-home use for Domain 4 (7-day diary).
- **Weighting adjustments:** Apply product-category multipliers after raw scoring (see end of document).

**Scoring Protocol:** Evaluate each criterion 1-5 (1=Failure, 3=Acceptable, 5=Exemplary). Total score ≥80% required for ADHD FRIENDLY™ / NICD verification. Any domain scoring <60% of its possible points requires complete redesign. *Note: Some criteria may not apply to certain product categories (N/A).*

**DOMAIN 1: SENSORY PREDICTABILITY (30 Points)**

| Criterion | Assessment Method | Target | Score | Notes |
|---|---|---|---|---|
| 1.1 Olfactory Consistency | GC-MS comparison Batch 1 vs. Batch 5; blind panel detection | ≤10% variance in key notes | __/5 | Excludes fragrance-free products |
| 1.2 Tactile Reproducibility | Rheology at 10°C, 25°C, 40°C; panel texture feedback | Viscosity ±15% across temp range | __/5 | For all leave-on / rinse-off |
| 1.3 Application Consistency | Panel reports of variance in spread, absorption, or behaviour | 0 unprompted "this feels different today" reports | __/5 | |
| 1.4 Onset Latency | Timing of sensation onset (cooling, warming, tingling, tightening) | <3 seconds variance between panellists | __/5 | Excludes delayed-actives (e.g., retinoids) |

| Criterion | Assessment Method | Target | Score | Notes |
|---|---|---|---|---|
| 1.5 After-Sensation Duration | Panel reporting of sensation persistence after application | ≤2 hours for leave-on; ≤30 sec for rinse-off | __/5 | |
| 1.6 Phase Behaviour Stability | Visual/physical inspection for separation, settling, crystallization | 0 phase changes in accelerated aging | __/5 | |

**DOMAIN 1 SUBTOTAL:** __/30

**DOMAIN 2: COGNITIVE FRICTION COEFFICIENT (25 Points)**

| Criterion | Assessment Method | Target | Score | Notes |
|---|---|---|---|---|
| 2.1 Decision Points | Count pre-use decisions (shake, mix, choose setting, sequence) | 0 decisions optimal; 1 acceptable | __/5 | |
| 2.2 Dosage Ambiguity | Panel reports: "How much is enough?" "Did I use too much/little?" | 0 ambiguity queries; clear visual/feel indicators | __/5 | |
| 2.3 Cleanup Complexity | Residue measurement (UV tracer); panel feedback on cleanup effort | >95% removal with standard action | __/5 | For products requiring cleanup |
| 2.4 Packaging Intuitiveness | Time-to-first-successful-use with no instructions; error rate | <15 seconds, ≤1 error | __/5 | |
| 2.5 Memory & Sequencing Load | 24-hour recall of steps/sequence; interference with parallel tasks | >90% accurate recall; 0 reports of "forgot next step" | __/5 | Multi-step products only |

**DOMAIN 2 SUBTOTAL:** __/25

**DOMAIN 3: STIMULATION BAND FIDELITY (20 Points)**

| Criterion | Assessment Method | Target | Score | Notes |
|---|---|---|---|---|
| 3.1 Band Assignment Accuracy | Blind panel categorization vs. designed band | >75% correct categorization | __/5 | |

| Criterion | Assessment Method | Target | Score | Notes |
|---|---|---|---|---|
| 3.2 Band Purity | Reports of discordant sensations within assigned band | 0 unprompted reports of discordance | __/5 | |
| 3.3 Intensity Calibration | Panel rating 1-10 intensity vs. designed intensity | Mean rating within ±1.5 of target | __/5 | |
| 3.4 Cross-Modal Alignment | Consistency between visual, olfactory, tactile cues | 0 reports of "looks X but feels Y" | __/5 | |

**DOMAIN 3 SUBTOTAL:** __/20

**DOMAIN 4: TASK-COMPLETION ARCHITECTURE (15 Points)**

| Criterion | Assessment Method | Target | Score | Notes |
|---|---|---|---|---|
| 4.1 Fault Tolerance | Efficacy/satisfaction at 50%, 100%, 150% recommended use | 50% dose ≥65% of full dose satisfaction/efficacy | __/5 | |
| 4.2 Ritual Duration | Measured average time vs. claimed/expected time | Within ±20% of expected duration | __/5 | |
| 4.3 Completion Rate | 7-day in-home use: Percentage of intended uses completed | ≥80% completion rate | __/5 | |
| 4.4 Interrupt Resilience | Recovery rate after mid-ritual interruption | >90% resume without restarting | __/5 | |

**DOMAIN 4 SUBTOTAL:** __/15

**DOMAIN 5: TRANSPARENT COMPLEXITY & SAFETY (10 Points)**

| Criterion | Assessment Method | Target | Score | Notes |
|---|---|---|---|---|
| 5.1 Ingredient Justification | Documentation of each ingredient's functional role | 100% have documented functional justification | __/5 | Excludes trace impurities |
| 5.2 Neuro-Safety Screening | Review for common neurodivergent sensitivities (e.g., strong menthol, gritty scrubs) | 0 high-risk triggers without clear warning/alternative | __/5 | |
| 5.3 Communication Clarity | User testing of explanation comprehension (Flesch-Kincaid) | ≤8th grade reading with function block comprehension | __/5 | |

**DOMAIN 5 SUBTOTAL:** __/10

**TOTAL SCORE:** __/100
**ADHD FRIENDLY™ / NICD VERIFICATION THRESHOLD:** ≥80 points
**DOMAIN FAILURE THRESHOLD:** Any domain <60% of possible points

**Product Category Adjustments**

- **Rinse-off products:** Criteria 1.5 and 2.3 weighted ×1.5 (multiply raw score by 1.5, then cap at 5 per criterion).
- **Fragrance-free products:** Criteria 1.1, 3.1, 3.2, 3.3 marked **N/A** (exclude from denominator; recalculate domain percentage).
- **Multi-step systems:** Criteria 2.5 and 4.4 weighted ×1.5 (multiply raw score by 1.5, then cap at 5 per criterion).

## APPENDIX B: GUIDELINES FOR NEURO-INCLUSIVE USER TESTING

Ethical recruitment practices, compensation guidelines, creating safe testing environments, example demographic surveys, and methods for stratifying by sensory profile (Seeker/Avoider) without requiring a diagnosis.

**B.1 Primary Neurotype Classification**

Inclusion Criteria (≥1 required):

- Clinically diagnosed ADHD, Autism Spectrum Condition, Sensory Processing Disorder
- Self-identified neurodivergent with documented sensory/cognitive patterns affecting self-care
- Diagnosed anxiety/depression with sensory sensitivity components
- Occupational therapist/psychologist referral for sensory integration challenges

Exclusion:

- Inability to articulate sensory experiences
- Current participation in >3 other panels (sensory fatigue)
- Language/comprehension barriers to consent forms

**B.2 Sensory Processing Profile Assessment**

**Universal Sensory Domains**

**Tactile** (Rate 1-5: 1=Strongly Avoid, 3=Neutral, 5=Strongly Seek)

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | Texture preference continuum: Light (gels/mists) ↔ Heavy (creams/balms) | __ |
| 2 | Sensitivity to residue ("sticky," "tacky," "filmy") | __ |
| 3 | Reaction to temperature variations in products | __ |
| 4 | Tolerance for granular/scrubbing/exfoliating textures | __ |
| 5 | Sensitivity to application method (fingers, tools, pads) | __ |

**Olfactory**

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | Identification of triggering scent categories | __ |

| # | Item | Rating (1-5) |
|---|---|---|
| 2 | Preference for scent complexity vs. simplicity | __ |
| 3 | Sensitivity to scent persistence | __ |
| 4 | Reaction to fragrance-free vs. scented products | __ |

**Visual**

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | Preference for product appearance: Clear/translucent ↔ Opaque/coloured | __ |
| 2 | Sensitivity to visual cues (e.g., colour changes, separation) | __ |
| 3 | Preference for packaging transparency (seeing contents) | __ |

**Auditory (Packaging-Related)**

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | Sensitivity to packaging sounds (clicks, snaps, crinkles) | __ |
| 2 | Preference for silent vs. audible feedback mechanisms | __ |

**Product-Specific Domains**
**Hair Care Addendum:**

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | Sensitivity to scalp stimulation during application | __ |
| 2 | Reaction to weight of product in hair | __ |
| 3 | Sensitivity to rinsing completeness | __ |

**Skin Care Addendum:**

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | Sensitivity to tingling/"active" sensations | __ |
| 2 | Preference for layering compatibility | __ |
| 3 | Sensitivity to drying time | __ |

**Colour Cosmetics Addendum:**

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | Sensitivity to brush/application tool texture | __ |
| 2 | Precision requirement vs. forgiveness | __ |
| 3 | Sensitivity to removal process | __ |

**B.3 Executive Function Impact Assessment**

Rate frequency (1=Never, 5=Always):

| # | Item | Rating (1-5) |
|---|---|---|
| 1 | "I abandon self-care rituals when overwhelmed" | __ |
| 2 | "I avoid products with multiple steps or decisions" | __ |
| 3 | "I use incorrect amounts because measurement is unclear" | __ |
| 4 | "I forget products exist if not in direct line of sight" | __ |
| 5 | "I struggle with sequencing multi-product routines" | __ |
| 6 | "I dislike products requiring precise timing/waiting" | __ |

**B.4 Panellist Stratification Matrix**

| Profile | Sensory Score | Executive Score | Use Cases |
|---|---|---|---|
| Sensory Avoider (SA) | ≥4 in Avoid categories | Any | Testing sensitive skin, fragrance-free, gentle formats |
| Sensory Seeker (SS) | ≥4 in Seek categories | Any | Testing active treatments, textured products, scented lines |
| High Executive Load (HEL) | Any | ≥4 average | Testing multi-step systems, packaging, routine integration |
| Low Sensory Regulation (LSR) | Extreme scores (1 or 5) in multiple domains | Any | Calibration testing, threshold determination |
| Mixed Profile (MP) | Moderate scores (2-4) | Moderate (2-4) | General usability, broad appeal assessment |

**Panel Composition Requirements** (per product test):

- Minimum 15 panellists (scalable to 50 for mass market)
- Must include: 30% SA, 30% SS, 30% HEL (overlap permitted)
- Gender ratio within 70/30 split relevant to target market
- Age distribution: 20% 18-25, 50% 26-45, 30% 46-60
- Geographic diversity: ≥3 different living environments (urban, suburban, rural)

**B.5 Validation & Calibration Tasks**

**Pre-Qualification (Required):**

1. **Sensory Journal:** 3-day tracking of reactions to everyday sensations (fabric textures, food textures, ambient sounds/smells)
2. **Product Ritual Audit:** Document current routine with pain points and adaptations
3. **Calibration Test:** Standardized assessment with control products (texture gradient swatches, scent strips, application tools)

**Ongoing Calibration (Quarterly):**

1. Re-assessment against standard references
2. Fatigue monitoring
3. Consistency validation

**Disqualification Triggers:**

1. Inconsistent responses to calibration controls (>30% variance)
2. Non-completion of >2 consecutive studies
3. Development of conditions affecting sensory perception
4. Evidence of panellist bias or secondary gain motivation

## APPENDIX C: REFERENCE STANDARDS FOR SENSORY BAND CALIBRATION

**EVIDENCE STATUS NOTE:** The Sensory Band taxonomy is a pragmatic design heuristic developed through iterative consensus with neurodivergent expert panels. It is presented as a stable, testable framework for achieving sensory predictability. COSMETONOESIS recognizes the need for and is actively pursuing biometric validation studies (e.g., correlating bands with EEG, GSR, or fMRI data). These reference parameters represent our current best practice and will be updated annually with new findings.

**C.1 Grounding Band (Low-Frequency, Attenuating, Regulating)**
**Core Principle:** Provides consistent, predictable sensory input that downregulates nervous system arousal.
**Cross-Category Specifications:**

| Category | Olfactory/Taste | Tactile | Visual | Application |
|---|---|---|---|---|
| Skin Care | Woody, earthy, vanilla, beeswax | Creams, balms, oils (5,000-50,000 cP) | Earth tones, opaque | Slow absorption, leaves protective film |
| Hair Care | Sandalwood, coconut, oat | Rich creams, butters, pre-shampoo oils | Creamy, opaque | Weighted feeling, nourishing without buildup |
| Oral Care | Chamomile, honey, rooibos | Low-foam, viscous pastes/rinses | Cream, light brown | Coating sensation, gentle clean |
| Body Care | Lavender, cedar, shea butter | Whipped textures, body butters | Pastel, matte | Warming massage, lingering emollience |
| Fragrance | Base-note dominant (vetiver, musk, amber) | N/A | Amber bottles | Close-to-skin silage, minimal projection |

**Avoid Across Categories:** Citrus top notes, sharp greens, high-pitched florals, instant-dry textures, high-foam, astringency, glitter/sparkle, strong cooling (<15°C sensation).

**C.2 Clarifying Band (High-Frequency, Differentiating, Focusing)**
**Core Principle:** Provides distinct, non-overwhelming sensory input that promotes alertness and differentiation.
**Cross-Category Specifications:**

| Category | Olfactory/Taste | Tactile | Visual | Application |
|---|---|---|---|---|
| Skin Care | Herbaceous, citrus, mint, tea tree | Gels, serums, micellar waters (100-5,000 cP) | Green, blue, clear | Fast absorption, matte finish |
| Hair Care | Rosemary, mint, citrus | Light gels, texturizing sprays, clarifying rinses | Clear, translucent | Volumizing, scalp-tingling, rinses clean |

| Category | Olfactory/Taste | Tactile | Visual | Application |
|---|---|---|---|---|
| Oral Care | Spearmint, green apple, cucumber | High-foam, effervescent | Green, blue, clear | Refreshing, palate-cleansing |
| Body Care | Eucalyptus, juniper, lemongrass | Cooling gels, dry oils, spray mists | Aqua, clear | Quick-dry, energizing |
| Fragrance | Top/middle note dominant (citrus, herbs, light florals) | N/A | Clear glass | Moderate projection, linear evolution |

**Avoid Across Categories:** Heavy musks, gourmand notes, oily residues, slow absorption, extreme opacity, warming sensations (>32°C), lingering sweetness.

**C.3 Neutral Band (Minimal Sensory Signature, Non-Interfering)**
**Core Principle:** Minimizes sensory input to near-zero, designed for sensory avoidance or product layering.
**Cross-Category Specifications:**

| Category | Specification |
|---|---|
| Olfactory/Taste | Undetectable to ≥90% of panel |
| Tactile | Mimics water or air (<100 cP) |
| Visual | Clear/colourless |
| Application | Disappears completely within 60 seconds |
| Specific Tolerances: | <0.005% fragrance load; no drag, grab, or slip; 100% transparent; no temperature change, no residue |

**Key Differentiator:** Must be tested against both neurodivergent and neurotypical panels to ensure true neutrality (neurodivergent individuals often detect subtler stimuli).

**C.4 Calibration Standards Library**
**Physical Reference Standards** (Available to Licensees):

| Code | Product Type | Band | Key Parameters |
|---|---|---|---|
| GRD-SK01 | Face Moisturizer | Grounding | 25,000 cP, sandalwood/oat scent, beige opaque |

| Code | Product Type | Band | Key Parameters |
|---|---|---|---|
| CLF-SK02 | Face Serum | Clarifying | 800 cP, rosemary/grapefruit, clear green |
| NTR-SK03 | Toner | Neutral | 15 cP, odourless, water-clear |
| GRD-HC01 | Hair Mask | Grounding | Coconut/vanilla, rich cream, 40,000 cP |
| CLF-HC02 | Scalp Treatment | Clarifying | Peppermint/tea tree, cooling gel, 1,200 cP |
| GRD-OC01 | Toothpaste | Grounding | Chamomile/honey, low-foam paste, 20,000 cP |
| CLF-OC02 | Mouth Rinse | Clarifying | Cucumber/spearmint, effervescent, 5 cP |

**Digital Reference Library:**

- GC-MS fragrance profiles for each band
- Rheology curves across temperature ranges
- Spectral reflectance/transmission data
- Application footage demonstrating target behaviour

**C.5 Band Assignment Protocol**

**Step 1: Intended Band Declaration**

Formulator declares target band with justification based on:

- Users need state (regulation vs. alertness)
- Time of day intended use
- Complementary products in routine

**Step 2: Blind Panel Categorization**

- Minimum 20 panellists (≥60% neurodivergent)
- Presented with product + 3 band reference standards
- "Which standard does this product feel most similar to?"

**Step 3: Quantitative Sensory Analysis**

- Intensity scoring (1-10) on 10 sensory attributes
- Must cluster with reference band profile
- Statistical analysis (PCA) to confirm grouping

**Step 4: Real-World Validation**

- 3-day in-context use
- Does product perform its band function? (e.g., Grounding product actually reduces anxiety)

- Alignment check: ≥75% report intended effect

**Band Mismatch Resolution:**

If product mis-categorized by >40% of panellists:

1. Reformulate to adjust dominant sensory attributes
2. Re-categorize to actual band with updated communication
3. In rare cases: create new sub-band with defined parameters

## APPENDIX D: THE HONESTY ALIGNMENT & VERIFICATION PROTOCOL

**D.1 Purpose & Scope**
This appendix operationalizes **Article VIII: The Principle of Radical, Functional Honesty**. It provides the testing framework to ensure that every NICD-verified product's **communication, sensory cue, and performance align without deception, omission, or neurological betrayal.**

**D.2 The Honesty Verification Method Framework**
**Phase 1: Claim & Cue Deconstruction**
**Step 1.1: Promise Extraction**

- List every explicit and implicit promise made by the product through:
  - Packaging text
  - Marketing claims
  - Sensory cues (colour, texture in tube/jar, scent through packaging if applicable)
  - Product name
  - Imagery
- **Output:** "Promise Map" document.

**Step 1.2: Cue Intention Declaration**

- For each sensory attribute, the formulator must declare its intended neurological purpose:
  - *Example:* "Pale yellow colour → visual cue for 'gentle creaminess' and 'lemon note'"
  - *Example:* "Spearmint oil at 0.05% → provides mild cool sensation (≤2/10 intensity) for focus cue, not for intense freshness"

**Phase 2: Dual-Panel Verification**
**Panel H (Honesty Panel): Neurodivergent Certified**

- **Composition:** 15-20 neurodivergent individuals, screened per Appendix B.
- **Method:** Given **only the final product and its packaging**. No additional instructions.
- **Task:** Use product for 3-7 days. Complete daily log answering:
  1. "What did you expect based on the packaging?"
  2. "What did you actually experience?"
  3. "Was there any point where the product surprised you in a negative way?"
  4. "Rate the alignment between promise and experience: 1 (betrayed) to 5 (perfectly aligned)."
- **Success Metric:** ≥80% of panellists must rate alignment at 4 or 5.

**Panel B (Blind Panel): Ground Truth Establishment**

- **Composition:** 15-20 individuals (mixed neurotypes), **completely naïve** to the product and brand.
- **Method:** Given the **product in plain, unmarked container**. No packaging, no claims.
- **Task:** Use product. Then answer:
  1. "What is this product's main purpose, in your own words?"
  2. "What sensory band does it belong to? (Grounding/Clarifying/Neutral)"
  3. "What is its dominant sensation (e.g., cooling, warming, creamy, light)?"
  4. "Who do you think this is for?"

- **Output:** "Blind Perception Profile."

**Phase 3: Alignment Analysis & "Honesty Gap" Scoring**
The **Honesty Gap Score (HGS)** is calculated as follows:

| Component | Description | Points |
|---|---|---|
| **Claim-to-Blind Alignment (CBA)** | Compare brand's stated purpose/band from Phase 1 with Panel B's blind perception | Full alignment = 0<br>Partial alignment = 1<br>Misalignment = 3 |
| **Cue-to-Experience Alignment (CEA)** | Compare each declared sensory cue intention from Step 1.2 with Panel H's experienced reality (per cue: colour, texture, scent, taste, after-feel) | As promised = 0<br>Moderately different = 1<br>Deceptively different = 3 |
| **Omission Penalty (OP)** | Any significant negative experience reported by >20% of Panel H that was **not warned about** | 5 points per omission |

**HGS Formula:**
**HGS = CBA + CEA + OP**
**Verification Threshold:**

| HGS Score | Result |
|---|---|
| ≤ 2 | NICD Honesty Verification (excellent alignment) |
| 3 – 5 | Requires reformulation or recommunication |
| ≥ 6 | Fails NICD verification |

**Phase 4: Transparency Documentation**
For verified products, the following must be publicly available:
**1. The Honesty Fact Sheet:** A simple document showing:

- **Our Promise:** [Core claim]
- **Our Sensory Design:** [Band + key sensations]
- **What We Don't Promise:** [Explicit limitation statement]
- **Who Should Be Cautious:** [Clear allergy/avoidance warnings]

**2. The "Why We Chose This" Statement:** For any potentially controversial ingredient (e.g., a synthetic preservative, a known allergen), a brief, honest rationale accessible via QR code:

- *Example:* "We include phenoxyethanol at 0.5% as our preservative. After testing 12 alternatives, this was the only one that prevented microbial growth without altering the sensory profile our neurodivergent panellists require."

**D.3 Special Case: The "Negative Cue" Requirement**

For products containing **known high-prevalence irritants or allergens** (e.g., propolis, certain essential oils, acids), **passive honesty is insufficient.** The product must contain a **deliberate, mild pre-application cue** that signals "caution" to sensitive individuals.

- **Example:** A propolis-containing paste might have a **subtle, characteristic propolis scent detectable upon opening** (not masked), serving as a natural identifier for those sensitive to it.
- **Example:** A product with exfoliating acids might have a **very slight, immediate tingle upon application** (within safe bounds) that signals "active" rather than hiding it behind numbing agents.

**D.4 Annual Honesty Re-Audit**

Because ingredients and manufacturing can drift, NICD verification requires **annual re-audit** of the Honesty Gap Score using the same protocol. Drift beyond thresholds results in loss of verification.

**D.5 Integration with Other Appendices**

| Appendix | Integration Point |
|---|---|
| **Appendix A (Assessment Matrix)** | Domain 5 "Transparent Complexity" now draws its data from the Honesty Audit. |
| **Appendix B (Panel Screening)** | Panel H members are drawn from the High Executive Load (HEL) and Sensory Avoider (SA) profiles, as they are most sensitive to promise-experience gaps. |
| **Appendix C (Sensory Bands)** | The Blind Panel (Panel B) results become the **empirical calibration** for whether a product truly belongs to its claimed band. |

## APPENDIX E: MANDATORY ATTRIBUTION AND AUDIT REPORTING FORMAT

This appendix defines the non-negotiable requirements for publishing or sharing the results of any NICD audit to ensure proper attribution and prevent misappropriation of the standard.

**E.1 Required Attribution Statement**

Any public communication, blog post, video, social media post, or report that shares the results, conclusions, or scores of an NICD audit **must** include the following boilerplate text in a clearly visible position:

*"This assessment was conducted using the NICD Standard V4.0 and The ADHD Algorithm™ methodology, which are the intellectual property of **COSMETONOESIS**. The standard provides the technical framework for evaluating neuro-inclusive design. For more information on the standard or verification, visit www.cosmetonoesis.com."*

**Placement Requirements:**

- For written reports: Executive summary, methodology section, or footer
- For videos: In the description box and spoken/displayed within the first 60 seconds
- For social media: In the caption or as an overlay (platform character limits permitting)
- For audio/podcasts: Verbally stated at the beginning of the segment discussing results

**E.2 non-compliance**

Failure to adhere to the requirements in this appendix is a violation of the personal use license (Section 1) and may result in a public notice of copyright and trademark infringement from COSMETONOESIS.

**Consequences may include:**

- Revocation of verification status for the audited product
- Public delisting from NICD Verified directory
- Legal action for unauthorized commercial use
- Notification to audit client of license violation

## APPENDIX F: NEURO-SENSORY IRRITATION INDEX (NSI) & NEUROACTIVE INGREDIENT INTEGRATION

### F.1 Neuro-Sensory Irritation Index (NSI)

The **Neuro-Sensory Irritation Index (NSI)** evaluates the potential for sensory overstimulation during product use.
This parameter complements dermatological irritation assessments by addressing **neurological sensory discomfort in the absence of visible skin irritation**.

#### F.1.1 Assessment Domains

NSI evaluates five sensory domains:

| Domain | Description |
|---|---|
| 1. Olfactory intensity spike | Sudden or overwhelming scent onset |
| 2. Abrupt tactile stimulation | Unexpected texture or application sensation |
| 3. Thermal or chemical tingling response | Cooling, warming, or tingling sensations |
| 4. Persistence of sensory after-effects | Lingering sensations after use |
| 5. Cross-modal sensory conflict | Contradictory cues across senses (e.g. visual expectation vs tactile reality) |

#### F.1.2 Scoring Scale

Each domain is scored on a scale from **0–4**:

| Score | Description |
|---|---|
| 0 | No irritation potential |
| 1 | Very mild sensory presence |
| 2 | Noticeable but comfortable stimulation |
| 3 | Strong stimulation approaching discomfort |
| 4 | Sensory overload or avoidance response |

#### F.1.3 Total NSI Score Range & Interpretation

| Total NSI Score | Classification |
|---|---|
| 0 – 5 | Neurologically comfortable |
| 6 – 10 | Acceptable stimulation band |
| 11 – 15 | Elevated sensory irritation risk |
| 16 – 20 | Neurologically incompatible |

#### F.1.4 Band-Specific Thresholds

| Product Band | Maximum NSI |
|---|---|
| Neutral or Grounding | ≤ 8 |
| Clarifying | ≤ 12 |

**F.2 Neuroactive Ingredient Integration**

**F.2.1 Mandatory Classification**
All ingredients identified or reasonably expected to exhibit neuroactive properties shall be classified according to **Appendix J** and assigned a Neuroactive Tier.

**F.2.2 Assessment Validity Requirement**
NSI evaluation shall not be considered valid unless Neuroactive Tier classification has been completed in accordance with Appendix J.

**F.2.3 Interpretation Framework**
Neuroactive Tier distribution within a formulation shall be considered when interpreting NSI outcomes, including:

- potential reduction of neuro-sensory irritation
- potential contribution to sensory overstimulation

Particular attention shall be given to formulations containing **Tier 3 and Tier 4 ingredients** in cases of elevated NSI scores.

**F.2.4 Non-Quantitative Role**
Neuroactive Tier classification supports structured interpretation of NSI results and does not directly alter numerical scoring.

**F.2.5 Documentation Requirement**
Neuroactive Tier classification and its role in NSI interpretation shall be explicitly documented within the assessment report.

**F.3 NSI Assessment Protocol**

**Step 1: Panel Selection**

- Minimum **15 panellists** (≥60% neurodivergent, as defined in Appendix B)
- Inclusion of both:
  - Sensory Seeker (SS) profiles
  - Sensory Avoider (SA) profiles

**Step 2: Controlled Application**

- Standardised application amount and method
- Controlled environment:
  - Temperature: **22 ± 2°C**
  - Relative Humidity: **40–60%**

**Step 3: Domain Scoring**
Panellists shall rate each of the five domains:

- Immediately after application
- Re-assessment at:
    - 1 minute
    - 5 minutes
    - 15 minutes (mandatory for Domain 4: persistence)

**Step 4: Aggregate Calculation**

- Domain scores shall be averaged across panellists
- Total NSI = sum of domain means
- Final value rounded to nearest whole number
- **95% confidence intervals shall be reported**

**Step 5: Neuroactive Integration Analysis**
Correlations between Neuroactive Tier distribution and domain-specific NSI scores shall be evaluated.
The assessment shall include:

- Identification of Tier-related drivers of sensory response
- Detection of patterns between ingredient neuroactivity and observed sensory effects
- Documentation of mechanistic interpretation supporting NSI outcome

## APPENDIX G: STANDARDIZED SENSORY UNITS (SSU)

Standardized Sensory Units (SSU) provide a semi-quantitative system for recording perceived sensory intensity.
SSU allows comparison of sensory characteristics across formulations and batches.

### G.1 SSU Scoring Scale

Each sensory modality is scored by panellists using a **0–10 scale**:

| Score Range | Descriptor |
|---|---|
| 0 | No perceptible stimulus |
| 1 – 2 | Barely detectable |
| 3 – 4 | Mild stimulation |
| 5 – 6 | Moderate stimulation |
| 7 – 8 | Strong stimulation |
| 9 – 10 | Dominant sensory experience |



### G.2 Calculation

The final SSU value is calculated as the **mean score across panel participants** for a given sensory modality.
**Formula:**

$$\text{SSU} = \frac{\sum_{i=1}^{n} \text{Panelist Score}_i}{n}$$

Where:

- $n$ = number of panellists (minimum 15, per Appendix B)
- Panellists Score$_i$ = individual 0-10 rating

### G.3 Recommended Stability Criteria

| Comparison | Maximum Allowable Variance |
|---|---|
| Batch variance (Batch 1 vs. Batch 5) | ≤ ±1.0 SSU |
| Shelf-life variance (time zero vs. accelerated aging) | ≤ ±1.5 SSU |

**Consequence:** Products exceeding these ranges fail sensory predictability requirements (Domain 1).

**G.4 Application Protocol**

**Step 1: Modality Selection**

Select relevant sensory modalities for the product type:

| Product Category | Typical Modalities to Score |
|---|---|
| Skin care | Cooling, tingling, tackiness, absorption speed, residue feel |
| Hair care | Scalp sensation, wet slip, dry feel, weight |
| Oral care | Foaming, cooling, astringency, after-taste |
| Fragrance | Intensity, projection, longevity, note clarity |
| Colour cosmetics | Drag, cushion, drying time, finish |

**Step 2: Panel Administration**

- Standardized application amount and method
- Controlled environment (22±2°C, 40-60% RH)
- Panellists score immediately after application
- For persistence metrics: re-score at defined intervals (e.g., 1 min, 5 min, 15 min)

**Step 3: Statistical Reporting**

- Report mean SSU ± standard deviation
- Report 95% confidence interval
- For batch comparison: conduct two-sample t-test ($p < 0.05$ indicates significant drift)

**G.5 Integration with Other Appendices**

| Appendix | Integration Point |
|---|---|
| **Appendix A (Domain 1)** | SSU provides the quantitative foundation for Olfactory Consistency (1.1), Tactile Reproducibility (1.2), Onset Latency (1.4), and After-Sensation Duration (1.5) |
| **Appendix B (Panels)** | SSU panels use same recruitment and stratification requirements |
| **Appendix C (Sensory Bands)** | Each band has target SSU ranges for key modalities (see Reference Standards Library) |
| **Appendix F (NSI)** | NSI Domain 3 (Thermal/chemical tingling) may be quantified using SSU |

## APPENDIX H: PANEL COMPOSITION & TESTING PROTOCOL

To ensure reproducible NICD assessments, panels must follow standardized composition guidelines.

**H.1 Panel Size**

| Minimum | Recommended | For Mass Market Verification |
|---|---|---|
| 15 participants | 20–25 participants | 30–50 participants |

**H.2 Neurodivergent Representation**
**Minimum Requirement:** ≥60% of panellists must be neurodivergent.
**Suggested Distribution by Profile:**

| Profile | Percentage of Panel |
|---|---|
| ADHD profiles | 30–40% |
| Autism spectrum sensory profiles | 15–25% |
| Other sensory-processing differences (e.g., SPD, anxiety with sensory components) | 10–15% |

**Total neurodivergent representation:** 60–80% (balance may include overlapping diagnoses)

**H.3 Control Group**
At least **20% of participants** should represent neurotypical sensory profiles to provide baseline comparison.
**Control group role:**

- Establish population-normative baselines
- Identify sensory experiences unique to neurodivergent perception
- Ensure product remains usable for general market (if intended)

**H.4 Testing Conditions**
Products should be evaluated under the following conditions:

| Condition | Requirement |
|---|---|
| Repeated uses | Minimum 3–7 days of consecutive use |

| Condition | Requirement |
|---|---|
| Real-world environments | In-home routine, not lab-only |
| Interruption scenarios (where applicable) | Mid-ritual interruption with recovery tracking (per Domain 4.4) |
| Time-of-day variation | Morning, evening, and as-intended use context |
| Temperature variation | Products tested at storage temps (10°C, 25°C, 40°C) where relevant |

**H.5 Evaluation Metrics**
Panel data must include:

| Metric | Source Appendix |
|---|---|
| SSU sensory scoring | Appendix G |
| NSI irritation scoring | Appendix F |
| Completion success rate | Domain 4.3 |
| Cognitive friction feedback | Domain 2 (Dosage Ambiguity, Decision Points, Memory Load) |
| Honesty alignment rating | Appendix D (Panel H) |
| Sensory band categorization | Appendix C (Blind Panel) |

**H.6 Panellists Management**
**H.6.1 Recruitment Sources**

- Neurodivergent community organizations
- Occupational therapy clinics
- University disability services
- Online neurodivergent communities (with ethical compensation)

**H.6.2 Compensation Guidelines**

- Hourly rate: minimum local living wage

- Per-study stipend: $50–150 USD (or equivalent) depending on duration
- Reimbursement for travel, childcare, or other participation barriers
- No contingent compensation based on outcomes

**H.6.3 Safe Testing Environment Requirements**

- Low-sensory waiting area (dim lighting, no fragrance, quiet)
- Option for virtual participation where applicable
- Break accommodations during longer sessions
- No pressure to complete if sensory overload occurs
- Clear exit protocol with full compensation

**H.6.4 Example Demographic Survey Fields**

- Age range
- Gender identity
- Neurotype (self-identified or diagnosed; multiple selection allowed)
- Sensory profile (per Appendix B.2)
- Executive function impact (per Appendix B.3)
- Living environment (urban/suburban/rural)
- Current product routine length and complexity

**H.7 Data Quality & Exclusion Criteria**

**Valid data requires:**

- Completion of ≥80% of scheduled uses (for multi-day protocols)
- Completion of all required surveys
- No pattern of random or straight-line responding

**Exclusion after recruitment:**

- Inconsistent responses to calibration controls (>30% variance per Appendix B.5)
- Non-completion of >2 consecutive studies (for ongoing panels)
- Development of conditions affecting sensory perception

**H.8 Integration with Other Appendices**

| Appendix | Integration Point |
|---|---|
| **Appendix B** | Detailed screening, stratification, and calibration |
| **Appendix D** | Panel H (Honesty Panel) draws from HEL and SA profiles |
| **Appendix E** | Attribution for published panel results |

| Appendix | Integration Point |
|---|---|
| **Appendix G** | SSU scoring protocol |
| **Appendix F** | NSI scoring protocol |

## APPENDIX I: RELATIONSHIP BETWEEN TOXICOLOGICAL SAFETY AND NICD

Traditional cosmetic safety assessments focus primarily on **toxicological and dermatological safety**.
These evaluations ensure that products do not cause:

- irritation
- sensitisation
- systemic toxicity
- phototoxicity

**However,** such assessments do not evaluate **neurological sensory responses** or **cognitive usability**.

### I.1 What NICD Adds

NICD introduces an additional evaluation dimension addressing:

| Dimension | Description |
|---|---|
| Sensory predictability | Consistency of sensory experience across uses and batches |
| Stimulation intensity | Alignment with target sensory band (Grounding/Clarifying/Neutral) |
| Cognitive accessibility | Reduction of decision points, dosage ambiguity, memory load |
| Routine stability | Fault tolerance, interrupt resilience, completion rates |

### I.2 Relationship Statement

NICD **does not replace** regulatory safety evaluation.
Instead, it **extends cosmetic product assessment into the domain of neurological usability**.

| Traditional Safety | NICD Neuro-Usability |
|---|---|
| Dermatological tolerability | Sensory predictability |
| Toxicological risk | Cognitive friction |
| Irritation (skin) | Neuro-Sensory Irritation Index (NSI) |
| Patch testing | Panel testing with neurodivergent participants |

| Traditional Safety | NICD Neuro-Usability |
|---|---|
| Clinical dermatology | Neuro-inclusive design |

**I.3 Core Analogy**
**If dermatological tolerability evaluates whether the skin can tolerate a cosmetic product, neuro tolerability evaluates whether the nervous system can comfortably experience it.**

**I.4 Overlap & Independence**

| Assessment Type | Required Separately? | Relationship |
|---|---|---|
| Regulatory safety (toxicology, dermatology) | **Yes** – NICD does not certify safety | NICD assumes product is already legally safe |
| NICD neuro-usability verification | **Yes** – separate panel and protocol | Builds on safe product; adds neuro-inclusive layer |

**Verification prerequisite:** NICD verification **only applies** to products that have passed all applicable regulatory safety assessments for their market.

**I.5 Documentation Requirement**
Any NICD audit report must include a **declaration of regulatory safety status**:
*"The product(s) assessed in this report have [passed / not been evaluated for] all applicable regulatory safety requirements for [jurisdiction(s)]. NICD verification assesses neuro-usability only and does not constitute a safety certification."*

**I.6 Integration with Other Appendices**

| Appendix | Integration Point |
|---|---|
| **Appendix F (NSI)** | Complements dermatological irritation with neuro-sensory irritation |
| **Appendix H (Panels)** | Neurodivergent panel composition ensures neurological tolerability data |
| **Appendix A (Domain 5)** | Safety criteria focus on neuro-safety, not toxicology |

## APPENDIX J: NEUROACTIVE INGREDIENT CLASSIFICATION & TIERING SYSTEM (NITS)

**J.1 Purpose**
The **Neuroactive Ingredient Classification & Tiering System (NITS)** establishes a structured methodology for the identification, classification, and weighting of ingredients based on their **interaction with the skin–nervous system axis**.
This Appendix supports and refines the evaluation of:

- **NSI (Nervous System Impact)**
- **Neuro-Tolerability Score (NTS)**

by introducing a **mechanistic hierarchy of neuroactive relevance**.

**J.2 Scope**
This system applies to:

- All cosmetic ingredients included in NICD assessments
- Both leave-on and rinse-off formulations
- Finished formulations and pre-audit ingredient screening

NITS is **mandatory where NSI evaluation is performed**.

**J.3 Definitions**
**Neuroactive Ingredient**
Any substance capable of directly or indirectly influencing:

- neurogenic inflammation
- cutaneous sensory perception
- skin–brain signalling pathways

**Neuroactivity Pathways**
Neuroactivity shall be interpreted across three pathways:

1. **Indirect Modulation** (barrier, inflammation control)
2. **Sensory Modulation** (TRP channels, irritation perception)
3. **Direct Neuromodulation** (neuropeptides, neurotransmitter-related activity)

**J.4 Tier Classification**
All ingredients shall be classified into one of the following tiers:

**Tier 0 — Non-Neuroactive**
Ingredients with no known interaction with neurocutaneous pathways.
**Characteristics:**

- No influence on neurogenic inflammation
- No modulation of sensory signalling

**NICD Role:**

- Baseline contribution only

**Tier 1 — Indirect Neuro-Support**
Ingredients that reduce the **drivers of neuro-irritation** without acting directly on neural pathways.
**Mechanisms:**
- Barrier reinforcement
- Non-neurogenic anti-inflammatory action
- Hydration stabilisation

**NICD Role:**
- Reduction of baseline neuro-reactivity

**Tier 2 — Neuro-Sensory Modulators**
Ingredients that influence **cutaneous sensory perception and irritation signalling**.
**Mechanisms:**
- TRP channel modulation
- Reduction of neuropeptide release (e.g. CGRP, Substance P)
- Alteration of perceived discomfort

**NICD Role:**
- Reduction of perceived sensory load

**Tier 3 — Neuroactive Modulators**
Ingredients with demonstrated interaction with the **skin–brain axis**.
**Mechanisms:**
- Modulation of neurochemical mediators
- Influence on neuroinflammatory cascades
- Interaction with stress-related signalling pathways

**NICD Role:**
- Active regulation of neurocutaneous communication

**Tier 4 — Psycho-Sensory Modulators**
Ingredients capable of influencing **emotional or cognitive perception via sensory pathways**.
**Mechanisms:**
- Olfactory–limbic system activation
- Central perception modulation

**NICD Role:**
- High-impact, high-variability neuro-sensory influence

**Note:**
Tier 4 ingredients require **heightened scrutiny due to variability and sensitisation potential**.

**J.5 Tier Assignment Criteria**
Tier classification shall be based on:

- Published scientific literature
- Mechanistic plausibility
- Supplier technical dossiers
- Regulatory and toxicological data

Where evidence is limited, the **lower tier classification shall be applied by default**.

**J.6 Integration into NSI (Nervous System Impact)**
NITS shall be used to support NSI scoring as follows:

- Tier distribution within the formula shall be identified
- Relative contribution shall consider:
    - concentration
    - exposure conditions
    - cumulative and synergistic effects

**Guidance (non-prescriptive):**

- Tier 1 → low contribution
- Tier 2 → moderate contribution
- Tier 3 → high contribution
- Tier 4 → variable (positive or negative)

Final NSI scoring remains **expert-led**, with NITS providing structured justification.

**J.7 Risk Considerations**
The presence of higher-tier ingredients does not inherently indicate improved NICD performance.
Assessors shall consider:

- Sensitisation potential
- Overstimulation risk
- Population-specific vulnerability (e.g. neurodivergent users)

**J.8 Documentation Requirements**
NICD reports shall include:

- Tier classification per ingredient (where relevant)
- Justification for Tier ≥2 assignments
- Summary of tier distribution within the formulation

**J.9 Limitations**
NITS is a **classification and support tool**, not a standalone determinant of product performance.
Final NICD outcomes shall always consider:

- Full formulation context

- Sensory profile
- Use conditions

## APPENDIX K: NEURO-TOLERABILITY FRAMEWORK

Traditional cosmetic safety frameworks evaluate toxicological and dermatological safety. NICD introduces the concept of **Neuro Tolerability**, which evaluates whether cosmetic products remain comfortable and usable across diverse sensory processing profiles.

### K.1 Core Dimensions of Neuro-Tolerability

Neuro-tolerability focuses on three core dimensions:

| Dimension | Description |
|---|---|
| **Sensory Stability** | The product delivers consistent sensory responses across uses and batches |
| **Sensory Comfort** | The product does not trigger sensory distress, overstimulation, or avoidance behaviour |
| **Cognitive Usability** | The product can be used without excessive mental effort, confusion, or routine disruption |

Neuro-tolerability therefore represents **an additional layer of cosmetic product compatibility**, complementing existing toxicological and dermatological safety assessments.

### K.2 Neuro-Tolerability Score (NTS) – Detailed Calculation

The NTS is a composite index (0–100) that quantifies a product's neuro-inclusive safety and user-friendliness.

#### K.2.1 Components

| Component | Description | Raw Score (0–25) |
|---|---|---|
| NSI – Nervous System Impact | Potential neuroactive effect of ingredients (e.g., menthol, essential oils, caffeine, preservatives with neuromodulatory activity) | 0–25 |
| SSU Variance – Sensory System Uniformity | Variability in tactile, olfactory, visual, or auditory perception among neurodiverse users | 0–25 |

| Component | Description | Raw Score (0–25) |
|---|---|---|
| Cognitive Load | Mental effort required to interpret instructions, apply product, and integrate into routines | 0–25 |
| Sensory Predictability | Consistency and predictability of sensory experience (texture, fragrance, appearance) | 0–25 |

**K.2.2 NTS Formula**

$$\text{NTS} = 100 - \left[\frac{(w_1 \cdot \text{NSI} + w_2 \cdot \text{SSU\_Variance} + w_3 \cdot \text{Cognitive\_Load} + w_4 \cdot \text{Sensory\_Predictability})}{\sum w_i}\right] \times 100$$

**Default equal weights:** $w_1 = w_2 = w_3 = w_4 = 1$
*Note:* Weights may be adjusted per target population; any adjustment must be documented.

**K.2.3 Interpretation**

| NTS Score | Classification |
|---|---|
| 80 – 100 | Excellent neuro tolerability |
| 60 – 79 | Moderate neuro tolerability |
| 40 – 59 | Low neuro tolerability |
| < 40 | Poor neuro tolerability – product may trigger sensory or cognitive discomfort |

**K.3 Component Scoring Methodology**

**K.3.1 NSI – Nervous System Impact**

1. Identify neuroactive ingredients in formula (per Appendix J / Neuroactive Tier system)
2. Collect NOAEL, $EC_{50}$, and other neurotoxicity/neuromodulatory data from literature
3. Assign raw score 0–25 based on cumulative neuroactive potential

**K.3.2 SSU Variance – Sensory System Uniformity**

1. Conduct sensory evaluation with neurodiverse panel (minimum 30 participants)
2. Measure tactile, olfactory, visual, auditory, or thermal perception using SSU (Appendix G)
3. Compute coefficient of variation (CV) across participants:

$$\text{SSU\_Variance} = \left(\frac{\sigma_{\text{perception}}}{\mu_{\text{perception}}}\right) \times 25$$

Where:

- $\sigma_{\text{perception}}$ = standard deviation of SSU scores across panellists
- $\mu_{\text{perception}}$ = mean SSU score across panellists

**K.3.3 Cognitive Load**

1. Evaluate packaging, instructions, steps required, multi-sensory cues
2. Use NASA TLX or equivalent cognitive load index
3. Convert to 0–25 scale (0 = minimal load, 25 = maximal effort required)

**K.3.4 Sensory Predictability**

1. Conduct longitudinal trials or use predictive modelling based on formulation properties (viscosity, fragrance volatility, spreadability)
2. Assess alignment of expected vs. actual sensory experience (per Appendix D)
3. Scale 0–25 (0 = fully predictable, 25 = highly inconsistent)

**K.4 Integration with NICD Audits**

| Requirement | Specification |
|---|---|
| Mandatory status | NTS is **mandatory alongside dermatological tolerability** |
| Reporting | Must be reported numerically in audit reports |
| Qualification threshold | Products scoring **≥80 NTS** may qualify for NICD "Neuro Tolerable" designation |
| ADHD Friendly™ verification | Products must meet NTS ≥80 **plus** all other Domain thresholds (≥80 total, no domain <60%) |

**K.5 Relationship to Other Appendices**

| Appendix | Integration Point |
|---|---|
| **Appendix A (Domains)** | NTS components map to Domain 1 (Sensory Predictability) and Domain 2 (Cognitive Friction) |
| **Appendix F (NSI)** | NSI component of NTS |

| Appendix | Integration Point |
|---|---|
| **Appendix G (SSU)** | SSU Variance component of NTS |
| **Appendix D (Honesty)** | Sensory Predictability component draws from Honesty Gap analysis |
| **Appendix H (Panels)** | Panel composition requirements for SSU Variance and Cognitive Load |

END OF UNIVERSAL APPENDICES (A-K)

*These appendices constitute the cross-category implementation framework for Neuro-Inclusive Cosmetic Design. All product categories—skin care, hair care, oral care, body care, colour cosmetics, and fragrance—must be evaluated against these universal criteria, with category-specific adjustments as noted.*