

WINTER JACKET PRODUCT GUIDE

Product Category: Premium Insulated Winter Outerwear

Version: 1.0

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EXECUTIVE SUMMARY

The Premium Winter Jacket is a comprehensive cold-weather solution engineered to provide exceptional warmth, breathability, and protection across diverse winter conditions. Featuring advanced multi-layer construction with professional-grade insulation, this jacket represents the intersection of technical performance and everyday wearability.

Key Highlights:

- Temperature rated for -10°C to -40°C conditions
- Professional 3-layer construction with moisture barrier
- Advanced synthetic insulation technology
- Water-resistant outer shell
- Breathable, moisture-wicking design

1. PRODUCT OVERVIEW

1.1 Purpose and Application

The Winter Jacket is designed for:

- Daily winter commuting and recreational activities
- Outdoor work in cold environments
- Active pursuits in moderate to severe cold
- Professional use in temperature-controlled settings
- Travel to cold-climate destinations

1.2 Target Use Environments

Condition	Temperature Range	Suitable	Notes
Mild Winter	-5°C to 0°C	Yes	Comfortable for light activity
Cold Winter	-10°C to -20°C	Yes	Ideal rated condition
Severe Cold	-20°C to -40°C	Yes	With base layering
Extreme Arctic	Below -40°C	Limited	Requires supplemental protection

2. TECHNICAL SPECIFICATIONS

2.1 Dimensional Specifications

Sizing Chart

Size	Chest (cm)	Length (cm)	Shoulder Width (cm)	Sleeve Length (cm)
XS	82-86	70	41	78
S	88-92	72	43	80
M	94-98	74	45	82
L	100-104	76	47	84
XL	106-110	78	49	86
XXL	112-116	80	51	88

Fit Notes:

- Regular fit allows room for layering
- Pre-shrunk and treated for dimensional stability
- Length tested to ensure hip coverage
- Sleeve length verified for wrist coverage with base layer

2.2 Weight and Material Composition

Component	Specification
Total Jacket Weight	680-750g (1 lb 8 oz)
Outer Shell Weight	150g/m ²
Insulation Weight	120-180g depending on size
Lining Weight	90g/m ²
Total Material Weight	Approximately 60% insulation, 25% shell, 15% lining

2.3 Material Composition

Outer Shell Layer

- **Material:** 100% Polyester Ripstop Blend
- **Weight:** 150g/m²
- **Waterproofing:** Water-Resistant Coating (DWR - Durable Water Repellent)
- **Water Column Rating:** 5,000mm
- **Breathability:** 5,000g/m²/24hr (measured by ISO 811)
- **Tear Strength:** 65 N/5 cm (MD), 55 N/5 cm (CD)
- **Function:** Protection against wind and light precipitation

Moisture Barrier Layer

- **Material:** ePTFE (Expanded Polytetrafluoroethylene) Membrane
- **Thickness:** 0.5mm
- **Pore Size:** 0.2 micrometers
- **Water Resistance:** Blocks liquid water while allowing vapor transmission
- **Breathability Rating:** >10,000g/m²/24hr
- **Seam Sealing:** Taped seams with specialized adhesive
- **Standard:** Exceeds ISO 11092 requirements

Insulation Layer

- **Type:** Advanced Synthetic Insulation (PrimaLoft Black Technology)
- **Composition:** 100% Polyester microfibers in quilted baffles
- **Weight:** 120-180g/m² (varies by size)
- **Thermal Resistance (Rct):** 0.38-0.42 m²·K/W
- **Fill Power Equivalent:** 700+ equivalent down
- **Loft Height:** 70-80mm when new
- **Compressibility:** Maintains 80% loft after compression
- **Moisture Performance:** Retains warmth when wet (unlike traditional down)
- **Durability:** Resists clumping and migration after 500+ wear cycles

Lining Layer

- **Material:** 100% Polyester Taffeta
- **Weight:** 90g/m²
- **Finish:** Smooth, low-friction surface
- **Function:** Comfort and ease of layering over base garments

2.4 Construction Methods

Feature	Specification
Seam Type	Box-stitch quilted baffles
Baffle Pattern	Horizontal chambers 15cm wide
Seam Sealing	100% taped with waterproof adhesive
Stitch Count	8-10 stitches per cm for durability
Thread	Heavy-duty polyester, UV-resistant
Zipper Type	YKK #5 coil, two-way separating
Zipper Grade	Water-resistant with fabric flap
Hardware	Reinforced metal reinforcements at stress points

3. THERMAL PERFORMANCE

3.1 Temperature Ratings

CLO Rating System

Temperature Range	CLO Rating	Activity Level	Description
-10°C to -5°C	5.0 CLO	Moderate activity	Light winter conditions
-20°C to -10°C	6.5 CLO	Moderate activity	Standard winter conditions
-30°C to -20°C	7.5 CLO	Low-moderate activity	Severe cold conditions
-40°C and below	8.5+ CLO	Minimal activity	Arctic conditions (requires layering)

CLO Definition: 1 CLO = thermal resistance value of 0.155 m²·K/W (the insulation value of a typical business suit)

3.2 Thermal Resistance Analysis

EN 342 Cold Protection Standard Compliance

Metric	Measured Value	Standard Requirement	Status
Icler (clothing insulation, static)	0.38 m²·K/W	>0.30 for class 3	✓ PASS
Iclr (reduced insulation from air circulation)	0.32 m²·K/W	>0.20 for class 2	✓ PASS
Ret (moisture resistance)	6.2 m²·Pa/W	<20 for good breathability	✓ PASS
EN 342 Classification	Class 3, Level 2	Suitable for -15°C to -20°C	✓ CERTIFIED

3.3 Insulation Comparison Matrix

Insulation Type	Thermal Efficiency	Weight	Water Resistance	Price	Sustainability
PrimaLoft Black (Our Choice)	0.42 m²·K/W	140 g	Excellent	Mid-High	Recycled content available
Traditional Down	0.38 m²·K/W	130 g	Poor	High	Natural, ethical sourcing
Synthetic Polyester	0.32 m²·K/W	180 g	Good	Low	Recycled polyester option
Thermoball	0.37 m²·K/W	135 g	Very Good	Mid	Recycled content available

4. WATERPROOFING AND BREATHABILITY

4.1 Water Protection Features

Outer Shell Water Resistance

- **Water Column Height:** 5,000mm (ISO 811 test)
 - Equivalent to withstanding spray from 5-meter distance
 - Suitable for rain and light snow
 - Not rated for submersion or heavy downpour

DWR (Durable Water Repellent) Coating

- **Type:** Fluorocarbon-free polyurethane-based coating
- **Durability:** Maintains effectiveness for 20-30 wash cycles
- **Renewal:** Can be restored with specialized treatment
- **Coverage:** Applied to outer shell at 15-25 gsm

Seam Sealing

- **Coverage:** 100% of stress seams taped
- **Material:** Waterproof adhesive with polyester backing
- **Tested Pressure:** >1,000mm water column at seams
- **Durability:** Lasts 300-500 wear hours before degradation

4.2 Breathability Performance

Moisture Vapor Transmission

- **Rating:** >10,000g/m²/24hr (ASTM E96-B method)
- **Interpretation:** Vapor molecules pass through membrane while blocking liquid water
- **Real-world impact:** Perspiration escapes efficiently during moderate activity

Breathability Comparison

- Winter Jacket: >10,000g/m²/24hr (Excellent)
- Rain jackets: 5,000-8,000g/m²/24hr (Good)
- Non-breathable rain gear: <1,000g/m²/24hr (Poor - condensation buildup)

4.3 Weather Resistance Certifications

Standard	Test Criterion	Result	Performance Level
EN 343	Waterproofness & Breathability	Class 4:2	Highest class for both
ISO 9073-3	Water Resistance	Class 4	Excellent water resistance
ASTM D1141	Salt Spray (Durability)	>500 hours	Long-term coastal use

5. PRODUCT FEATURES AND DESIGN

5.1 Closure Systems

Main Zipper

- **Type:** YKK #5 two-way separating zipper
- **Material:** Injection-molded nylon coil
- **Operation:** Smooth action even in cold (<-10°C)
- **Internal Storm Flap:** Fabric overlay prevents wind infiltration

Wind Flap

- **Material:** Quilted polyester backing
- **Function:** Secondary barrier against wind when zipper is partially open
- **Attachment:** Snap buttons for quick access to internal pockets

Hood Design

- **Construction:** Adjustable with drawstring cord
- **Peak:** Reinforced bill for wind deflection
- **Closure:** Dual adjustment points (side and back)
- **Visibility:** Fits over helmet or standard headwear

5.2 Pocket System

Pocket Type	Location	Capacity	Features
Hand Pockets	Front waist	~500ml	Fleece-lined, zipper closure
Chest Pocket	Upper left	~200ml	Smartphone sized, zippered
Internal Pocket	Beneath lining	~300ml	Document/passport safe, hook-and-loop closure
Back Waist Pocket	Lower back	~400ml	Phone-accessible, magnetic closure

Total Pocket Capacity: ~1.4L storage

5.3 Cuff and Hem Details

Sleeve Cuffs

- **Material:** Elasticated knit ribbing
- **Fit:** Snug but not restrictive
- **Adjustability:** Optional thumb loops to improve fit and seal
- **Function:** Prevents cold air infiltration and helps seal over gloves

Hem Design

- **Length:** Hip-length coverage (prevents exposed lower back)
- **Adjustment:** Drawstring cord with toggles for waist customization
- **Hang:** Box pleat at back for movement and ventilation

6. MAINTENANCE AND CARE

6.1 Cleaning Instructions

Machine Washing

Water Temperature: 30°C (warm) or cold

Washing Program: Gentle/delicate cycle

Detergent: Mild, phosphate-free detergent

Fabric Softener: NOT recommended (clogs membrane pores)

Load Size: Wash alone or with 1-2 similar items maximum

Hand Washing (Recommended)

1. Fill bathtub with cold water
2. Add mild detergent (1 teaspoon per 5L water)
3. Submerge jacket and gently agitate for 10 minutes
4. Rinse thoroughly 3-4 times with fresh water
5. Drain and gently squeeze out excess water (do not wring)

Drying Procedure

- **Method:** Air dry flat or hanging in well-ventilated area
- **Temperature:** Room temperature (20-25°C)
- **Duration:** 48-72 hours to ensure complete dryness
- **Placement:** Avoid direct sunlight and heat sources
- **Humidity:** Use in humidity-controlled environment (40-60% RH ideal)

6.2 DWR Reapplication

When to Reapply:

- After 20-30 wash cycles or 1-2 seasons of regular use
- When water no longer beads on outer shell
- After 200+ hours of wear

Reapplication Process:

1. Clean jacket per washing instructions
2. Dry completely (24+ hours)
3. Apply DWR spray or wash-in treatment following product instructions
4. Air dry for additional 24 hours before wearing

6.3 Storage Guidelines

Seasonal Storage

- **Before storage:** Clean and dry completely
- **Storage location:** Cool, dry closet (18-22°C, 40-50% humidity)
- **Position:** Hang on padded hanger or fold in acid-free storage bag
- **Duration limit:** No issue for 1 year; refresh DWR annually if stored 12+ months
- **Avoid:** Plastic bags (trap moisture), cedar blocks (damage synthetic fibers)

Short-term Storage

- After use, dry before storage
- Shake out and hang to air for 2-4 hours
- Store in well-ventilated closet

7. PERFORMANCE IN DIFFERENT CONDITIONS

7.1 Climate Condition Performance Matrix

Clima te	Tem perat ure	Humid ity	Wind	Perfor mance Rating	Notes
Mount ain Winte r	-15°C to -25°C	Low (40- 50%)	High (20+ km/h)	Excele nt	Handles altitude and wind exposure
Urban Winte r	-10°C to -15°C	Moder ate (50- 60%)	Moderat e (10-15 km/h)	Excele nt	Ideal for daily commuting
Coasta l Winte r	-5°C to -10°C	High (70- 80%)	High (15-25 km/h)	Very Good	Wind protection critical; some moisture from spray
Wet Snow	-2°C to -5°C	Very High (75- 90%)	Moderat e (10-20 km/h)	Good	Outer shell resists water but not fully waterproof
Dry Snow	-15°C to -30°C	Low (30- 40%)	Variable	Excele nt	Ideal condition for the jacket

7.2 Activity Suitability

Activity	Intensity	Duration	Temp Range	Suitability
Commuting	Low-Moderate	15-45 min	-15°C to -5°C	Excellent
Hiking	Moderate-High	2-6 hours	-20°C to -10°C	Very Good (remove if overheating)
Outdoor Work	Moderate	4-8 hours	-25°C to -10°C	Very Good (add base layers)
Sightseeing	Low	1-3 hours	-10°C to 0°C	Excellent
Skiing	High	2-4 hours	-30°C to -15°C	Good (will shed excess heat; may need ventilation)
Static Outdoor	Minimal	30+ min	-40°C and below	Requires supplemental insulation

8. SIZING AND FIT GUIDANCE

8.1 Measurement Instructions

How to Measure:

1. **Chest:** Wrap soft measuring tape around fullest part of chest, keeping tape parallel to ground
2. **Length:** Measure from base of neck down back to desired hem (typically hip level)
3. **Shoulder Width:** Measure from shoulder seam to shoulder seam across back
4. **Sleeve Length:** Measure from center back neck, across shoulder, down to wrist with arm extended

8.2 Fit Recommendations

- **Outer Base Layer:** Jacket should fit comfortably over thermal base layer
- **Mid Layer:** Accommodate one fleece or wool mid-layer without excessive bulk
- **Movement:** Arm movement unobstructed with 2-3 finger space at shoulders
- **Torso:** Loose enough for layering; fitted enough to prevent excessive cold air infiltration

8.3 Layering Recommendations

Layer	Material	Thickn ess	Purpose
Base Layer (1st)	Merino wool or synthetic	~150- 200g	Moisture management and warmth
Mid Layer (2nd)	Fleece or wool	~250- 400g	Additional insulation for extreme cold
Outer Layer (3rd)	Winter Jacket	~150g shell	Wind and moisture protection

9. WARRANTY AND DURABILITY TESTING

9.1 Warranty Coverage

Compone nt	Warrant y Period	Coverage	Exclusions
Seams and Stitching	2 years	Manufacturing defects	Normal wear, damage from misuse
Zipper	1 year	Replacement for defective units	Teeth breakage, slider malfunction
Insulation	Lifetime	Clumping or migration >10%	Compression from normal use, water damage
Shell Material	2 years	Holes, tears, delamination	Pilling, fading, normal wear
Overall Jacket	2 years	Manufacturing defects	Environmental damage, misuse

9.2 Durability Testing Results

Lab Testing Standards Completed

Test	Standard	Result	Cycles/Duration	Status
Seam Strength	ISO 13935-2	Failure load >150N	Pass	✓ Pass
Tear Resistance	ASTM D1117	>65N for shell	Pass	✓ Pass
Abrasion Resistance	ISO 12947	>50,000 cycles	Rubs index 4	✓ Pass
Zipper Durability	ISO 17399	500+ open/close cycles	Pass	✓ Pass
Pilling Resistance	ASTM D3136	Grade 4-5	Pass	✓ Pass
Color Fastness	ISO 105-C06	4 hours at 60°C	Grade 4	✓ Pass
Shrinkage	ASTM D1868	<2% in length, <3% width	Pass	✓ Pass

Real-World Durability Testing

- **Field Test Duration:** 500+ cumulative wear hours
- **Environments:** Mountain use, urban commuting, rain exposure
- **Findings:**
 - Seams maintain integrity after repeated stress
 - DWR coating effective for 20-25 wash cycles
 - Insulation maintains 85-90% loft after 50+ cycles
 - Zipper operates smoothly through -30°C temperatures
 - No delamination or membrane separation observed

10. ENVIRONMENTAL AND SUSTAINABILITY

10.1 Material Sourcing

- **Synthetic Insulation:** 50% recycled polyester content (goal: 75% by 2026)
- **Outer Shell:** Virgin polyester with DWR coating applied locally
- **Thread:** Recycled polyester core, polyester wrap
- **Packaging:** 100% recyclable cardboard, recycled paper fill

10.2 Production Standards

- **Manufacturing:** ISO 14001 certified facilities
- **Chemical Use:** OEKO-TEX Standard 100 compliant
- **Water Usage:** Estimated 50 liters per jacket during production
- **Carbon Footprint:** Approximately 8-10 kg CO₂ equivalent per unit

10.3 End-of-Life Options

- **Recycling:** Can be disassembled into material streams at participating facilities
- **Donation:** Multiple organizations accept gently-used winter jackets
- **Repair Services:** Extended product life through professional repair
- **Trade-in Program:** 15% discount on future purchase with trade-in of old jacket

11. FREQUENTLY ASKED QUESTIONS (FAQ)

Warmth and Performance

Q: How warm is this jacket really? Can I wear it in -40°C?

A: The jacket is rated for -10°C to -20°C as standalone outerwear, and can extend to -30°C to -40°C with proper base layering (thermal base + fleece mid-layer). Below -40°C, supplemental protection is recommended.

Q: Will it keep me warm while I'm active vs. sitting still?

A: Yes to both. The synthetic insulation works in static situations. During high activity, you may experience overheating; use ventilation options (unzip partially) to regulate.

Q: What's the difference between CLO rating and temperature rating?

A: CLO rating measures insulation value (thermal resistance). Temperature rating predicts comfort at specific temps based on CLO value, activity level, and wind conditions.

Maintenance and Care

Q: How often should I wash this jacket?

A: Wash when visibly soiled (typically 1-2 times per season for regular users). Excessive washing reduces DWR effectiveness. Use spot cleaning for minor stains.

Q: Can I machine wash or should I hand wash?

A: Both are acceptable. Hand washing is gentler and recommended for best results. Use cool water, mild detergent, and avoid fabric softener.

Q: How do I know when to reapply DWR coating?

A: When water stops beading on the outer shell. Typically occurs after 20-30 washes or 1-2 seasons of regular use.

Material and Composition

Q: Is this jacket waterproof or water-resistant?

A: Water-resistant. The 5,000mm water column rating handles rain and light snow, but sustained heavy rain may eventually saturate the fabric. For full waterproofing in severe rain, wear over a rain shell.

Q: Is the insulation the same as down? Why use synthetic?

A: Synthetic (PrimaLoft Black) offers equivalent warmth to 700-fill down but retains warmth when wet, doesn't compress over time, and is hypoallergenic. Down excels in extreme cold static conditions but loses insulation when damp.

Q: What if I'm allergic to down feathers?

A: This jacket uses synthetic insulation, which is hypoallergenic and suitable for sensitive individuals.

Fit and Sizing

Q: I'm between sizes—which should I choose?

A: Choose the larger size if you plan significant layering, or the smaller size if wearing as a single outer layer over a light base layer.

Q: Can I wear this jacket over a heavy sweater?

A: Yes, but you'll feel more bulk and may lose mobility. For best results, use the jacket over a thin thermal base layer plus a fleece mid-layer in very cold conditions.

Q: Is this jacket suitable for women/men?

A: This guide covers the standard fit. Gender-specific fits available with different cut, sleeve length, and torso proportions—see size charts for specific models.

Technical Details

Q: What's the difference between the Rct and CLO measurements?

A: Rct is the scientific thermal resistance measurement ($\text{m}^2\cdot\text{K}/\text{W}$). CLO is a practical comfort rating ($1 \text{ CLO} \approx 0.155 \text{ m}^2\cdot\text{K}/\text{W}$). Both describe warmth, just in different units.

Q: How does wind affect the jacket's performance?

A: Strong wind significantly reduces insulation value by forcing cold air through the material. The wind-resistant outer shell and sealed seams minimize this. With 20+ km/h winds, the effective warmth drops approximately 1-2 CLO ratings.

12. TECHNICAL DIAGRAMS AND SPECIFICATIONS

12.1 Jacket Construction Layers

The Winter Jacket features a sophisticated multi-layer system designed to balance warmth, breathability, and durability.

From outside to inside:

1. **Outer Shell (2-3mm):** Polyester ripstop with DWR coating provides water and wind resistance
2. **Moisture Barrier (0.5mm):** ePTFE membrane blocks liquid water while transmitting vapor
3. **Insulation (60-100mm):** PrimaLoft Black synthetic fill creates thermal protection with minimal weight
4. **Lining (1-2mm):** Smooth polyester provides comfort and easy layering

12.2 Specifications Summary Table

Specification Category	Value/Rating
Temperature Range	-10°C to -40°C (with layering)
Weight	680-750g (1 lb 8 oz)
EN 342 Rating	Class 3, Level 2
Water Column Height	5,000mm (water-resistant)
Breathability	>10,000g/m ² /24hr
Thermal Resistance	0.38-0.42 m ² ·K/W
CLO Rating	5.0-8.5 depending on conditions
Insulation Type	PrimaLoft Black (synthetic)
Recommended Layering	Base + Optional mid-layer + Jacket
Warranty	2 years manufacturing defects
Care	Machine or hand wash, air dry
Certifications	ISO 14001, OEKO-TEX 100, EN 342, EN 343

APPENDIX: TECHNICAL TERMS GLOSSARY

CLO (Clo unit): Thermal insulation measurement where 1 CLO = the insulation of a typical business suit (0.155 m²·K/W)

DWR (Durable Water Repellent): Coating applied to fabric that causes water to bead and run off rather than absorbing into fibers

ePTFE (Expanded Polytetrafluoroethylene): Breathable membrane with micropores that block liquid water while allowing water vapor to pass through

EN 342: European standard for thermal protection of clothing

EN 343: European standard for waterproofness and breathability of clothing

Fill Power: Rating of down's ability to provide insulation (higher = better); measured in cubic inches per ounce

Icler/Iclr: Thermal insulation values where Icler is static insulation and Iclr is reduced insulation accounting for air circulation

PrimaLoft Black: Advanced synthetic insulation technology that mimics down with superior wet-weather performance

Ret (Moisture Vapor Resistance): Measurement of how much clothing restricts perspiration escape (lower = more breathable)

Rct (Thermal Resistance): Measurement of insulation effectiveness in $\text{m}^2\cdot\text{K}/\text{W}$ (higher = warmer)

Seam Sealing: Waterproof tape applied over stitched seams to prevent water infiltration

Water Column Height: Test measurement where 5,000mm means jacket resists water pressure equivalent to 5-meter column height

Product Guide prepared for testing and evaluation purposes.

For official product information, consult manufacturer documentation.

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