Duct Sizing Quick Guide

Size every run to your static budget, then prove it with a gauge

1. THE STEPS

- Room CFM = System CFM x (Room load / Total load) (loads from Manual J)
- Available static (ASP) = Blower rating - coil - filter - registers/grilles - other devices
- Total effective length (TEL) = longest supply run + longest return run, including fittings
- Friction rate = ASP x 100 / TEL -> set the ductulator on THIS number, not an automatic 0.10
- Line up CFM with friction rate, read round size (between sizes? go up), then check velocity

2. EXAMPLE (1,200 CFM system)

Item	CFM	Friction	Size	Velocity
Bedroom branch	100	0.08	6 in. round	~510 fpm
Main supply trunk	1,200	0.08	16 in. round	~860 fpm

Static budget: 0.50 blower - 0.20 coil - 0.08 filter - 0.06 registers/grille = 0.16 ASP. 0.16 x 100 / 200 ft TEL = 0.08

3. VELOCITY LIMITS (residential, ACCA Manual D)

Supply trunk	Supply branch	Return trunk	Return branch
900 fpm	600 fpm	700 fpm	600 fpm

Velocity (fpm) = CFM / area (sq ft). Round area = 3.1416 x (D/12)^2 / 4. Rectangular area = W x H / 144.

4. ROUND vs. RECTANGULAR

Size	Area	Equivalent round	~CFM at 0.08
12 x 8	96 sq in.	10.7 in.	~445
24 x 4	96 sq in.	9.8 in.	~355
16 in. round	201 sq in.	= 18x12, 22x10, 30x8	~1,290

Equal area does NOT mean equal airflow. Keep rectangular duct at 4:1 or less; closer to square is better.

5. LAYOUT RULES

- No hard elbow right off the blower or coil
- Straight duct ahead of takeoffs; don't stack fittings
- Turning vanes or long-radius elbows
- First takeoff a couple of feet past the plenum
- No end-cap takeoffs; damper in every branch
- Flex pulled tight: compressed flex = big pressure drop
- Support flex about every 4-5 ft; max ~1/2 in. sag per ft
- Long, sweeping bends; no kinks or pinch points
- Cut off extra flex; never coil it in the attic
- Fittings count as feet: look them up in Manual D

6. PROVE IT IN THE FIELD

- TESP = supply static (after coil, before 1st fitting) + return static (between filter and blower), ignore signs
- Compare to the blower rating and your design ASP. Verify airflow and room CFM. Record a baseline.