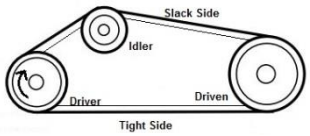
# Idlers

The use of adjustable centers is usually preferred over the use of idlers. However, in certain cases, the using adjustable centers to allow for installation and tensioning is not possible. Idlers provide a way to induce the tension necessary to operate the drive. Idlers can also be used to: clear obstructions, detour belts to turn corners, reduce belt whip and vibration in long spans, increase arc of contact on long critically loaded sheaves, clutch certain types of drives, and maintain tension. Because they cause additional bending stress, idlers usually reduce the life of a belt. There are four possible positions for an idler (in order of preference): inside slack side, outside slack side, inside tight side, outside tight side. Things to consider when choosing an idler and placement:

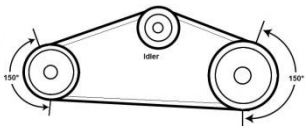
- Inside idlers are grooved sheaves, sprockets, or flat pulleys. Outside idlers must be flat pulleys (with the exception of double V-belts and dual sided synchronous belts) because they contact the top of the belt.
- Weighted or spring loaded idlers require much less force to maintain necessary effective drive tension if placed on the slack slide of the belt. These types of idlers may not be used on reversing drives.
- Outside idler diameter should be at the very minimum 1.5x the diameter of the small sheave in the drive. Outside idlers should be placed as close as possible to the small sheave to increase the arc of contact. Also, because belts move back and forth slightly on a flat pulley, locating the flat idler as far from the next pulley minimizes the possibility of the belt entering in a misaligned condition.
- Grooved idlers must meet industry standards for the type of drive. Flat idlers used on the outside may be flanged, a minimum flange height of 25% of nominal belt thickness is recommended. A flanged flat idler should be 15% wider than the face width of the grooved pulleys. An idler used on the inside should not be flanged. Unflanged idlers should have a width of at least 25% wider than the face width of the grooved pulleys.
- An inside idler reduces the arc of contact of both pulleys and should be positioned to give an equal arc of contact on both pulleys. Diameter for an inside idler is equal to that of the smallest sheave in a drive.
- A drive incorporating an idler should be laid out to scale or using a computer and measured in the extreme positions (no idler engagement and maximum idler engagement) to determine the nominal belt length and ensure that the recommended installation and take-up allowances can easily be reached.
- An idler shortens the life of a belt by adding another peak to the loading cycle. Idlers placed on the slack side of the drive cause a lower peak than those placed on the tight side. (Resulting from the tight side tension plus the stress from bending around the pulley) Smaller pulleys cause higher peaks than larger pulleys. Outside idlers cause reversing bending. V-belts are not designed for reverse bending which is why inside idlers are preferred. The effects of reverse bending are especially detrimental to the 3V, 5V, and 8V cross sections. The service factor "Add-ons" in the table help to account for this shortened life when calculating drive requirements.

| Service Factor Add-Ons | |
|---|---|
| Inside Slack | 0.0 |
| Outside Slack | 0.1 |
| Inside Tight | 0.1 |
| Outside Tight | 0.2 |

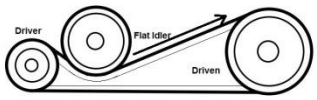
| Minimum Diameters for Flat Outside Idler (in) | | | |
|---|---|---|---|
| Belt Section | Diameter | Belt Section | Diameter |
| A, AX | 4.3 | L | 1.6 |
| B, BX | 7.7 | H | 2.9 |
| C, CX | 12.5 | XH | 6.5 |
| D | 18.1 | XXH | 9.4 |
| 3V, 3VX | 4.0 | 3M | 0.6 |
| 5V, 5VX | 12.0 | 5M | 1.1 |
| 8V, 8VX | 18.0 | 8M | 2.9 |
| MXL | 0.3 | 14M | 6.4 |
| XL | 0.8 | Poly-J | 2.0 |



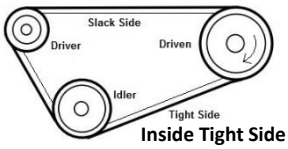
**Inside Slack Side**



**Inside Idler Giving Equal Arcs of Contact**



**Flat Outside Idler Located Close to Small Sheave**



**Inside Tight Side**