

DENIM WASHING

A Buyer's Introduction

Denim washing for buyers, merchandisers and product developers



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What you will be able to do after this session

Seven things. Each one is something you will actually do on a live order.

- 1 Name the main denim washes and recognise them on a garment
- 2 Explain roughly how each effect is created
- 3 Say why the same wash name gives different results in different factories
- 4 Identify the common wash defects and know what causes them
- 5 Ask a laundry the right questions before you approve a wash
- 6 Judge whether a sustainability claim about a wash is supported
- 7 Understand how wash complexity drives cost, lead time and risk

BUYER TAKEAWAY

You are not being trained to run a laundry. You are being trained to judge one.



The five questions to ask about any wash

Every wash and every effect in this programme is explained against the same five questions.

1

What is it?

The process in one sentence.

2

What does it look like?

The visual signature you can recognise on a garment.

3

How does it feel?

Hand feel, and whether the process changes it.

4

What can go wrong?

The defects that come with this process.

5

What does it cost me?

Price, lead time, complexity, reproducibility.

BUYER TAKEAWAY

A wash you cannot answer all five questions about is a wash you cannot approve.

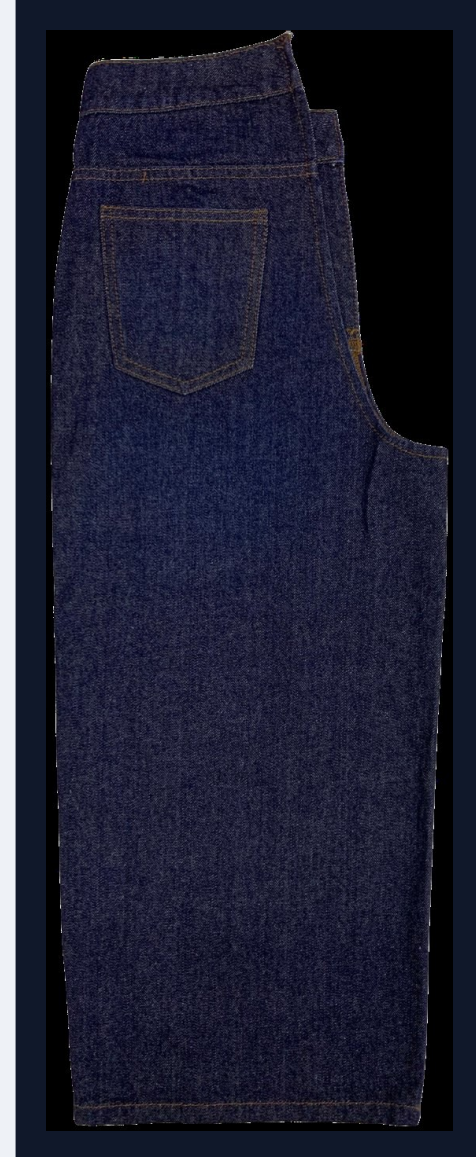
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Denim basics

Denim fades the way it does because of how it is woven and how it is dyed

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

Why indigo behaves differently from every other dye, and why the fabric decision and the wash decision are one decision, not two.



What denim is

WARP-FACED TWILL

The warp yarns run down the length and sit mostly on the face. The weft runs across and sits mostly on the back.

DYED WARP, UNDYED WEFT

In classic denim the warp is dyed and the weft is left undyed. That is why the face is blue and the inside is pale.

THE TWILL LINE

The diagonal on the face is the weave. Right-hand, left-hand and broken twills each fade differently.

WHERE FADING HAPPENS

The exposed warp on the face is what abrades, and abrasion is what makes the fade.

BUYER CHECKPOINT

Twill direction and construction are part of the wash result, not just the fabric spec. If the mill changes the weave, the approved wash will not look the same.



Rinse wash, close to the original shade

Indigo and ring dyeing: why denim fades

INDIGO HAS POOR AFFINITY FOR COTTON

It does not penetrate to the core of the yarn. Repeated dips build up rings of dye around a white core, which is why it is called ring dyeing.

A FADE IS SURFACE REMOVAL

Remove the outer layer of the yarn and the white core shows through. Stone, enzyme, bleach, laser and ozone are all doing the same job by different means.

DYE DEPTH SETS THE CEILING

Deeper penetration gives a garment that fades slowly and stays dark. Shallower penetration fades fast and shows high contrast.

BUYER TAKEAWAY

Wash development and fabric selection are one decision, not two. A wash approved on one fabric will not reproduce on another, however similar the spec sheet looks.



Acid wash: white core exposed

Black and sulphur denim behaves differently

DIFFERENT DYE CLASS

Most black and grey denim is dyed with sulphur dyes, not indigo. Some fabrics use sulphur under indigo, or indigo under sulphur, to shift the cast.

DIFFERENT RESPONSE

Sulphur dyes respond differently to enzyme, bleach and oxidation. A recipe that works on indigo will not translate.

CAST SHIFT

Black denim commonly shifts cast during washing, going brown, green or blue depending on the chemistry.

SHADE VARIATION READS HARDER

The eye reads small differences in a dark shade more easily than in a mid blue, so black shows garment-to-garment variation more.

BUYER CHECKPOINT

Never approve a black wash by reference to a blue standard. Ask for a black-specific development and a black-specific shade band.



Weight, construction and stretch

WEIGHT

Given in ounces per square yard. It affects how much abrasion the fabric can take and how long a cycle it needs. Lighter fabric reaches the target faster and damages faster.

RIGID OR STRETCH

Elastane changes everything. Heat and chemistry damage elastane, which shows as loss of recovery, bagging at knee and seat, and growth in wear.

YARN CHARACTER

Slub, neps and irregular yarns produce a textured fade. The same wash on a flat yarn looks completely different.

WEFT COLOUR

A coloured or black weft changes the whole result even when the warp is identical.

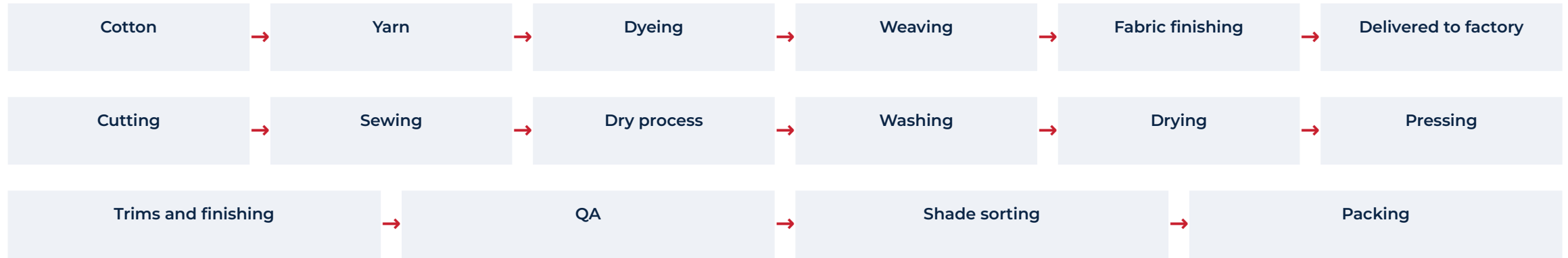


Enzyme wash on a dark base

BUYER CHECKPOINT

Ask for the wash to be developed on the actual bulk fabric. A wash approved on a substitute fabric is not approved, whatever the substitute cost you in sampling time.

From fabric to finished garment



Washing happens after sewing, on a complete garment

Everything on that garment goes through the process: fabric, thread, pocketing, labels, rivets, buttons and zips.

Dry processes may come before the wet process, after it, or both

Whiskering is usually marked on a dry garment. Grinding often follows the wet process.

The garment leaves the wash a different size from the one that entered

Shrinkage allowances are built into the pattern, so a change of wash is also a change of fit.

BUYER TAKEAWAY

Trims are part of the wash. A button that corrodes or a label that bleeds is a wash problem, and it is usually found in bulk rather than in the sample.

Why the same wash looks different on different fabrics

The same written process gives a different garment when any one of these changes.

At the mill

Fabric construction, weight and weave
Indigo depth and dyeing method
Yarn type: ring spun, open end, slub
Weft colour and elastane content

In the laundry

Garment volume in the machine
Machine type, drum size and action
Water quality and temperature
Chemical supplier and product grade

On the floor

The operator, on any manual step
Loading practice and cycle timing
Whether a reference garment is at the workstation
Which shift ran the lot

A wash name is not a specification. Always work to a physical standard.



Twelve words you need on day one

TERM	PLAIN MEANING	TERM	PLAIN MEANING
Desize	Removing the weaving size from the warp	Neutralisation	The step that stops and clears an oxidising treatment
Ring dyeing	Dye on the yarn surface, white core inside	Cast	The tone of a shade: too red, green or yellow
Back staining	Loose dye redepositing on pockets and weft	Shade band	Sealed lightest and darkest acceptable garments
Hand feel	How the fabric feels: soft, dry, papery, stiff	Sealed standard	The signed physical garment bulk is judged against
Contrast	Difference between the lightest and darkest area	Liquor ratio	Water per kilogram of garment in the machine
Crocking	Colour transferring by rubbing, wet or dry	Growth and recovery	How far stretch fabric bags out and springs back

These twelve cover most of what you will hear in a wash review. The glossary at the end of this deck carries the rest.



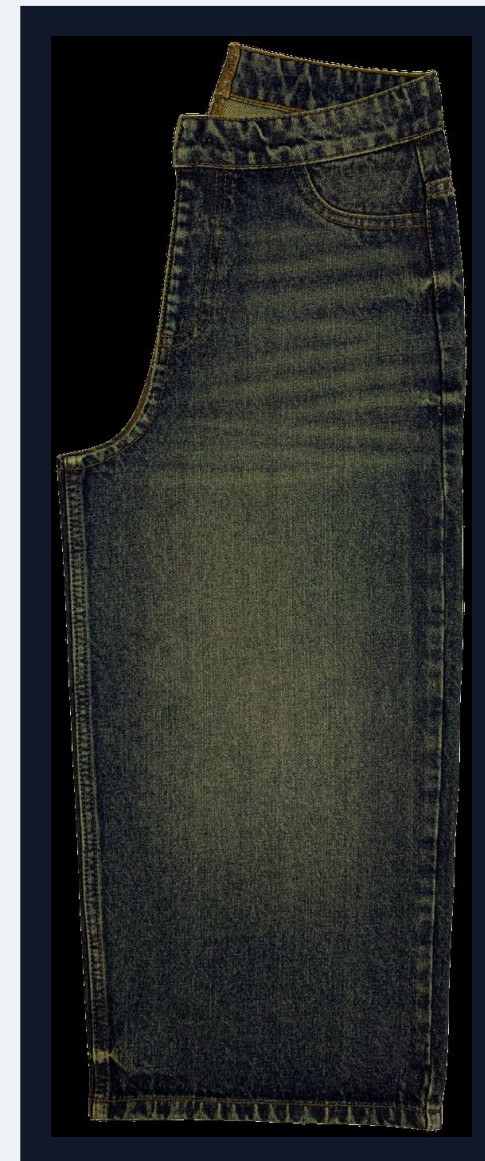
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Washing fundamentals

What washing actually does, and why bulk differs from your sample

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

How to place any technique in the right family, read a wash cycle as a sequence of steps, and understand why a recipe does not travel between laundries.



What garment washing actually does

Washing does four jobs at once. When you approve a wash you are approving all four.

1 • Cleans

Removes size, loose dye and soil left from production.

2 • Softens

Changes the hand feel from stiff and dry to the target feel.

3 • Ages

Creates the fade, contrast and wear pattern the design calls for.

4 • Stabilises

Relaxes the fabric so the garment is closer to its final size.

Reject a garment that has the right shade and the wrong hand feel. It has failed two of the four jobs.



The map: wet, dry and advanced

Every technique in this programme sits in one of these three groups. Most finished garments use all three.

Wet processes

Carried out in water in a washing machine.

Rinse · desize · enzyme · stone · bleach · acid · tint · overdye · garment dye · dip dye · tie dye · discharge · softening

Dry processes

Carried out on a dry garment, by hand or by a machine acting on one area.

Whiskering · hand sanding · grinding · destroy · rip and repair · PP spray and rubbing · resin and 3D crinkle · tagging · pigment spray and drop

Advanced technologies

Replace or reduce steps in either group.

Laser · ozone · low-liquor systems · water recycling · foam and spray chemical delivery

A finished garment is a sequence, not a single process. When you ask a laundry what the process is, you are asking for an ordered list of steps.

Wash type or wash effect?

The most common confusion among new buyers. A garment has one wash type and usually several wash effects.

	WASH TYPE	WASH EFFECT
What it describes	The overall look and shade of the finished garment	One localised technique applied within a wash
Examples	Rinse · mid · dark · vintage · acid · snow	Whiskers · PP spray · grinding · destroy · tagging · pigment drop
How many per garment	One	Usually several
Where the cost sits	Machine time, chemicals, water	Labour, operator skill, equipment
Main risk	Shade variation lot to lot	Position and consistency garment to garment

If you cannot name both for a garment in front of you, you cannot brief it to a second supplier or compare two quotations.



A standard wash cycle, step by step

A common sequence. The steps and their order change with the target effect, so treat this as a frame rather than a specification.

1 • Desize

Warm wash with an enzyme to remove the size applied to the warp for weaving. Incomplete desizing gives patchy results in every later step.

2 • Rinse

Removes loose dye and the desize liquor.

3 • Fading step

Enzyme, stone, both, bleach, or a dry-tumble effect.

4 • Neutralisation

Required after any oxidising step. Without it the chemistry stays in the garment and shows later as a cast or a failed test.

5 • Rinse

Repeated until the effluent runs clear.

6 • Tint or overdye

If the target shade calls for it.

7 • Softening

Sets the final hand feel.

8 • Extract and dry

Where most of the shrinkage happens.

Two steps to always ask about: was the garment properly desized, and was it properly neutralised. Almost every chemical defect traces back to one of those two.



Machines, load size and why bulk differs from sample

TWO DIFFERENT MACHINES

Sample washes are done in small machines with small loads. Bulk washes are done in large machines with large loads.

MECHANICAL ACTION CHANGES

Garments in a full drum rub against each other. A garment washed almost alone does not.

LIQUOR RATIO CHANGES

The water per kilogram of garment changes with the load, which changes chemical concentration at the fabric surface.

THE CONSEQUENCE

A sample washed at sample load will not reproduce at bulk load unless the laundry adjusts the recipe for the change.

BUYER CHECKPOINT

Ask whether the approved standard was washed at production load. If it was not, expect a shade shift at bulk and plan a size set before you commit the delivery date.



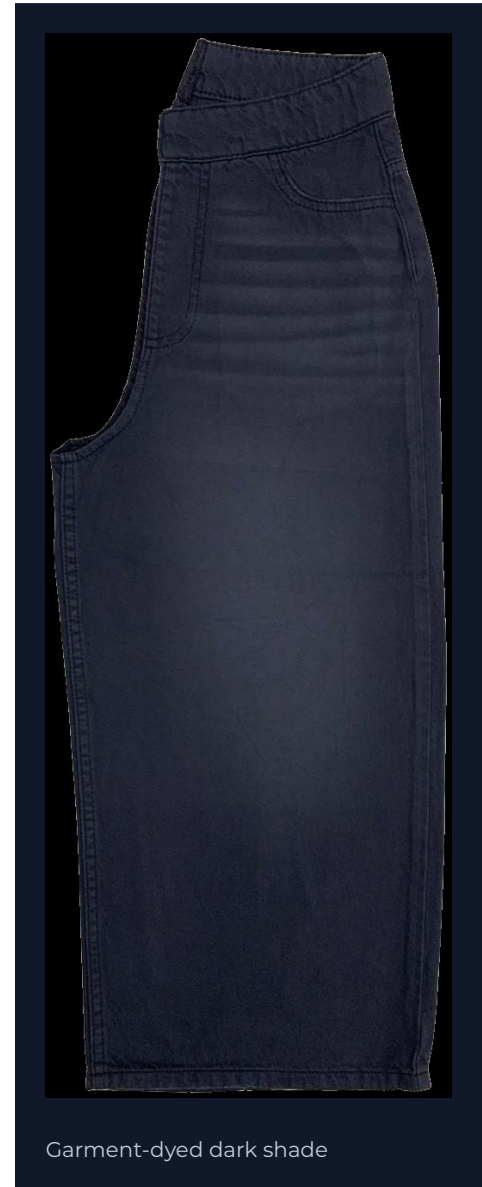
Dark wash, low contrast

Why a recipe does not transfer between factories

Two laundries running the same written recipe will produce different garments, because all of these differ between them.

- **Machine make, drum size, drum action and extraction**
Mechanical action is a physical property of the machine, not something in the recipe.
- **Water hardness, temperature and source**
Water chemistry changes how enzymes and bleach behave, and it changes by season.
- **Chemical brands and product grades**
The same generic chemical from two suppliers is not the same product.
- **Operator technique on every manual step**
Whiskering, scraping, spraying and towel work are hand skills.
- **Loading practice and cycle timing**
How full the drum is run, and how strictly the timings are held.

A recipe is not portable. A physical standard is.



Garment-dyed dark shade

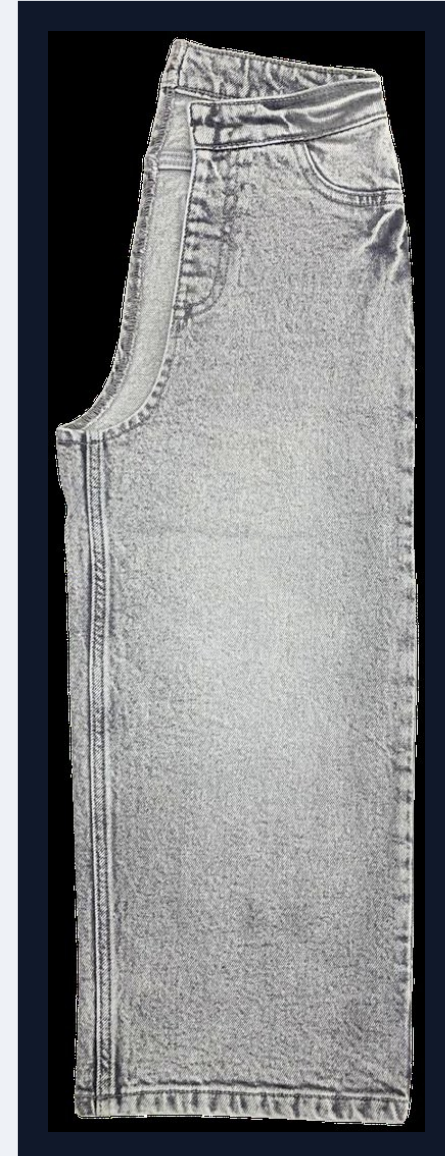
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Wet processes

The washes that set the shade

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

What each wet process is, what it looks like on a garment, what it does to the hand feel, what goes wrong, and what it costs you.



Rinse wash

- WHAT IT IS** The lightest wet process. A short water wash, usually with softener.
- WHAT IT LOOKS LIKE** Dark, close to the original fabric. Size and loose dye removed, very little fade.
- HOW IT FEELS** Softer than raw denim but still crisp.
- WHAT CAN GO WRONG** Uneven rinsing, residual dye, crocking on dark shades.
- WHAT IT COSTS** Lowest cost, shortest cycle, easiest to reproduce in bulk.

BUYER CHECKPOINT

Check shade consistency lot to lot, and check back staining on pockets and labels. Rinse looks simple, which is exactly why shade variation slips through unnoticed.



Rinse wash on indigo

Enzyme wash

WHAT IT IS Cellulase enzymes remove the fibre surface, which fades and softens the garment.

WHAT IT LOOKS LIKE Even natural fading, highlights on seams and edges, no hard contrast.

HOW IT FEELS Noticeably soft. This is the main reason it is specified.

WHAT CAN GO WRONG Back staining, uneven fading, strength loss if over-treated.

WHAT IT COSTS Low to medium, medium cycle, repeatable when properly dosed.

ALSO WORTH KNOWING

Enzyme replaces pumice stone, so it avoids stone sludge and machine wear. It is still a full wet process with heating and effluent load.

BUYER CHECKPOINT

Ask which enzyme type is used and what the anti-back-staining agent is. Check pocketing and weft for staining, and ask for tensile and tear results on a washed garment.



How enzyme washing actually works

THE ENZYME ATTACKS THE FIBRE, NOT THE DYE

Cellulase hydrolyses cellulose at the fibre surface. Fibrils loosen and detach, and the indigo on those fibrils leaves with them. The fade is a consequence.

ACID OR NEUTRAL CELLULASE

Acid cellulase strips more colour but attacks the cotton harder and causes noticeably more back staining. Neutral cellulase is gentler, with less colour removal.

OVER-TREATMENT IS FIBRE LOSS

Because the enzyme removes cellulose, running it too long or too hot means measurable weight loss and lower tensile and tear strength.

BUYER TAKEAWAY

The softest hand feel and the weakest fabric often arrive together. Test strength on the washed garment, because that is where the loss shows up.



Stone wash

WHAT IT IS	Pumice stones tumbled with the garments. Mechanical abrasion rather than chemistry.
WHAT IT LOOKS LIKE	Higher contrast than enzyme, with pronounced highlights on seams, hems and pocket edges.
HOW IT FEELS	Softened by the abrasion, sometimes slightly fuzzy on the surface.
WHAT CAN GO WRONG	Stone marks, damage at seams and hems, pumice trapped in pockets, machine wear.
WHAT IT COSTS	Medium. Stone handling, sludge disposal and higher machine maintenance sit in the price.

BUYER CHECKPOINT

Ask whether stone is used alone or with enzyme, and check hems, belt loops and pocket corners on the approved standard. That is where stone damage appears first.



Mid blue with seat and hip fading

Bleach wash

- WHAT IT IS** An oxidising bath, normally hypochlorite based, that destroys the dye rather than abrading it.
- WHAT IT LOOKS LIKE** Light and fairly even. Can go very light, and can flatten contrast if pushed.
- HOW IT FEELS** Can be harsh and dry if the neutralisation and softening are short.
- WHAT CAN GO WRONG** Over-bleaching, which is irreversible, plus strength loss, yellowing and cast shift.
- WHAT IT COSTS** Medium, but the rejection risk is real because the process cannot be reversed.

BUYER CHECKPOINT

Ask for the neutralisation and clearing steps by name, and for a residual chemical and pH result on the finished garment. Bleach damage does not show at once.



Light shade reached by bleach

Acid wash

WHAT IT IS

Pumice soaked in an oxidiser and tumbled with dry or damp garments, so the stones deposit chemistry in random contact points.

WHAT IT LOOKS LIKE

Sharp white marbling against a darker ground. No two garments identical.

HOW IT FEELS

Dry, sometimes slightly harsh where the oxidiser hit hardest.

WHAT CAN GO WRONG

Difficult to control, high rejection, strength loss, yellowing if neutralisation is incomplete.

WHAT IT COSTS

Medium price with a real rejection allowance that must be in the quotation.

ALSO WORTH KNOWING

No acid is used at any stage. The name is historical. Say oxidising agent when you brief a supplier, and always ask about the neutralisation step.

BUYER CHECKPOINT

Agree a shade band rather than a single standard, because the effect is random by design. Ask the laundry for its actual rejection rate on this wash before you accept a price.



Acid wash marbling

Neutralisation is not optional

Neutralisation is where oxidising washes are won or lost. Nothing looks wrong at the time, which is why the step gets shortened.

After potassium permanganate

Manganese dioxide forms on the garment and must be cleared.

Ask what clearing agent is used and for the residual result.

After sodium hypochlorite

Residual chlorine must be removed with a reducing agent such as sodium bisulphite.

Chlorine left on the garment keeps working in the warehouse.

If it is skipped

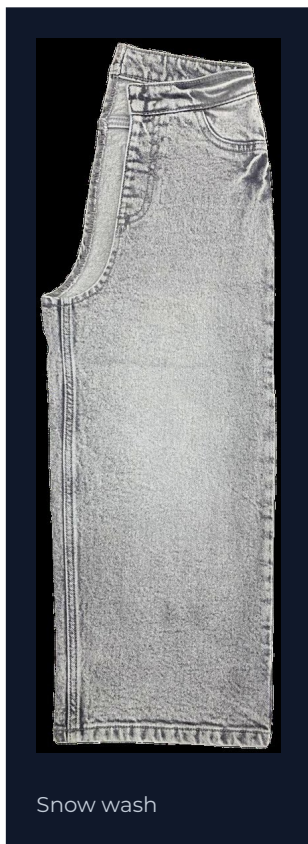
Yellowing in storage, continued strength loss, a cast shift, and residual chemistry on a garment worn against the skin.

Ask for the residual chemical and pH result on the finished garment. It is a cheap test and it is the only evidence the step was done properly.



One family, three names

Where the oxidiser touches the cloth is what makes the pattern. How much of it there is makes the shade.



The first three are the same chemistry carried onto the cloth three different ways: by stone, by towel, and by stone again at a lighter setting. The fourth was bleached in the bath, which is why it has no marbling at all.

Vintage wash

WHAT IT IS A combination wash. Stone or enzyme, plus bleach, plus tint, plus localised dry effects.

WHAT IT LOOKS LIKE Warm, aged and uneven in a natural way, usually with a tint pulling the blue towards yellow, grey or brown.

HOW IT FEELS Soft and broken in. Part of what the customer is paying for.

WHAT CAN GO WRONG Cumulative shade variation, strength loss from stacked treatments, and drift between lots.

WHAT IT COSTS High price, long cycle, highest fashion value of any wash family.

BUYER CHECKPOINT

Vintage is the highest-risk wash for bulk-to-standard matching, because every added step adds variation. Ask how many steps the wash has. Four steps means four chances to drift.



Vintage wash with thigh fading

Shade words are not washes

MID, LIGHT AND DARK DESCRIBE THE RESULT

They tell you where the finished garment sits on the shade scale. They tell you nothing about how it got there.

THE ROUTE IS A SEPARATE QUESTION

Enzyme, stone, bleach, laser, ozone or a combination will all reach a mid shade, at very different costs and with very different risks.

ASK BOTH QUESTIONS EVERY TIME

First, what shade is the target. Second, what process reaches it. Write both into the technical pack.

BUYER TAKEAWAY

You cannot compare two quotations for a mid wash until both suppliers have answered the second question. When a costing looks unusually cheap, this is usually why.



Tinting and overdye

WHAT IT IS

A light colour applied over a washed garment to shift its cast, or a full re-dye to a new colour.

WHAT IT LOOKS LIKE

Tinting warms or cools the cast: dirty, yellow, grey or green. Overdye gives a new colour with the wash structure showing through.

HOW IT FEELS

Largely unchanged, though heavy overdye can stiffen slightly.

WHAT CAN GO WRONG

Difficulty matching the tint from lot to lot, change in cast, and unevenness of the tint across the garment.

WHAT IT COSTS

Medium, and it adds a step, so it adds both cycle time and a failure point.

BUYER CHECKPOINT

Ask for a tinted band, not just a tinted standard, and expect more variation than on an untinted wash. Cast is the property that drifts.



Vintage wash with a warm tint

Garment dyeing

WHAT IT IS	Dyeing the finished sewn garment rather than the fabric. Used for colour flexibility and late colour decisions.
WHAT IT LOOKS LIKE	Solid colour with the garment structure showing through. Seams and thread often take colour differently.
HOW IT FEELS	Softer than piece-dyed fabric of the same colour, because the garment has been through a full wet cycle.
WHAT CAN GO WRONG	Shade variation between garments, poor fixation, streaks in the body, and seam colour differing from the panel.
WHAT IT COSTS	Medium to high, dye-lot bound, with colour matching as the main risk.

BUYER CHECKPOINT

Ask how shade variation is controlled and how garments are sorted before packing. Check inside pockets and along seams for uneven penetration.



Garment-dyed dark shade

Cold dyeing

- WHAT IT IS** Dyeing at low temperature, close to ambient, instead of in a hot bath.
- WHAT IT LOOKS LIKE** Anything from soft pastels to fully saturated colour. The temperature does not limit the shade.
- HOW IT FEELS** Softer, with less fabric damage than a hot bath.
- WHAT CAN GO WRONG** Uneven dyeing, poor fixation and colour variation, all of which come from the longer dwell.
- WHAT IT COSTS** Energy saving against a hot process, but a longer cycle and a narrower dye selection.

BUYER CHECKPOINT

Confirm the working temperature and the fixation system with the dye supplier before it goes into a technical pack, and approve against a physical standard rather than a description.

Deep purple-blue garment dyeing

Dip dyeing and gradient effects

WHAT IT IS The garment is partially immersed in a dye bath to create a gradient, an ombre or a sharp two-tone break.

WHAT IT LOOKS LIKE A colour gradient, usually rising from the hem, with a transition zone whose softness depends on how the dip is controlled.

HOW IT FEELS Unchanged from the base wash in most cases.

WHAT CAN GO WRONG Uneven dip line, poor fixation at the transition, and streak marks where the garment was lifted.

WHAT IT COSTS Medium. Strong visual differentiation for relatively low process complexity.

BUYER CHECKPOINT

Measure the dip height from the hem on a measured garment and agree a tolerance in centimetres. Check it across the whole size range, because a line set from the hem will look wrong on a larger size unless it is set proportionally.



Two-tone dip at the hem

Tie dye and tie bleach

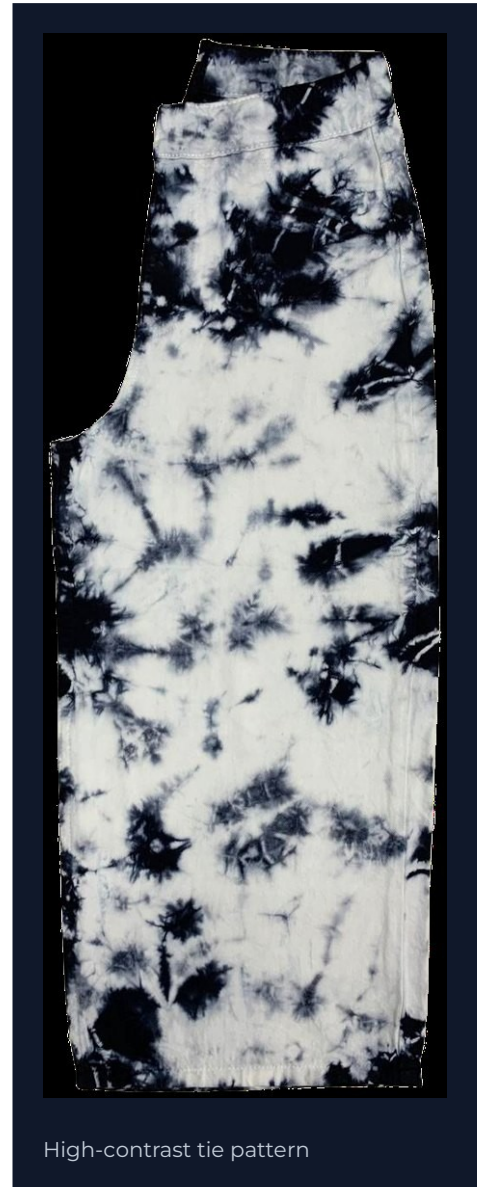
- WHAT IT IS** The garment is tied, folded, knotted or clamped. The compressed areas resist the liquor and stay dark.
- WHAT IT LOOKS LIKE** Sharp organic starburst and ring patterns. Every garment different by design.
- HOW IT FEELS** Unchanged by the tying itself. The base wash sets the hand.
- WHAT CAN GO WRONG** Very difficult to reproduce, uneven pattern density, and high rejection.
- WHAT IT COSTS** High. The tying is a hand skill, so output is limited per operator per day.

ALSO WORTH KNOWING

Tie effects are sometimes confused with 3D crinkle, which is a resin and heat treatment producing texture rather than a colour pattern. They are different techniques.

BUYER CHECKPOINT

A single approved standard is not workable. Agree a high and a low limit sample with a pattern density expectation, then inspect against the range rather than against one garment.



High-contrast tie pattern

Dischargeable dyeing

WHAT IT IS

The garment is dyed with a reducible dye, then a discharge chemical removes colour in selected areas.

WHAT IT LOOKS LIKE

Contrasting patterns or faded areas lifted out of a solid dyed ground, with a soft edge.

HOW IT FEELS

Soft. The discharged area is chemically stripped rather than abraded.

WHAT CAN GO WRONG

Incomplete discharge, uneven patterns, shade variation, and odour or residual chemistry if the wash is short.

WHAT IT COSTS

High, and it is limited to dyes that will actually discharge.

BUYER CHECKPOINT

Confirm the dye is dischargeable before the colour is approved, not after. Ask which discharge chemistry is used, check it against the restricted substances list, and ask for the residual and pH result.



Discharge mark on garment dye

Wet processes at a glance

PROCESS	HOW THE SHADE IS REACHED	LOOKS LIKE	MAIN RISK
Rinse	Water and softener only	Dark, close to raw	Shade variation lot to lot
Enzyme	Cellulase removes the fibre surface	Even fading, soft	Back staining, strength loss
Stone	Pumice abrasion in the drum	High contrast on seams and edges	Seam damage, sludge
Bleach	Oxidising bath destroys the dye	Light and fairly even	Over-bleaching, irreversible
Acid or snow	Oxidiser carried on stones	Random white marbling	High rejection, yellowing
Vintage	Several processes stacked	Warm, aged, tinted	Cumulative shade drift
Tint and overdye	Colour applied over the wash	Shifted cast or new colour	Cast drift lot to lot
Garment dye	Dyed after sewing	Solid colour, structure visible	Shade variation, fixation
Dip dye	Partial immersion	Gradient or two-tone	Uneven dip line
Tie dye and tie bleach	Mechanical resist then treatment	Organic starburst patterns	Reproducibility
Dischargeable	Colour chemically removed	Contrast on a solid ground	Incomplete discharge

Shade words such as mid, light and dark describe the target, not the route. Establish both before comparing two quotations.



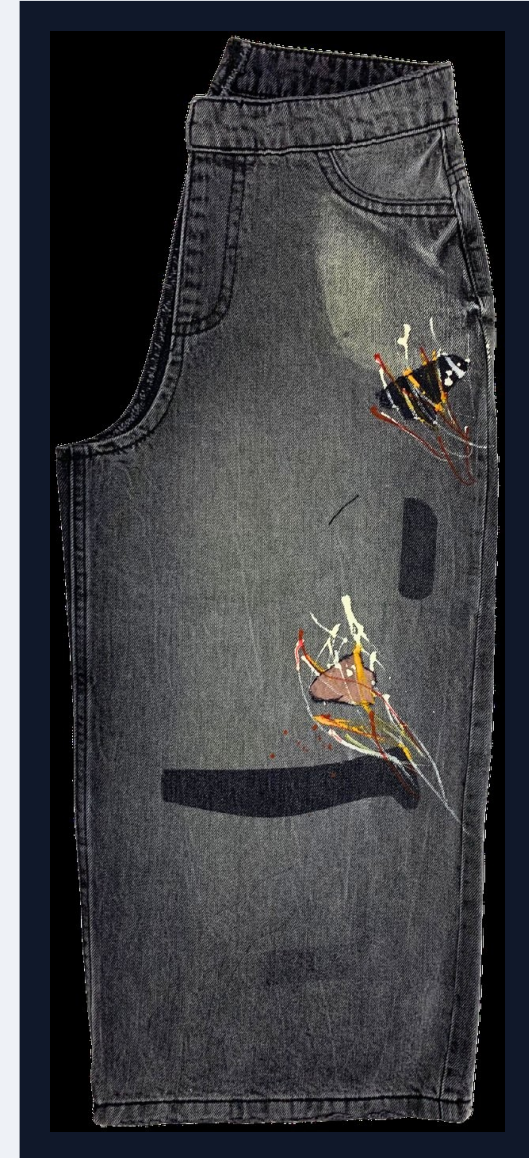
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Dry and localised processes

Placed effects mean dry processes

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

How each localised effect is made by hand or machine, why operator skill decides the result, and which effects now carry a compliance question.



Whiskering

WHAT IT IS	The garment is folded or moulded over a form, then the raised creases are faded by hand, PP spray or laser.
WHAT IT LOOKS LIKE	Horizontal faded lines at the hip and upper thigh imitating natural creasing, defined and radiating from the crotch.
HOW IT FEELS	Slightly drier where the surface has been abraded.
WHAT CAN GO WRONG	Left and right not matching, position drifting between garments and operators, and pattern looking wrong across sizes.
WHAT IT COSTS	High if manual, because it is a hand skill on every garment. Low per piece once it is a laser file.

BUYER CHECKPOINT

Lay five garments from one lot flat and compare left with right. Check the whisker position across the size range. If those five differ, nothing else in the wash will be consistent.

Whiskers on a dark grey wash

Hand sanding and scraping

WHAT IT IS	Manual abrasion of selected areas, usually the thigh, seat and back pocket, using abrasive paper or a pad over a form.
WHAT IT LOOKS LIKE	Soft graded fading in the high-wear areas. Done well, the edges are hand and the pattern is obviously man-made.
HOW IT FEELS	Softer and thinner in the sanded area, with a slightly raised surface.
WHAT CAN GO WRONG	Inconsistency between operators and between garments, hard edges, and over-sanding that thins the fabric.
WHAT IT COSTS	High. It is entirely labour, and labour scales with volume rather than with machinery.

BUYER CHECKPOINT

Ask how many operators run the style and whether each has a sealed reference garment at the workstation.
Look at the edges of the sanded area for a hard line.



Thigh and seat highlights

Grinding and edge abrasion

- WHAT IT IS** Mechanical abrasion of edges and seams with a grinding wheel or stone.
- WHAT IT LOOKS LIKE** Frayed pocket edges, worn hems, thinned seam tops, and broken belt loops.
- HOW IT FEELS** Locally thin and sometimes fluffy where fibres have lifted.
- WHAT CAN GO WRONG** Excessive grinding, which opens the seam rather than aging it, and inconsistency between garments.
- WHAT IT COSTS** Medium. Fast per garment, but it needs a control sample on the line.

BUYER CHECKPOINT

Pull gently at a ground seam. If it opens, the grinding has gone through the seam. Ask for a seam slippage and tear result after grinding, not before it.



Abraded edges on acid wash

Destroy, rip and repair

WHAT IT IS	Deliberate cuts, holes and fraying, then optionally backed with contrast fabric or darned with thread.
WHAT IT LOOKS LIKE	Open holes with exposed weft threads, or holes backed with contrast fabric and visible stitching.
HOW IT FEELS	Locally stiffer where a backing fabric or dense stitching sits.
WHAT CAN GO WRONG	Tears spreading beyond the design in washing, in the shop or in wear, and inconsistent damage size across garments.
WHAT IT COSTS	High, and it carries a higher return rate in the market than most effects.

ALSO WORTH KNOWING

Check whether the damage sits over a stress point such as the knee or the seat. That is where a fashion detail becomes a durability claim.

BUYER CHECKPOINT

Approve the exact size, position and density on a marked-up garment, then check the tears again after the wash. Destroy that is correct before the machine is often too large after it.



Tears backed and darned in white

PP spray and PP rubbing

WHAT IT IS Potassium permanganate solution sprayed or rubbed onto selected areas to bleach out local highlights.

WHAT IT LOOKS LIKE Sharp local highlights on whiskers, thigh, seat, knee and hem. Precise in skilled hands.

HOW IT FEELS Drier and slightly harsh in the treated area.

WHAT CAN GO WRONG Incomplete neutralisation leaving a brown or yellow cast, over-application weakening the fabric, and operator variation.

WHAT IT COSTS Medium in money, but it now carries a compliance cost that is covered on the next slide.

BUYER CHECKPOINT

Ask whether the laundry can reach the same effect by laser instead. Ask for the neutralisation procedure and the residual manganese result on the finished garment.



PP spray is now a compliance question

For a buyer, potassium permanganate is no longer only a quality and safety question.

- **Potassium permanganate is on the ZDHC Chemical Watchlist**

Brands and laundries face growing expectation to justify continued use or replace it.

- **Technology suppliers are pushing for a full phase-out**

The stated alternative is laser, which reaches similar local fading without the chemistry.

- **It changes the question you ask**

Not whether the laundry can do the effect, but whether it can do the effect without PP, and if not, why not.

- **It changes your own exposure**

A wash approved today can become a brand-risk conversation later. Check the restricted substances list before approval, not after.

Confirm your own brand's restricted substances position before this goes into a technical pack.



Localised fading, gradient application

Tagging, pigment spray and drop

WHAT IT IS

A group of localised colour applications. Pigment with a binder is sprayed, pressed, flicked or dripped on, then dried and heat cured.

WHAT IT LOOKS LIKE

Handmade irregular colour marks. Splatter reads as paint. Spray reads as a soft gradient or a shadow.

HOW IT FEELS

Stiffer where the binder is heavy, because pigment sits on the surface rather than in the fibre.

WHAT CAN GO WRONG

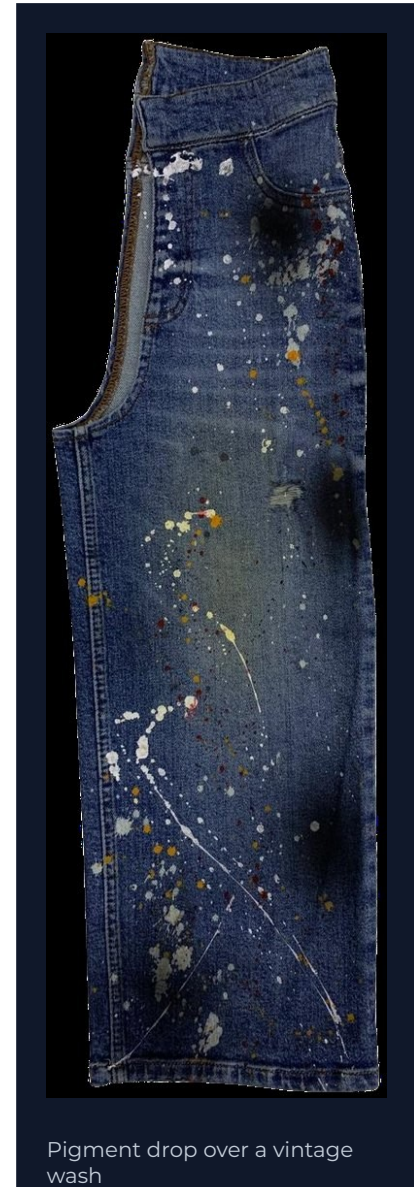
Crocking, uneven curing that leaves the pigment unfixed, and poor reproducibility because it is a hand process.

WHAT IT COSTS

Very high. Output is limited per operator per day, which makes it an MOQ constraint as much as a price one.

BUYER CHECKPOINT

Ask for rubbing fastness, dry and wet, before approval. Then rub a white cloth across the area yourself and look at the cloth.



Pigment drop over a vintage wash

Pigment application, step by step

1 • PREPARE THE SURFACE

A cationic pretreatment is exhausted onto the garment first. It acts as the link between the fabric and the pigment, because pigment has no affinity for cotton on its own.

2 • APPLY THE PIGMENT

By exhaust, spray or drop. A high liquor ratio and a low starting bath temperature give even take-up, and the temperature is then raised slowly.

3 • FIX WITH A BINDER

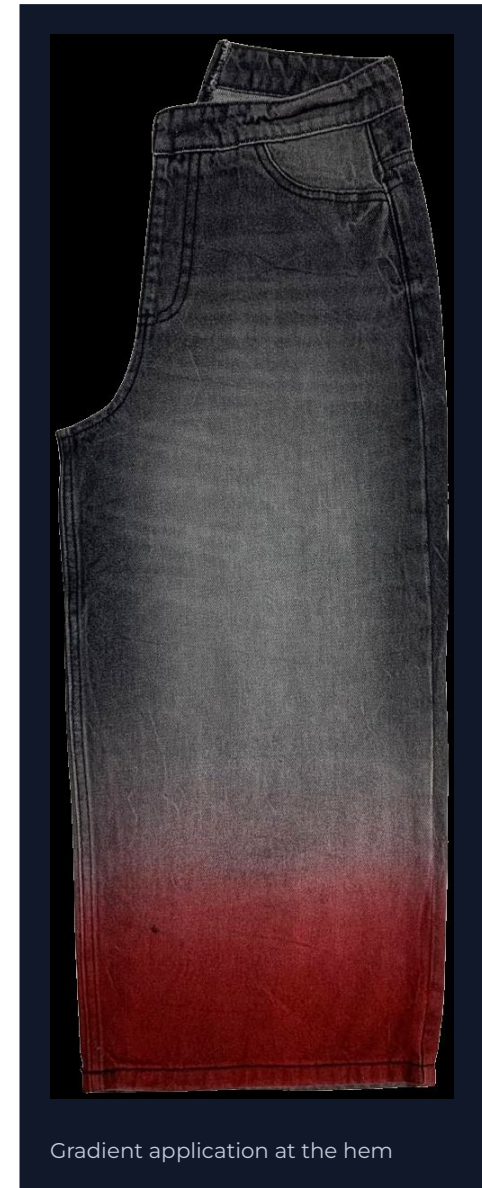
An acrylic-based binder is applied and cured, low temperature or air-cured. The binder is what gives the garment its rubbing fastness.

4 • DRY AND FINISH

Softener and drying set the final hand feel, which is stiffer in the pigmented area.

THE ONE TRADE-OFF TO REMEMBER

Deeper pigment shades always rub worse, and adding more binder does not fully fix it. Decide the acceptable crocking level before the shade is approved, not after.



Gradient application at the hem

Resin, 3D crinkle and permanent creases

WHAT IT IS	A crosslinking chemical is applied, the garment is formed into the required crease, and heat cures it in place.
WHAT IT LOOKS LIKE	Permanent three-dimensional creases, crinkles or shape retention that survive laundering.
HOW IT FEELS	Stiffer, and drier. This is the trade-off the customer notices first.
WHAT CAN GO WRONG	Residual formaldehyde from conventional resins, loss of tear strength, uneven curing and resin marks.
WHAT IT COSTS	High, and oven capacity is usually the bottleneck, so it constrains the delivery date more than the price.

ALSO WORTH KNOWING

Formaldehyde-free crosslinking systems are commercially available and are designed to give the same 3D effect with less strength loss. Ask whether one is being used.

BUYER CHECKPOINT

Ask which resin system is used and confirm the formaldehyde position against the restricted substances list. Ask for tensile and tear results after curing, on the finished garment.



Resin crinkle, all-over texture

Dry processes at a glance

EFFECT	HOW IT IS MADE	OPERATOR DEPENDENT	MAIN BUYER RISK
Whiskering	Moulding then fading, by hand, PP or laser	High if manual	Left and right not matching
Hand sanding	Abrasive paper over a form	Very high	Hard edges, over-thinning
Grinding	Wheel or stone abrasion at edges	Medium	Seams opening
Destroy	Cutting then grinding then washing	High	Tears growing after wash
Rip and repair	Destroy then backing or darning	Very high	Backing failing in wear
PP spray and rubbing	Potassium permanganate applied locally	High	Compliance, residual chemistry
Tagging and pigment	Pigment plus binder, then cured	Very high	Crocking, stiff hand
Resin and 3D crinkle	Crosslinker then heat cure	Medium	Formaldehyde, strength loss

Operator dependence is the best single predictor of how far bulk will drift from the approved standard. Count the manual steps before you approve the wash.



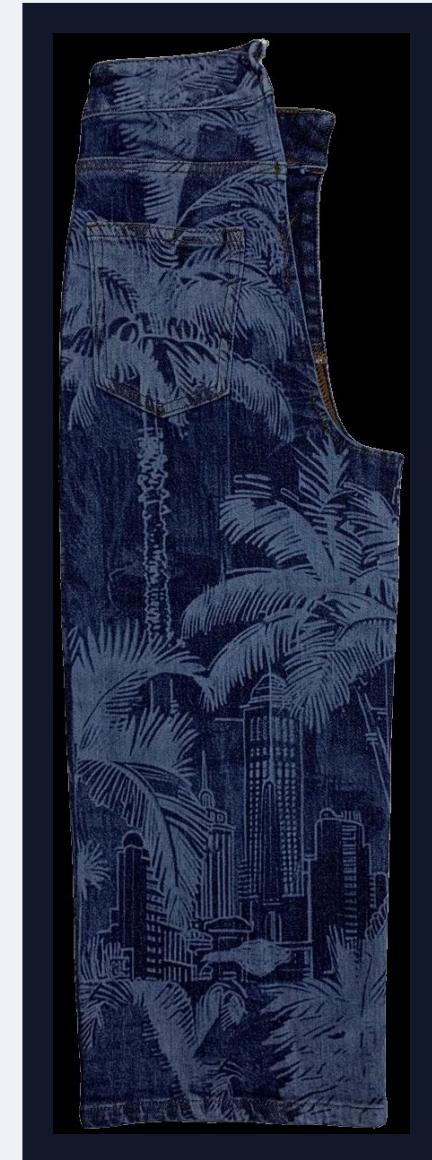
06

Advanced technologies

Judge the route, not the technology

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

What laser and ozone actually do, what they replace, and how to test a supplier's claim that a route has been made cleaner.



Laser

WHAT IT IS

A focused beam removes the dyed surface of the fabric under digital control. It replaces hand scraping, whiskering and much PP spray work.

WHAT IT LOOKS LIKE

Anything from a soft whisker to a photographic all-over design. Precise edges, and identical garment to garment.

HOW IT FEELS

Unchanged at low power. Harsh or scorched if the power is set too high for the fabric.

WHAT CAN GO WRONG

Over-power settings causing yellowing, strength loss and holes, and a file that does not transfer to another fabric.

WHAT IT COSTS

Expensive equipment, very fast per garment. Strong for repeat programmes, weak for one-off small runs.

BUYER CHECKPOINT

Ask whether the laser file was developed on the bulk fabric, and what wash follows the laser. Check the reverse of the lasered area for scorching.



All-over laser design

Marking, engraving and perforation

MARKING

The lightest setting. Affects the surface layer only, so it changes colour without changing the handle. Used for overall fading and soft worn effects.

ENGRAVING

A deeper pass. Removes more of the surface and leaves a tactile as well as a visual effect. Used for patterns, images and hard-edged distress.

PERFORATION

Full power, through the fabric, creating holes. A different operation with a different durability consequence, not simply a stronger version of engraving.

WHY THE WORDS MATTER

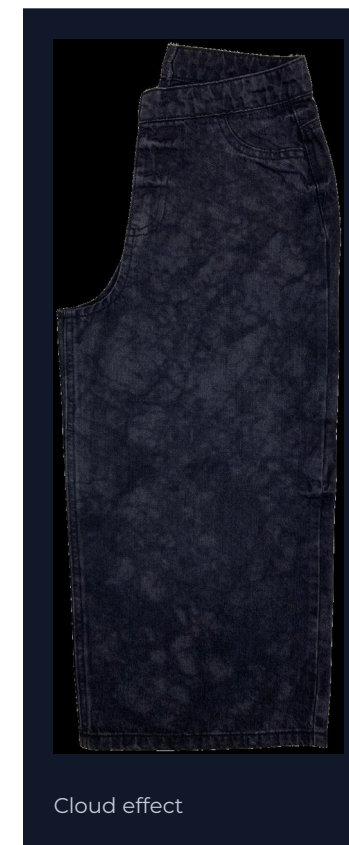
All three come off the same machine and the same file, and the difference is a setting. Use all-over laser design for a surface pattern. If you brief the wrong term, the laundry quotes the wrong price and produces the wrong garment.



Engraved lattice pattern

What laser can do that chemistry cannot

Precision and repeatability, rather than sustainability alone, are the commercial case for laser.



Every one of these is a digital file. Send the same file to the same machine on the same fabric and you get the same garment, which no chemical process can promise.

Ozone

WHAT IT IS

Ozone gas, generated from the oxygen in air, fades garments in a closed drum. It reacts with the dye, giving a bleached or worn look without a bleach bath.

WHAT IT LOOKS LIKE

Overall lightening with a cleaner, less redeposited surface. Often used together with laser.

HOW IT FEELS

Largely unchanged, and softer than the equivalent bleach route because there is less wet processing.

WHAT CAN GO WRONG

Shade control across batches, over-treatment causing strength loss, and an effect that is not identical to a bleach bath.

WHAT IT COSTS

Equipment cost, low running cost. It removes wet bleaching steps and the pumice in some routes.

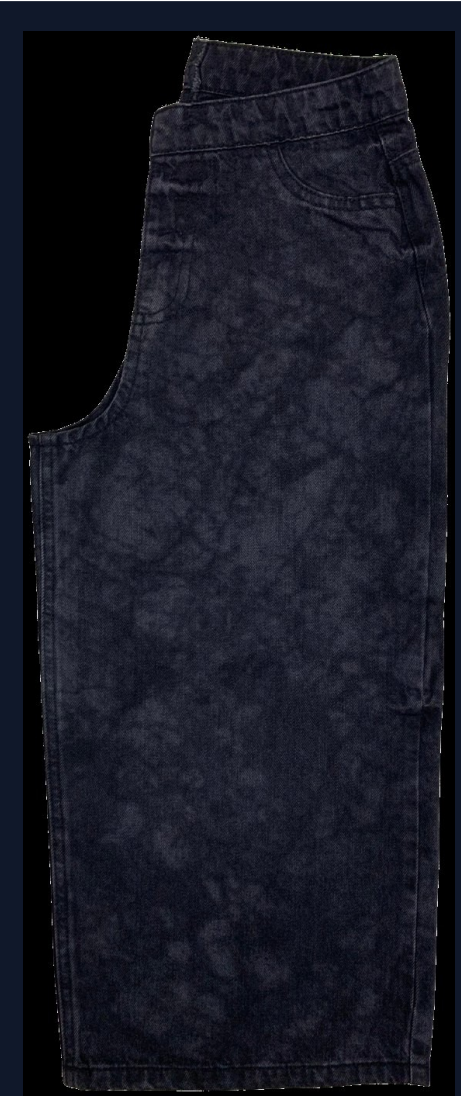
ALSO WORTH KNOWING

The gas is generated from air and destroyed at the end of the cycle inside a closed system, which is why the step itself carries very little chemical load.

BUYER CHECKPOINT

If a supplier proposes converting an approved bleach wash to ozone, treat it as a new development and ask for a new sealed standard. It is not a like-for-like substitution.

Overall lightening on a dark base



Low-liquor and water-saving systems

Machines and delivery systems designed to run at much lower water-to-garment ratios, or to recover and reuse process water.

Low-liquor machines

Run at a lower water-to-garment ratio, so less water to heat and less to treat.

Chemistry has to be re-dosed for the new ratio.

Foam and spray delivery

Chemicals delivered as foam, mist or spray rather than in a full bath.

Applies chemistry to the surface where the effect is wanted.

Water recovery loops

Process water filtered and reused within the laundry rather than discharged.

Recovery capacity is the constraint, not the intent.

Ask for water consumption per garment and how it is measured. A figure per batch tells you nothing unless you also know the batch size.



What replaces what

A substitution changes the impact profile. It does not automatically make the route clean. A laser garment washed in a high-liquor machine is not obviously better than an enzyme garment washed in a low-liquor machine with heat recovery.

TRADITIONAL STEP	MODERN ALTERNATIVE	WHAT ACTUALLY CHANGES
Hand scraping	Laser	Repeatability, speed, less dust exposure for the operator
Manual whiskering	Laser	Left and right consistency, faster design change
PP spray	Laser, sometimes with ozone	Removes an oxidising chemical and the operator exposure
Stone wash	Enzyme, ozone	Removes pumice sludge and machine wear
Bleach bath	Ozone	Reduces chemical load and effluent
High liquor ratio	Low-liquor and recovery systems	Reduces water volume and heating energy

When a supplier says they use laser and ozone, the next question is on which steps, and what the rest of the route still is.



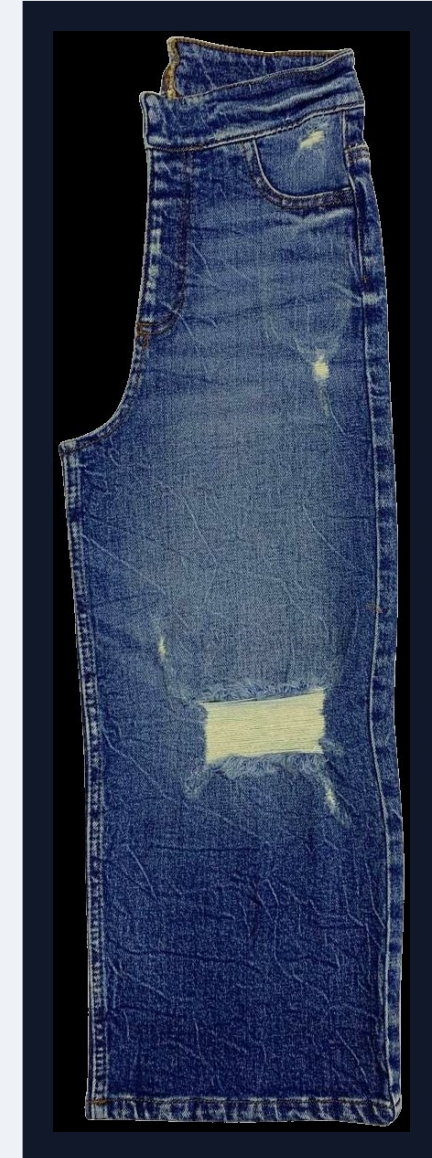
07

Building and approving a wash

A wash name is not a specification. The sealed physical standard is

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

How to read a finished garment as a sequence of processes, and how a wash gets from a reference image to an approved standard that will actually hold in bulk.



Reading a wash: seven things, in order

Take a finished garment and work through it in this order. It is a habit worth building, because it turns looking into specifying.

1 Overall shade

How light or dark is the ground?

2 Contrast

Even, or sharp highlights against a darker base?

3 Pattern

Random like acid and tie, or placed like whiskers and sanding?

4 Placement

Placed effects mean dry processes, so look for the form marks.

5 Damage

Holes, fraying, ground edges, and whether they are backed.

6 Colour additions

Tint, overdye, pigment, splatter, discharge.

7 Hand feel

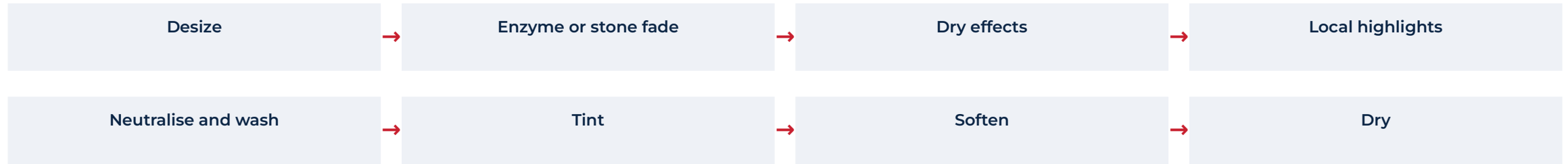
Soft, rough, stiff, papery. Feel the inside as well as the face.

A garment with a light even ground, sharp whiskers and a soft hand has been through at least three processes: a fading wet process, a dry whisker process and a softening step.



Tinted vintage with pigment drop

Combination washes: how a look is layered



Every step adds cost and time

A five-step wash costs more and takes longer than a two-step wash, on the same fabric and the same garment.

Every step adds a failure point

Rejection rates compound. Two steps at ninety-five per cent good are not ninety-five per cent good together.

Every step adds variation

Combination washes are harder to reproduce, and they drift further between lots.

BUYER TAKEAWAY

Count the steps in a wash before you agree a price or a delivery date. The step count is the best single predictor of both.



Wash development: standard to bulk

Seven stages. The one people skip under time pressure is stage five.

1 • Wash standard

The buyer or designer supplies the target: a garment, a swatch or a reference image.

2 • Wash trial

The laundry produces first trials against the target.

3 • Comments

Usually several rounds of revision.

4 • Approved standard

A physical garment is sealed, signed and dated. Both sides hold a copy.

5 • Size set

Run across the size range, at production load, on bulk fabric.

6 • Bulk trial

A production run at production conditions, in the nominated laundry.

7 • Bulk

With shade banding and in-line control against the sealed garment.

The size set catches the two most expensive problems: measurement change across sizes, and dry-effect placement that does not scale.



The approval documents you must have

Before bulk starts, you should be holding all seven of these. If you are not, you are relying on goodwill.

1 Sealed wash standard

A physical garment, signed and dated by both parties.

2 Shade band

Lightest and darkest acceptable, sealed, not described in an email.

3 Recipe reference

Held by the laundry and referenced in the approval.

4 Fabric approval for the actual bulk lot

Not for the development lot.

5 Test reports

Fastness, dimensional stability, tensile and tear, and the chemical tests your brand requires.

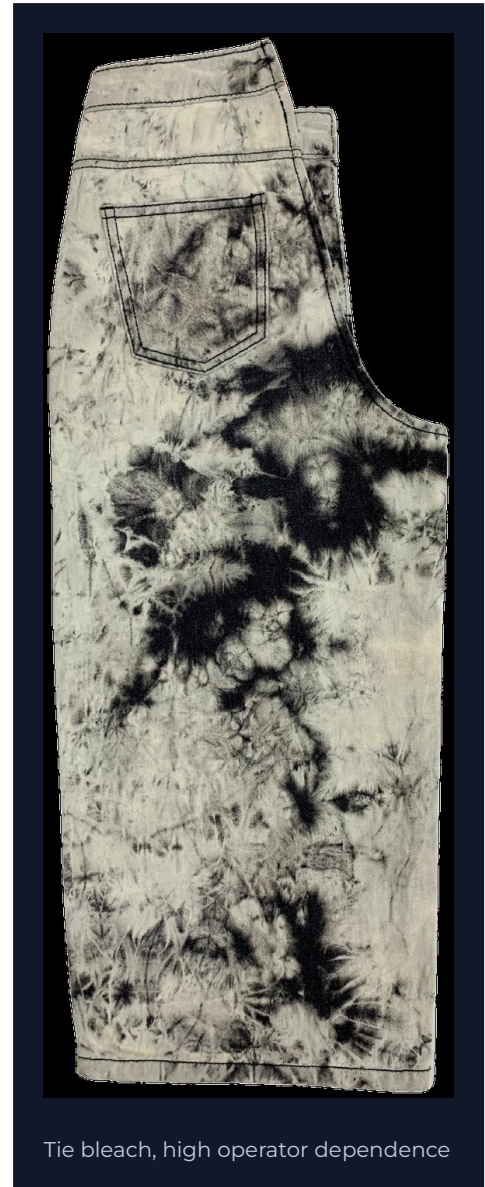
6 Placement specification

Every dry effect, with measurements, on a marked-up garment.

7 Trim approvals after washing

Not before. Buttons, rivets and labels go through the wash too.

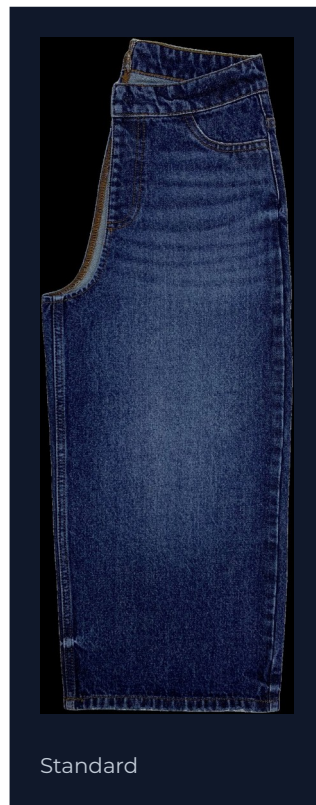
If you do not hold a sealed standard, you have no basis on which to reject a shipment. Verbal approval is not approval.



Tie bleach, high operator dependence

Shade bands and shade variation

No wash produces identical garments. Variation shows up in three places: garment to garment, panel to panel within a garment, and lot to lot.



A shade band is a set of sealed garments defining the acceptable range, normally a lightest and a darkest against the standard. Bulk garments are then sorted so that each carton, and ideally each store delivery, is consistent.

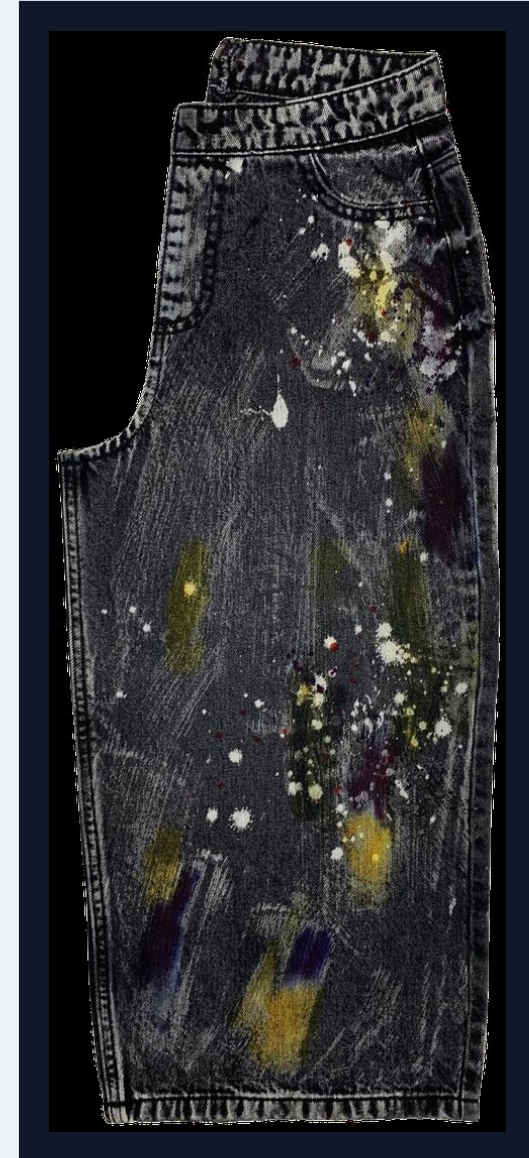
08

Quality and risk

Most disputes come from reproducibility. The ones that cannot be fixed come from chemistry

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

The defects you will actually meet, the technically defensible cause of each, and the tests that stop them reaching a customer.



The risk map

GROUP	EXAMPLES	WHERE IT IS CAUGHT
1 · Shade and appearance	Uneven shade, patchiness, streaks, cast shift, back staining	Inline and final inspection, under controlled light
2 · Chemical and strength	Over-bleaching, strength loss, residual chemistry, formaldehyde, crocking	Laboratory testing on the finished garment
3 · Dry process	Uneven whiskers, inconsistent scraping, excessive grinding, spreading tears	Inline against a sealed reference garment
4 · Dimensional and performance	Measurement change, shrinkage, growth, loss of recovery	Measurement after wash, across the size range
5 · Reproducibility	Bulk not matching the sealed standard	Size set and bulk trial, before the main run

Most disputes come from group five. Most of the ones that cannot be fixed come from group two, because chemistry is not reversible.



Shade and appearance defects

DEFECT	WHAT IT LOOKS LIKE	COMMON CAUSES
Uneven shade	One area lighter or darker than another	Overloaded machine, poor liquor circulation, incomplete desizing
Patchiness	Irregular light or dark patches	Uneven chemical distribution, garment folding in the drum
Streaks	Linear marks along the garment	Creasing during the process, mechanical marks
Back staining	Dull face, dirty-looking pockets and lining	Released indigo redepositing: enzyme choice, liquor ratio, short rinsing
Cast shift	Shade correct but the tone is wrong: too yellow, red or green	Incomplete neutralisation, residual chemistry, tint dosing
Garment-to-garment variation	Garments do not match each other	Batch, load and operator differences

Inspect under a controlled light source. Laundry lighting will hide a cast shift that a store's lighting will show immediately.



Chemical and strength defects

DEFECT	WHY IT MATTERS	WHAT TO ASK FOR
Over-bleaching	Irreversible, and it weakens the fabric	Tensile and tear on a bulk garment
Strength loss from enzyme or laser	The garment tears in wear	Tensile and tear on the treated area
Residual manganese from PP	Brown or yellow cast appearing after shipment	Neutralisation and rinse confirmation, finished garment test
Formaldehyde from resin	Restricted substance, legal exposure	Finished garment test report
Crocking on pigment	Colour rubs onto other clothing	Rubbing fastness, dry and wet
Elastane damage	Loss of recovery, bagging, growth	Growth and recovery test after wash

Every item here is found after the garment leaves the factory if it is not tested before. Chemical defects do not announce themselves at final inspection.



Dry process defects

DEFECT	WHAT CAUSES IT
Whiskers not matching left to right	Operator inconsistency, poor marking, no template
Whisker position wrong across sizes	Pattern set on one size only and scaled without checking
Hand sanding with hard edges	Operator technique, wrong abrasive grade
Sanding inconsistent between garments	Multiple operators with no reference garment on the line
Excessive grinding opening seams	Wheel pressure, time, no control sample
Tears spreading beyond the design	Damage placed on a stress point, no post-wash check
Laser scorching	Power setting too high for the fabric
Placement drift through the run	No inline control against a sealed garment

Ask whether the operators have a sealed reference garment at the workstation. That single control fixes most of this table.



Measurement and performance after wash

The garment that leaves the wash is a different size from the one that entered. Patterns are built with wash shrinkage allowances already in them.

- **Shrinkage differs by fabric, by wash and by measurement point**
Length and width do not move by the same amount, and the difference is not proportional.
- **Stretch fabrics add growth and recovery**
Heat and chemistry damage elastane, giving a garment that bags at the knee and seat within a day of wear.
- **Skewing and twisting at the leg**
Happens when the fabric relaxes unevenly through the wash and dry.
- **A wash revision is also a fit revision**
If the wash changes, the measurements change. The two cannot be approved separately.

Measure after wash, at bulk, across the size range. Ask for growth and recovery on every stretch quality.



Rinse wash, minimal shrinkage

Bulk versus approved sample

WHY BULK DOES NOT MATCH

The sample was washed at sample load, not production load

The bulk fabric came from a different lot

The laundry changed, or the machine changed

Different operators ran the manual steps

Stones or chemicals were replaced with a different grade

No shade band was agreed

The standard was a photograph or a swatch, not a sealed garment

HOW TO PREVENT IT

Seal a physical standard, signed and dated

Agree a shade band before bulk

Run a size set at production load on bulk fabric

Fix the laundry in the order confirmation

Keep a sealed reference garment at every manual workstation

Ask for the recipe reference to be held and quoted

Require inline checks, not only end-line

BUYER TAKEAWAY

Every prevention step costs a small amount of time in the TNA. The failure costs a shipment.



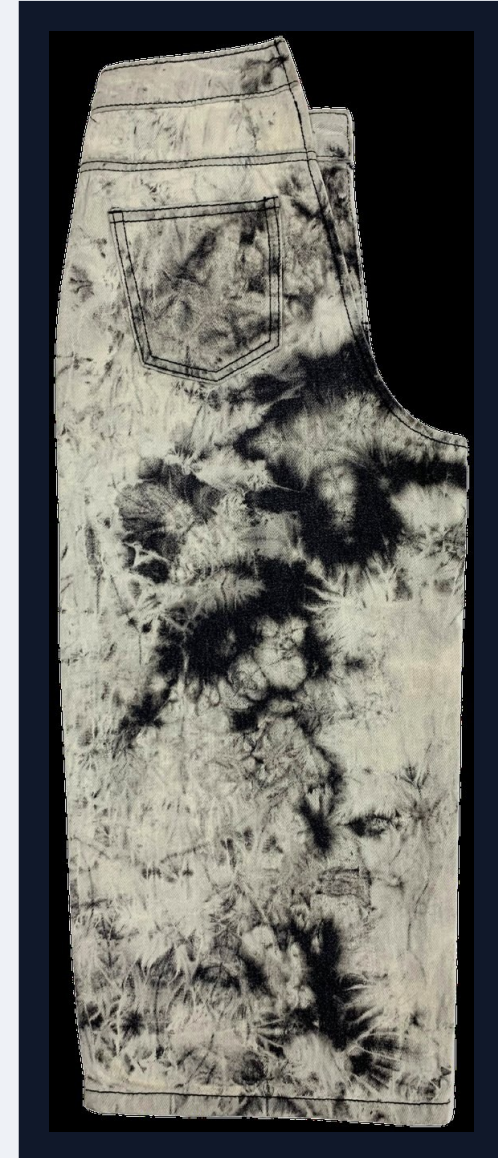
09

Buyer checkpoints

You are not being trained to run a laundry. You are being trained to judge one

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

What to physically check at each stage of an order, and the questions that separate a strong laundry from a weak one on a first visit.



Buyer checkpoints, stage by stage

AT DEVELOPMENT	AT APPROVAL	AT SIZE SET	AT BULK	BEFORE SHIPMENT
Is the wash developed on the actual bulk fabric?	Is the standard a sealed physical garment?	Was it washed at production load?	Is there a sealed reference garment at each manual workstation?	Does the bulk sit inside the agreed shade band?
How many process steps does this wash have?	Is there a shade band with sealed extremes?	Do the measurements hold across the size range?	Is shade banding running, and how are garments sorted?	Inspect under a controlled light source.
Which steps are manual?	Are dry-effect placements specified with measurements?	Do the dry effects scale correctly across sizes?	Is the laundry the one named in the order?	Check pockets, lining and thread for back staining.
Does it use PP, resin or pigment?	Have trims been approved after washing?	Is the shrinkage allowance still correct?	Are inline checks recorded, not just end-line?	Check the reverse of lasered and ground areas.
Is the effect reproducible at volume?	Are the test reports in hand?	Is growth and recovery tested on stretch?		Measure after wash, across the size range.

BUYER TAKEAWAY

Five columns, five moments. If you only ever use one column, use the last one, because that is the one that stops a claim.



Questions to ask a laundry

ABOUT THE PROCESS	ABOUT CONTROL	ABOUT CHEMISTRY	ABOUT CAPACITY	ABOUT SAFETY
What are the steps, in order? Which of them are manual? Was this developed on our bulk fabric? What is the expected rejection rate on this wash?	Was the standard washed at production load? Do operators have a sealed reference garment at the workstation? How do you shade band and sort? What is recorded inline, and by whom?	Do you use PP on this style? Which resin system? How do you neutralise, and how do you verify it? Can you provide finished garment test reports?	What is your capacity for this specific process? What is your minimum load? How long does redevelopment take if this moves to another laundry?	Is sandblasting used anywhere in your facility? Do you have an enclosed booth with extraction for spraying? Is your effluent treated on site or off site? What is your water consumption per garment, and how is it measured?

BUYER TAKEAWAY

Ask the capacity question about the specific process, not about the laundry's total capacity. A large laundry may have one laser machine.



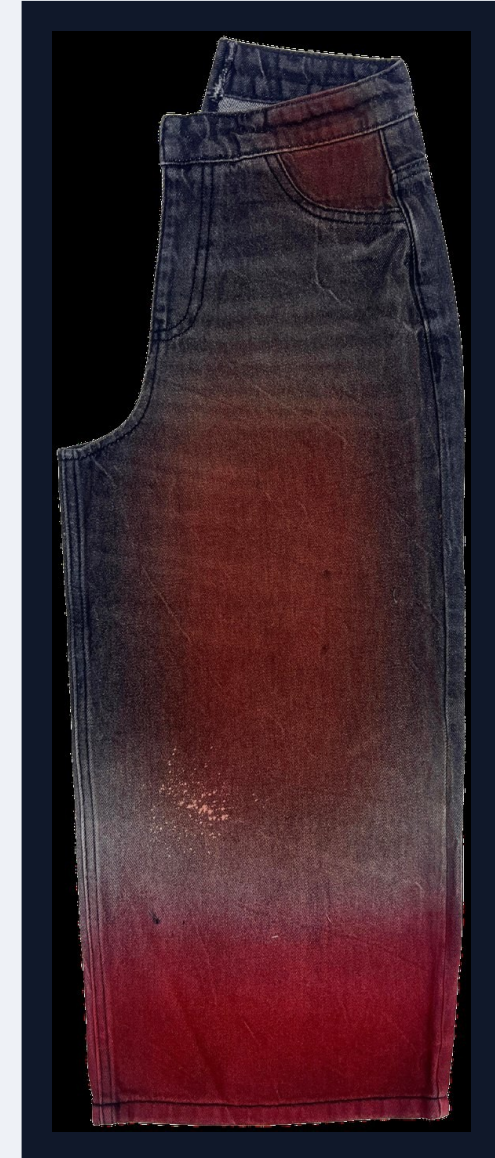
10

Cost, lead time and MOQ

The wash decision sets the price and the delivery date

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

What actually drives the cost of a wash, why manual content behaves differently from machine time, and where the real capacity constraints sit.



What drives the cost of a wash

In rough order of impact. The first two account for most of the difference between two washes that look similar.

1 • Number of process steps

Each step is machine time, labour, chemicals and a rejection risk.

2 • Manual content

Hand sanding, tagging and towel work are labour, and labour scales with volume rather than with machinery.

3 • Rejection rate

Acid, tie and heavy destroy carry rejection that must be costed in, not discovered later.

4 • Machine time

Long cycles occupy capacity that could run two shorter washes.

5 • Chemicals

Enzyme, resin and dyestuff costs vary widely by grade and supplier.

6 • Testing

Chemical-heavy washes need more test reports on the finished garment.

7 • Inspection load

Variable washes need more inspection hours per thousand pieces.

8 • Rework

Anything that can be re-washed will be, and it costs twice.

Two washes that look similar can differ substantially in cost because one is four steps and the other is seven. Ask for the step count when you ask for the price.



Lead time, capacity and MOQ

Wash choice constrains the delivery date as often as it constrains the price.

- **Development time scales with the number of trial rounds**

Heavily manual effects take more rounds, because each round depends on a hand skill.

- **Laundry capacity is a real constraint**

Laser, ozone and resin curing exist in fewer laundries and in limited capacity within them.

- **Manual processes do not scale by adding machines**

They scale by adding trained operators, which is slower and harder to reverse.

- **Minimum load sizes drive MOQ**

A wash below the minimum load either costs more per piece or gets washed at the wrong load, which changes the result.

- **A late laundry change is a new development**

Build the redevelopment time into the TNA before committing the date.

Ask the laundry's capacity for the specific process, not their total capacity.



Tie bleach over an overdyed base

What each wash family costs you

Relative positions rather than fixed prices. Confirm the actual bands with your own costing team and your nominated laundries.

WASH CHARACTER	COST	CYCLE TIME	BULK RISK	MOQ PRESSURE	WHY
Rinse	Lowest	Shortest	Low	Low	One short wet cycle, nothing manual
Enzyme	Low to medium	Medium	Medium	Low	Controlled and repeatable if dosed properly
Stone	Medium	Medium	Medium	Low	Stone handling, sludge, machine wear
Bleach	Medium	Medium	High	Low	Irreversible if over-run
Acid and snow	Medium	Medium	High	Medium	Rejection rate must sit in the price
Vintage combination	High	Long	High	Medium	Every stacked step adds cost and drift
Heavy manual work	High	Long	Very high	High	Output limited per operator per day
Resin and 3D crinkle	High	Long	Very high	High	Oven capacity is the bottleneck
Laser all-over	Medium per piece	Fast per piece	Low	High	High file setup cost, spread over the order
Garment dye and overdye	Medium to high	Medium	Medium	Medium	Dye lot bound, colour matching risk

A wash decision made in the design meeting sets the price, the lead time and the minimum order. It is not a late-stage detail.



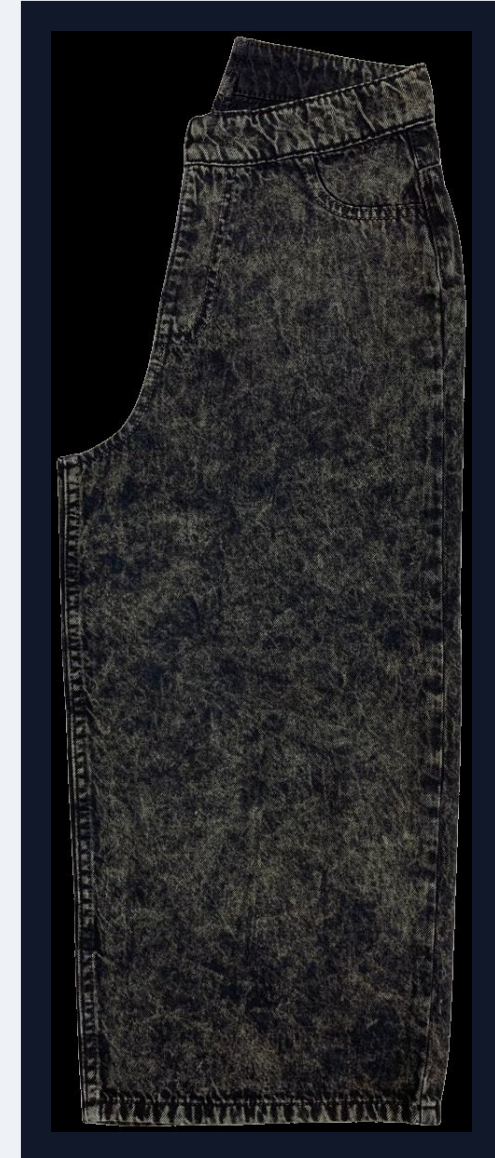
11

Safety, compliance and sustainability

No technology is sustainable in itself. Judge the complete route

WHAT YOU SHOULD UNDERSTAND AFTER THIS SECTION

The finishing techniques that carry a worker safety history, how restricted substances actually reach you, and how to test a sustainability claim in one question.



Worker safety in a denim laundry

Some denim finishing techniques have a documented history of serious harm to workers. A buyer needs to know which, and why.

Sandblasting

Abrading denim with high-pressure sand. It causes silicosis, an incurable lung disease, and deaths were documented among denim workers.

Turkey banned the practice, and from 2010 campaigning led major brands to ban or phase it out. It should not appear in any garment you approve.

Dry abrasion generally

Hand sanding and grinding generate dust.

Extraction at the workstation and PPE are the controls.

Chemical spraying

PP spray generates airborne particles.

The control is an enclosed booth with extraction and full PPE.

Chemical handling and storage

Oxidising agents, resins and dyestuffs need handling controls, correct storage and trained operators.

Ask directly whether sandblasting is used anywhere in the facility, and ask to see the spray booth and its extraction. Both are normal factory-visit questions.



Restricted substances and your chemical policy

Your brand holds a restricted substances list. It sets limits for the finished product, and it is your responsibility as well as the factory's.

- **Two different lists**

A restricted substances list covers what remains in the garment. A manufacturing list covers what is used in the process, whether or not it stays in the garment.

- **ZDHC maintains the industry manufacturing list and a watchlist**

The watchlist is the early signal. Chemicals move from watchlist to restricted.

- **Potassium permanganate is on the ZDHC Chemical Watchlist**

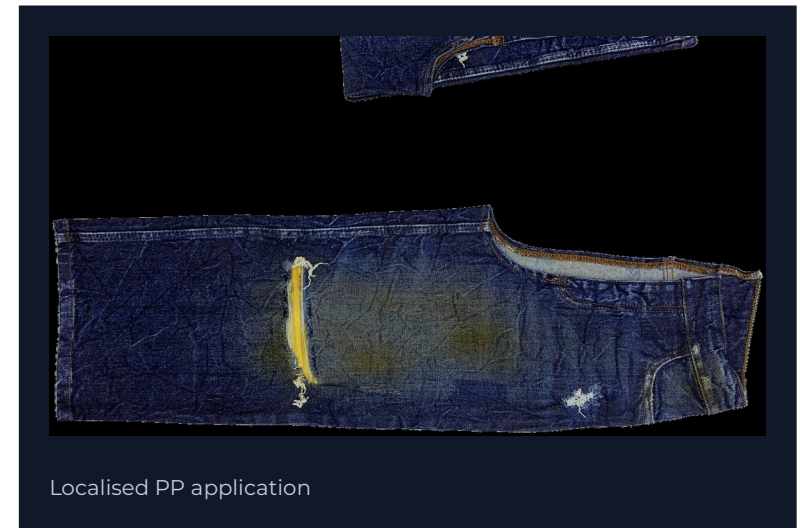
Check your brand's position before approving any PP effect.

- **Formaldehyde from crosslinking resins is restricted in finished garments**

Ask which resin system is used and whether a formaldehyde-free alternative was offered.

- **Test the garment, not the drum**

Test reports should be on the finished garment, not on the chemical supplied to the laundry.



A chemical that is legal today and watchlisted tomorrow is still in the garments you approved. That is why the watchlist matters more than the restricted list.

Water, energy and effluent

Where the impact actually sits, so you can tell which part of a claim is doing the work.

Water

Driven mainly by liquor ratio, and by the number of wet steps and rinses.

A dry step that adds two rinses afterwards has not saved water.

Energy

Mostly heating water, plus drying and machine running.

An electric process on coal-fired power is not automatically better than a thermal one.

Chemistry

Dyes, oxidising agents, enzymes, resins and softeners, plus the neutralising chemicals used to deal with them.

Effluent and solid waste

Everything that goes in comes out. Treatment capability matters as much as consumption.

Stone washing also produces pumice sludge.

Reading a sustainability claim

THE CLAIM YOU WILL HEAR	WHAT IS TRUE	WHAT IS LEFT OUT	HOW TO RESPOND
"Laser is chemical-free"	The laser step itself uses no wash chemistry	The garment is still washed before and after, and laser uses electricity	Ask what the laser replaced, and what is left in the route
"Enzyme is eco-friendly"	It removes pumice stone, sludge and machine damage	It is still a full wet process with heating and effluent	Ask for the comparison baseline: eco-friendly against what
"Ozone is zero discharge"	The ozone step uses very little water and no bath chemistry	The garment is still washed before and after, and generation uses energy	Ask which of your current washes could actually move onto it
"This process saves 90 per cent water"	Savings on a single step can be large	Whether it is per step or per garment, and against which process	Ask for the figure per garment and the baseline

Four questions cover almost every claim: what is the boundary, compared with what, how is it measured, and what is the energy source.



Ten things to take away

The first five.

- 1 Denim fades because indigo sits on the surface of the yarn**
Everything else in this programme follows from that one fact.
- 2 Wash type is the shade. Wash effect is the local technique**
Learn to name both separately and you can specify any garment.
- 3 A wash name is not a specification**
Approve a sealed physical standard and a shade band, never a description.
- 4 Every manual step is a variation risk**
Count them before you approve the wash. The step count predicts your bulk problems.
- 5 Test strength and measurement after the wash, never before it**
Greige results are not evidence for a washed garment.



Mid indigo with hip and seat fading

Ten things to take away

The second five.

6 Back staining is the defect that most often gets past sample approval

It shows on the parts of the garment nobody photographs.

7 Acid wash uses no acid

Say oxidising agent, and always ask about neutralisation.

8 Cellulase attacks the fibre, not the dye

That is why over-treatment costs you strength, not just colour.

9 PP spray is now a compliance question, not only a quality question

Check the restricted substances list before you approve, not after.

10 Judge the route, not the technology

One step being clean says nothing about the other seven.



The wash decision checklist

One line per stage. If you cannot tick the third column, do not move to the next row.

STAGE	WHAT YOU DECIDE	WHAT YOU MUST HAVE IN HAND	WHAT STOPS YOU
Concept	Wash type and effects	The fabric that is actually booked	No fabric confirmed yet
Development	Route to the shade	Step count, manual step count, RSL position	A wash needing chemistry your brand restricts
Approval	The shade band	Sealed standard, signed and dated by both parties	A standard that is a photograph or a swatch
Size set	Positions and tolerances	Production load, bulk fabric, full size range	A size set skipped to save a week
Bulk	Accept or hold	Reference garment at each workstation, inline records	End-line inspection only
Shipment	Release	Measurement after wash, strength and chemical reports	Greige results offered as evidence

Print this one. It is the slide people take back to their desk.



Glossary

TERM	DEFINITION	TERM	DEFINITION
Acid wash	High-contrast random marbling from oxidiser-soaked pumice. No acid is used.	Grinding	Abrasion of seams and edges with a wheel or stone.
Back staining	Loose dye redepositing on the lighter parts of a garment.	Growth and recovery	How far stretch fabric bags out, and how far it springs back.
Cast	The tone of a shade: too red, green or yellow against the standard.	Hand feel	The tactile quality of the finished fabric.
Cellulase	Enzyme that hydrolyses cellulose at the fibre surface.	Liquor ratio	Water per kilogram of garment in the machine.
Crocking	Colour transferring by rubbing, wet or dry.	Marking	Lightest laser setting, surface layer only.
Desize	Removing the weaving size so chemicals penetrate evenly.	Neutralisation	The step that stops and clears an oxidising treatment.
Discharge dyeing	Dyeing with a reducible dye, then chemically removing colour.	Overdye	Re-dyeing a finished garment to a new colour.
Dip dyeing	Partial immersion for a gradient or two-tone effect.	Ozone finishing	Fading with ozone gas in a closed drum instead of a bleach bath.



Glossary

TERM	DEFINITION	TERM	DEFINITION
Pigment	Insoluble colourant fixed with a binder, not bonded to the fibre.	Shade band	Sealed lightest and darkest acceptable garments.
PP spray	Potassium permanganate applied locally. On the ZDHC Watchlist.	Silicosis	Incurable lung disease caused by inhaling silica dust.
Resin finish	Crosslinking treatment that makes creases and 3D shapes permanent.	Snow wash	Variant of acid wash giving a white speckled surface.
Ring dyeing	Dye on the yarn surface with a white core inside.	Sulphur denim	Denim dyed or bottomed with sulphur dyes. Fades and casts differently.
RSL	Restricted substances list. Limits for the finished garment.	Tagging	Manual localised colour with a sponge, cloth, brush or tag.
MRSL	Manufacturing restricted substances list. Covers process chemicals.	Tint	Light overall colour applied to shift the cast of a wash.
Sealed standard	The signed physical garment bulk is judged against.	Towel bleach	Bleach applied by hand with a soaked towel.
Sandblasting	Abrading denim with high-pressure sand. Banned. Causes silicosis.	ZDHC	Zero Discharge of Hazardous Chemicals. Publishes the MRSL and watchlist.





Questions

Denim washing is not a finishing detail. It sets the price, the delivery date and most of the quality risk on the order.

The checklist two slides back is the practical summary. Everything else in this deck exists to explain why each line is on it.

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