PRD: Accumulation Detection Rules (Math & Thresholds)

Product: Terminal.AI
Feature: Accumulation Detection Engine
Layer: Market Structure (feeds Decision Matrix)
Phase: Formalization / Hardening
Status: Ready for Implementation

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1. Purpose & Guardrails

This document formalizes **when and why** the system may classify a regime as **ACCUMULATION**.

Hard Guardrails (Non-Negotiable)

- Accumulation is **never detected in isolation**
- Accumulation is evaluated **only through the Market Structure Decision Matrix**
- Any valid **Failed Breakout overrides Accumulation**
- Default outcome in ambiguity = **NEUTRAL**

This prevents bullish overfitting and trap misclassification.

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2. Definition (First Principles)

Accumulation is defined as:

> Sustained price compression with evidence of supply absorption and **no structural failure signals**.

It is a **patience regime**, not a directional signal.

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3. Evaluation Window

Parameter	Value	Rationale
Lookback window	20–40 candles	Captures base formation without noise
Minimum zone length	8 candles	Below this = noise
Max zone length	25 candles	Beyond this = potential distribution

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4. Core Metrics (Quantified)

4.1 Price Compression (Required)

Formula:

```
compression_pct = (zone_high − zone_low) / zone_mid
```

Thresholds: - Ideal: ≤ **4.0%** - Acceptable: ≤ **5.0%** (downgrade confidence) - Reject: > 5.0%

4.2 Time Spent (Required)

Condition:

```
8 ≤ number_of_candles ≤ 25
```

- < 8 → ignore (insufficient structure)
- 25 → downgrade (risk of distribution)

4.3 Volume Stability (Required)

Metrics: - avg_zone_volume - avg_prior_volume (same length)

Conditions: - avg_zone_volume ≥ **70%** of avg_prior_volume - No volume climax on down candles

Reject if: - Sustained volume collapse (< 60%) - Expansion on downside closes

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4.4 Wick Absorption (Supportive)

Metric:

```
absorption_ratio = lower_wick_length / candle_range
```

Conditions: - ≥ 2 candles with absorption_ratio ≥ **0.35** - Preferably near zone low

This indicates **supply absorption**.

4.5 Close Location Bias (Supportive)

Metric:

```
close_position = (close − low) / (high − low)
```

Condition: - Majority of closes ≥ **0.45** (mid-range or higher)

Reject if: - Persistent closes near lows (< 0.35)

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5. Explicit Rejection Filters (Critical)

Accumulation **must be rejected** if ANY of the following are true:

1. **Qualified Breakout Attempt occurred** (even if failed)
2. Expansion candle followed by immediate rejection
3. Volume expansion on down candles
4. Dominant upper-wick rejection pattern

If rejection triggered → defer to **Failed Breakout** or **Neutral** via matrix.

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6. Confidence Scoring

Signal Alignment Model

Condition Met	Points
Compression ≤ 4%	+2
Time window valid	+1
Volume stable	+2
Wick absorption	+1
Close bias	+1

Total possible: 7 points

Confidence Mapping

Points	Confidence
6–7	High
4–5	Medium
3	Low
< 3	Reject → Neutral

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7. Output Contract

```
{
  "state": "ACCUMULATION",
  "confidence": "Medium",
  "summary": "Price is compressing with steady absorption, indicating
accumulation.",
  "metrics": {
    "compression_pct": 0.035,
    "duration": 9,
    "volume_ratio": 0.82
  }
}
```

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8. Pseudocode (Deterministic MVP)

```
if (failedBreakoutDetected) return NEUTRAL;

if (compression <= 0.05 && duration >= 8 && volumeStable) {
  score = calcScore();
  if (score >= 3) return ACCUMULATION;
}

return NEUTRAL;
```

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9. Explanation Mapping (UI)

High Confidence

> “Tight compression with consistent absorption and stable volume.”

Medium Confidence

> “Compression present, but confirmation signals are mixed.”

Low Confidence

> “Early compression detected; requires further validation.”

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10. Non-Goals

- ❌Predict breakout direction
- ❌Time entries
- ❌Replace human discretion

The role is **structural clarity**, not forecasting.

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11. Locking Recommendation

✔️Implement behind feature flag ✔️Validate against real tickers ✔️Do not tune thresholds aggressively

Once stable, this feeds directly into: - Distribution Zones - Regime transitions - Agent personas