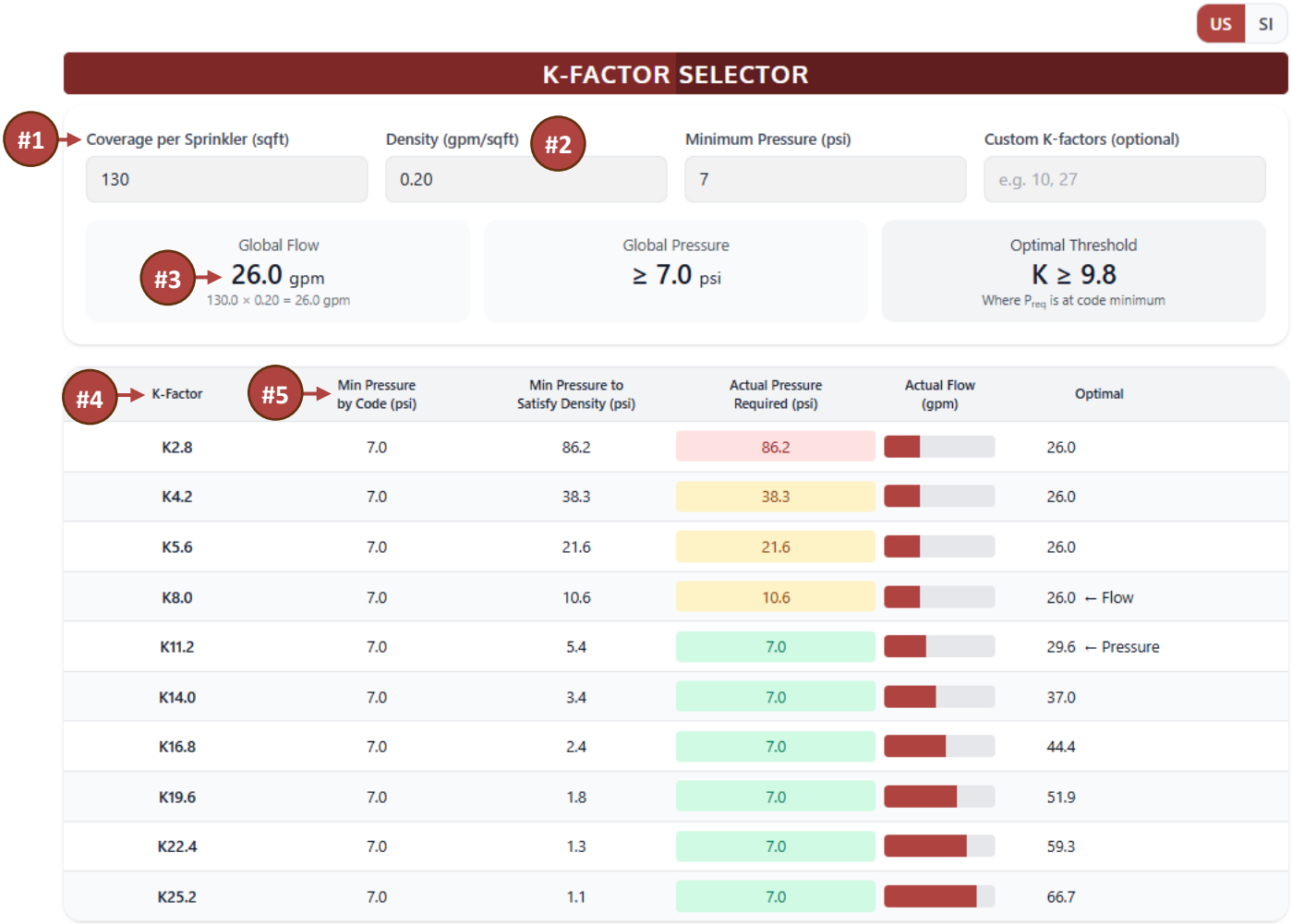
K-FACTOR SELECTOR

A USER'S GUIDE



DESCRIPTION

#1 COVERAGE AREA PER SPRINKLER: The area (sqft) assigned to a single sprinkler based on spacing (e.g., 10 ft × 13 ft = 130 sqft). A larger coverage area means a higher required flow (#3) for the sprinkler, whereas a smaller coverage area means a lower required flow for the sprinkler.

#2 DESIGN DENSITY: The selected density (gpm/sqft) for the hazard. The density, along with area, will drive the minimum flow the sprinkler must deliver according to Q_{min} = Density × Coverage Area.

#3 MINIMUM FLOW: This is the constant flow target for all k-factors in the table, computed from your inputs. It's the minimum amount that the sprinkler must flow.

$$Q_{min} = (\text{Coverage Area per Sprinkler}) \times (\text{Density})$$

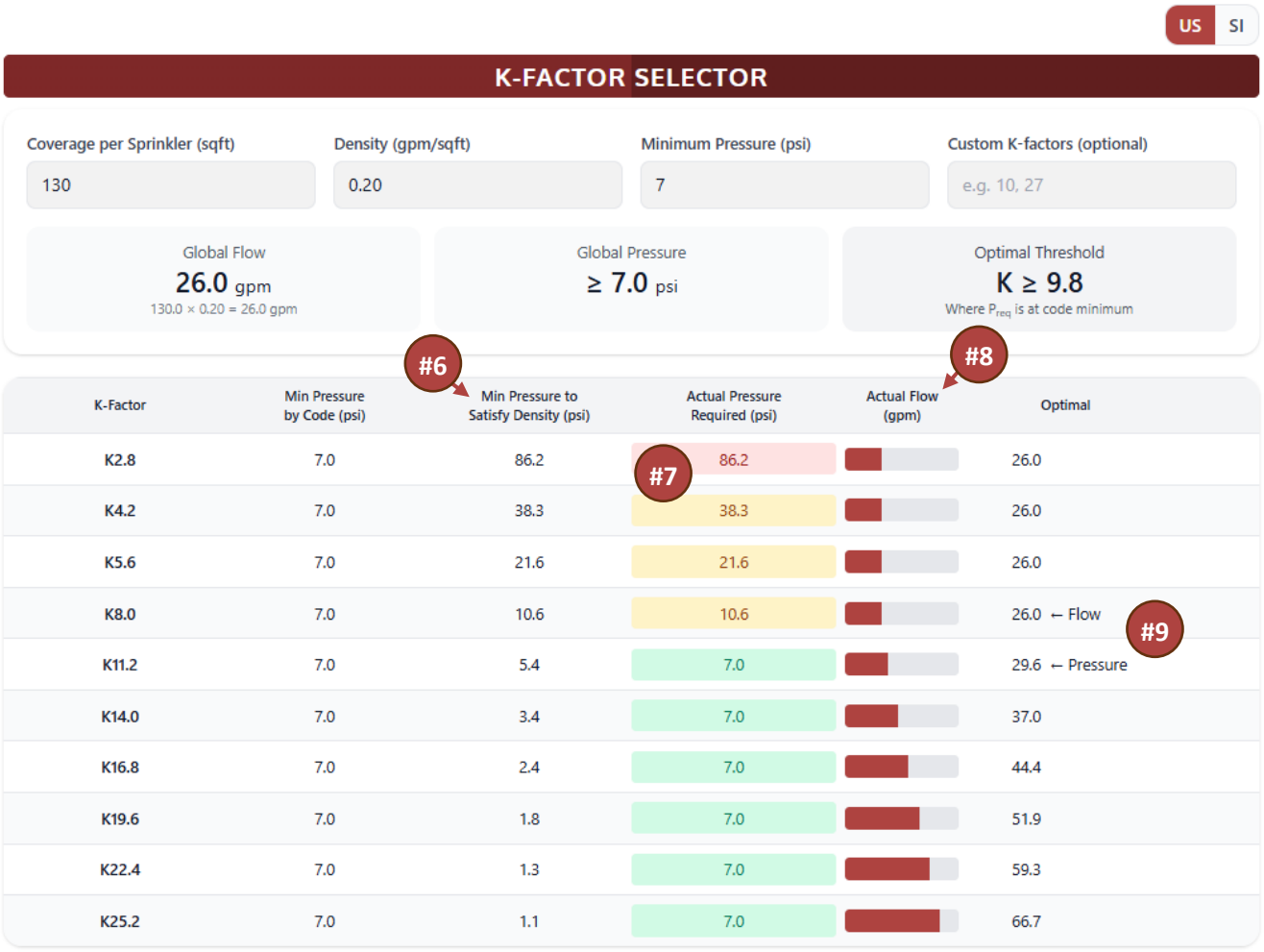
#4 K-FACTOR: Sprinkler discharge coefficient reflecting orifice size (typical values are shown in the table.For a given pressure, a larger k-factor yields more flow; for a given flow, larger K requires less pressure:

$$Q = K \cdot \sqrt{P} \qquad P = (Q/K)^2$$

#5 MINIMUM PRESSURE BY CODE OR LISTING: Some sprinklers have a minimum operating pressure (often 7 psi for standard spray; other types can be higher under their listings).

The tool enforces this floor, so pressures don't drop below what the sprinkler is listed to operate at.

If the calculated pressure to satisfy the density is *below* this value, the listing minimum governs (and the flow will be higher than the minimum flow target).



#6 MINIMUM PRESSURE TO SATISFY DENSITY: Pressure needed for the k-factor to achieve the minimum flow target:

$$P_{DENSITY} = (Q_{min} / K)^2$$

A smaller k-factor leads to higher required pressure. Larger k-factors lower the required pressure (until limited by the listing minimum).

#7 ACTUAL REQUIRED PRESSURE: This is the pressure your hydraulic calculation must deliver at that sprinkler. It's the controlling (dictating) pressure:

$$P_{ACT} = \max(P_{MIN}, P_{DENSITY})$$

#8 ACTUAL REQUIRED FLOW: Flow resulting from the actual controlling pressure:

$$Q_{ACT} = K \cdot \sqrt{(P_{ACT})}$$

If $P_{density} \geq P_{listing}$, then $Q_{actual} = Q_{min}$ (no overflow).

If $P_{density} < P_{listing}$, then $Q_{actual} > Q_{min}$ (overflow due to listing pressure floor).

#9 OPTIMAL: The table visual highlights help you pick a k-factor for a sprinkler that matches your goal:

To minimize pressure, choose the smallest k-factor, or one of the lowest k-factors, that keeps you near the minimum pressure. In the example cited above, a k-factor of 11.2 keeps the sprinkler starting pressure the lowest, at 7 psi.

To minimize overall flow, choose a k-factor with the least amount of overflow. In the example above, the 8.0 k-factor has the least possible flow and the lowest starting pressure *of* the k-factors with the least flow.

In short, higher k-factors will lower the starting pressure, but can increase overflow. Lower k-factors reduce overflow but increase the starting pressure.

Pick the k-factor that best fits your system constraints. If your project is very sensitive to pressure, perhaps you optimize for the lowest starting pressure.

If your project is very sensitive to flow, then reducing overflow can be the most beneficial choice.