

Caster Sizing Guide — Douglas Equipment

The Caster Sizing Guide for Warehouse Managers

A practical reference for specifying industrial casters — without the catalog overwhelm.

By Douglas Equipment · Miami, FL · Since 1955

Why this guide exists

Most caster failures we see in Miami's warehouses, hospitals, and food plants are not manufacturing defects. They are **specification mistakes** — a wheel that was right for the showroom but wrong for the cart's actual life.

Wrong spec, predictable outcome:

- A poly-tread caster melts under a 180°F bakery cart.
- A 4" wheel fails on a 1,500 lb pallet after three weeks of warehouse use.
- A rigid steel wheel chews through epoxy-coated hospital floors.
- A nylon caster shatters on the loading dock in February (rare in Miami, common in northern transfers).

This guide walks through the **six variables** we use at Douglas to spec casters for industrial customers. It is not a sales catalog. It is the checklist we wish every maintenance manager had before calling us.

Time investment: 15 minutes to read. Saves an average customer 3–5 caster replacements per cart per year.

The 6 spec variables (overview)

Every caster decision comes down to these six questions. Skip any one of them and you risk a re-buy within 6 months.

#	VARIABLE	WRONG ANSWER COSTS YOU
1	Load capacity per caster	Premature wheel failure, dangerous swivel collapse
2	Wheel diameter	Hard rolling effort, operator injury claims
3	Tread material	Floor damage, chemical degradation, melted wheels
4	Mount type	Cart redesign, mismatched hole patterns
5	Swivel configuration	Poor maneuverability, fleet rejection
6	Environment	Corrosion, contamination, total wheel failure

The rest of the guide expands each variable with the field-tested rules and tables we use.

Spec #1: Load capacity per caster

The formula every spec sheet should pass

$$\text{Load capacity per caster} = (\text{Total dynamic load} \times \text{Safety factor}) \div 3$$

Why divide by **3** (and not 4)? Floors are never perfectly flat. Real-world testing shows three of four casters bear the actual load at any given moment — the fourth floats.

Safety factor by use case

USE CASE	SAFETY FACTOR	EXAMPLE
Hand-pushed cart, smooth floor, walking pace	1.3	Hospital med cart, hotel housekeeping
Tugger / power-towed cart	1.5	Doral 3PL fleet, automotive lineside
Forklift-loaded, mixed terrain	2.0	Warehouse pallet cart, dock work
Outdoor / impact-prone	2.5	Lawn equipment cart, construction site

Worked example

Cart total weight + load = 1,200 lb. Used by warehouse staff on concrete with expansion joints.

$$\text{Required per-caster capacity} = (1,200 \times 2.0) \div 3 = 800 \text{ lb minimum}$$

You need casters rated **at least 800 lb each**, not 300 lb (the math most spec sheets use).

Quick-reference: minimum per-caster capacity

TOTAL CART LOAD	HOSPITAL PACE	WAREHOUSE GENERAL	DOCK / IMPACT
300 lb	130 lb	200 lb	250 lb
600 lb	260 lb	400 lb	500 lb
1,200 lb	520 lb	800 lb	1,000 lb
2,500 lb	1,080 lb	1,670 lb	2,080 lb
5,000 lb	2,170 lb	3,330 lb	4,170 lb

Field note: When in doubt, **over-spec capacity by 20%**. The cost difference between a 500 lb and 800 lb caster is typically under \$15. The cost of one downtime event is 10–50× higher.

Spec #2: Wheel diameter

Bigger is (almost always) better

Larger wheels:

- Roll easier (lower starting/rolling force)
- Bridge floor cracks, expansion joints, thresholds
- Last longer (load distributes over more surface area)
- Reduce ergonomic injury claims

Smaller wheels:

- Lower deck height (matters for ergonomic loading)
- Tighter turning radius
- Less expensive — usually

Practical wheel diameter chart

WHEEL DIAMETER	BEST FOR	AVOID IF
3" – 4"	Light service carts, point-of-use bins	Cart rolls over uneven floors or > 500 lb total
5" – 6"	General warehouse, hospital, retail back-of-house	High-load tuggers, outdoor surfaces
8"	Heavy carts, dock work, semi-outdoor	Tight aisle warehouses
10" – 12"	Tugger trains, lineside delivery, outdoor transfer	Indoor low-clearance docks

The rolling-effort rule

Industry benchmark: starting force should be **≤ 5% of rolling load** to avoid back/shoulder injuries.

A 1,200 lb cart on hard-tread 4" wheels can take 80–120 lb of starting push. Same cart on 8" polyurethane wheels: 35–50 lb. The 8" wheel solves an ergonomic claim before it happens.

Spec #3: Tread material decision matrix

This is where most specs go wrong. There is no universal "best" tread.

TREAD MATERIAL	STRENGTHS	WEAKNESSES	USE IT FOR
Polyurethane on iron	High load, floor-friendly, quiet	Cost, can flat-spot under static loads	Warehouse, hospital, retail, lineside
Phenolic (resin)	High temp tolerance (up to ~250°F), low cost	Hard on floors, noisy	Bakery oven racks, autoclave carts
Glass-filled nylon	High capacity, low rolling resistance	Brittle in cold, no shock absorption	Indoor heavy duty, dry environments
Solid rubber	Quiet, shock-absorbing, gentle on floors	Lower capacity, marks light floors	Hospital med carts, libraries, classrooms
Pneumatic (air-filled)	Best shock absorption, outdoor capable	Punctures, maintenance, lower capacity	Outdoor carts, ground transfer, lawn equipment
Stainless steel	Extreme heat, chemical, washdown	High noise, hard on floors	Foundries, hot foods, washdown corridors
Cast iron	Indestructible, heat tolerant	Floor damage, noise, no shock absorb	Foundries, mill shops, drop forge areas

Floor compatibility quick check

- **Sealed concrete:** anything works
- **Epoxy coating** (warehouse, food plant): poly on iron, soft rubber, nylon — avoid hard steel/cast iron
- **VCT tile** (hospital, retail): poly or soft rubber only
- **Quarry tile** (kitchen, food): poly, phenolic, stainless
- **Wood or laminate** (showroom, light commercial): poly or soft rubber

Spec #4: Mount type

Three common mounting standards. Picking the wrong one means re-machining the cart.

Top plate (most common)

Standard rectangular plate with four bolt holes. Industry has converged on a few common patterns — but they are **not interchangeable**. Always confirm:

- Plate length x width (e.g., 4" x 4.5")
- Bolt-hole pattern center-to-center
- Bolt-hole diameter (typical: 3/8" or 7/16")

Field rule: Measure the existing top plate before ordering. Three identical brands of caster can have three different bolt patterns.

Stem mount

- **Threaded stem** (e.g., 1/2"-13, 3/8"-16): screws into a tapped boss. Common on light-duty utility carts, racks, and consumer products.
- **Grip-ring stem:** snaps into a socket with a retaining ring. Common on hospital beds, audio equipment racks.
- **Expanding adapter:** for tubular legs (1.5" OD, 2" OD common). Used on retail fixtures, lab benches.

Plate vs stem: which to choose

CHOOSE PLATE WHEN	CHOOSE STEM WHEN
Heavy duty (> 400 lb per caster)	Lighter duty, residential or light commercial
Cart has a flat steel frame	Cart has tubular legs or molded shells
Replacement is occasional	Frequent caster swaps expected (clinical, lab)
Long service life is priority	Quick install / removal is priority

Spec #5: Swivel configuration

The four standard layouts

LAYOUT	WHAT IT DOES	BEST FOR
4 swivel	Full maneuverability, any direction	Tight aisles, hospital carts, kitting carts
2 swivel front, 2 rigid rear	Straight-line stability, easy turning	Warehouse long-haul, dock-to-pick, hand trucks
4 swivel + 2 directional locks	Switches between maneuverable and tracking	Mixed-use carts, food service
6-wheel (2 rigid center, 4 swivel corners)	Long carts pivot in place on center wheels	Linen carts, long industrial dollies

Swivel locks vs brakes vs total locks

These are different parts that customers regularly mix up:

- **Swivel lock:** stops the caster from swiveling — wheel still rolls.
- **Wheel brake (tread lock):** stops the wheel from rolling — caster still swivels.
- **Total lock:** stops both — the only stop that truly parks a cart.

If a nurse, picker, or food handler needs to walk away from a loaded cart, you want **total locks** — not brakes alone.

Spec #6: Environment

Match the caster to the **worst** condition it sees, not the typical one.

Water and chemicals (washdown, food, pharma)

- All-stainless components (raceway, axle, bearings, hardware)
- Zerk-free or sealed bearings (no grease purge)
- Tread: stainless, rubber, or polymer rated for the cleaning chemical
- Avoid: zinc plating, regular ball bearings, kingpin designs that trap water

Temperature

TEMPERATURE RANGE	TREAD TO SPEC	CASTER BODY
0°F – 130°F (typical indoor)	Any	Standard
130°F – 250°F (kitchen, bakery near ovens)	Phenolic, stainless, high-temp polymers	Heat-treated, stainless raceway
> 250°F (foundry, sterilizer)	Cast iron, stainless steel	All-metal, high-temp grease
Below 0°F (freezer, cold storage)	High-temp polymers (yes, the same family — wide range), avoid glass-filled nylon	Cold-rated bearings

Floor debris and impact

If the floor has shavings, broken glass, or debris (machine shops, demolition staging):

- Solid (non-pneumatic) wheels only
- Larger diameter (8"+) to bridge debris
- Open kingpin or sealed precision bearings — avoid loose ball bearings

Outdoor and corrosion (Miami special)

Miami's humidity + salt exposure (coastal yards, marine, hurricane-prep operations) drives premature corrosion on standard zinc-plated casters. For year-round outdoor service:

- Stainless steel components throughout
- Sealed bearings
- UV-resistant tread (TPR or specially-formulated polyurethane)
- Avoid: standard powder coat (chips and exposes substrate)

10 specification mistakes that cost money

These are the recurring patterns we see when reviewing customer fleets.

1. Sizing by cart weight instead of cart + load. Empty cart weighs 80 lb. Loaded, 1,400 lb. Many specs use the empty weight. Cost: replacement every 8–10 weeks instead of 18+ months.

2. Using soft poly on dock-impact applications. Pallet edges cut soft poly tread. For dock work, spec a harder durometer (Shore 90A+) or phenolic.

3. Specifying 4" wheels for cross-warehouse travel. Operator fatigue, ergonomic claims, and slow throughput. Min 6" for full-aisle travel; 8" preferred.

4. Forgetting the threshold and expansion joint. Wheel diameter must be at least **2× the gap width** to bridge cleanly. A 1/2" gap needs a 1"+ wheel — easy. A 1.5" expansion joint needs 3"+ — many small wheels fail here.

5. Mixing swivel and rigid on long carts. A 6'+ cart with 4 swivels at the corners is uncontrollable. Use the 2 rigid front / 2 swivel rear pattern, OR a 6-wheel layout with center rigids.

6. Same brake on every caster. Two casters with brakes is enough on a cart with 4 casters. Brakes on all 4 are redundant and add cost — unless ergonomic policy requires a specific lock position.

7. Stem mounts on heavy-duty applications. Threaded stems flex and unscrew under load. For anything over 400 lb per caster, use top plates.

8. Ignoring kingpin design in washdown. Hollow kingpin casters trap water and rust from the inside. Solid-kingpin or kingpinless designs are the only durable washdown choices.

9. Buying the cheapest casters for a 10-year cart. The caster is 3% of the cart cost but 90% of the maintenance cost over 10 years. Cheap casters mean 3–5 replacement cycles vs 1 cycle for industrial-grade.

10. Not standardizing across the fleet. A fleet with 12 different caster part numbers has 12 different failure modes and 12 different reorder cycles. Standardize on 2–3 SKUs for 90% of the fleet — the remaining 10% gets specialty parts.

Industry quick-spec sheet

The starting point for each vertical. Confirm against your specific load and environment.

Warehouse / 3PL / distribution

- Wheel: 6"–8" polyurethane on iron
- Capacity: 600 lb minimum per caster (12,000 lb cart)
- Layout: 2 rigid rear / 2 swivel front for long haul; 4 swivel for pick carts
- Mount: top plate, standardized hole pattern fleet-wide
- Tread durometer: Shore 90A–95A for dock-adjacent

Hospital / medical / clinical

- Wheel: 5" polyurethane or soft rubber
- Capacity: 250–400 lb per caster typical
- Layout: 4 swivel (med carts), 2 swivel + 2 rigid (linen, bulk)
- Mount: stem or top plate depending on cart family
- Locks: total locks (not brakes) for unattended carts
- Quiet operation matters — avoid metal-on-metal designs

Food processing / beverage / pharma washdown

- Wheel: stainless or food-grade polymer tread
- Capacity: per cart load + 20% margin

- Components: full stainless raceway, axle, hardware
- Bearings: sealed precision; no grease purge
- Avoid: zinc-plated steel anywhere on the caster

Marine / outdoor / dockside

- Wheel: pneumatic (air-filled) 8"+ for shock; or hard rubber 6"+ for capacity
- Capacity: per cart load × 1.5 safety factor
- Components: 304 or 316 stainless throughout (316 for chloride exposure)
- Bearings: sealed, marine-grade
- Tread: UV-resistant for sun exposure

Aerospace / electronics / ESD-sensitive

- Wheel: ESD-rated polyurethane or conductive rubber (10^5 – 10^9 Ω)
- Capacity: per cart load + tool weight
- Layout: 4 swivel for precision positioning
- Mount: top plate, anti-rotation features
- Documentation: keep ESD certificates of conformance from the supplier

When to call us

This guide gets you 80% of the way to the right spec. The last 20% is where decades of field experience save money.

Call Douglas Equipment when:

- The cart has an unusual load profile (asymmetric, dynamic, high vibration)
- The environment combines two or more challenges (heat + washdown, ESD + outdoor)
- The fleet is large enough that standardization decisions affect 5+ years of maintenance
- The previous caster failed prematurely and you need a failure-mode analysis before reordering
- You need an in-person walk-through of your floor (Miami-Dade, Broward, Palm Beach — we visit)

We are a Miami-based distributor of industrial casters, hand trucks, and material-handling equipment since 1955. We do not manufacture casters; we specify, source, and replace them across hundreds of customer fleets in South Florida and LATAM.

Talk to a specialist

- **Phone:** (305) 633-2421
- **Email:** info@dougleasequipment.com
- **Web:** dougleasequipment.com

- **Quote tool:** douglasequipment.com/quote
- **Showroom:** 7600 NW 74th Ave, Medley, FL 33166 (visit by appointment)

Douglas Equipment is an independent distributor. We are not a caster manufacturer and do not certify products. Specifications in this guide are practical field guidance derived from 70 years of distributing industrial material-handling equipment. Always confirm specifications against the actual application and the manufacturer's published load and environment ratings before placing an order.

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