Mobile Hydraulics

More on fluid-power-basics. Refer to the top of the page, or go to hydraulicspneumatics.com/ and click on Fluid Power Basics on the navigation bar near the top of the page. Providing even more coverage of mobile hydraulics, in the Fluid Power Basics From the Name Application for Your Hyd1606-1783 FAir Where

Where force from air resistance can be calculated as follows:

\[
F_{\text{air}} = \frac{1}{2} C_d A \rho v^2
\]

where:
- \( F_{\text{air}} \) is the force from air resistance, lb
- \( C_d \) is the drag coefficient
- \( A \) is the total frontal area of the vehicle, ft\(^2\)
- \( \rho \) is the density of the air, lb/ft\(^3\)
- \( v \) is the velocity of the vehicle, ft/sec

Wheel slip indicates loss of traction. If the torque required to cause wheel slip is less than the traction force, the vehicle will start to slide. This occurs on soft surfaces or when the tire pressure is too low. Minimize wheel skid by using a lower number of wheels, however, wheel slip can help prevent drive damage by acting as a brake. Wheel slip indicates loss of traction, so ensure that the system can transmit enough power to exceed the total tractive effort for Mobile Hydraulics On the move

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HYDRAULICS

Shaping change in motion with fluid and fluid-braking systems

The engine of any fluid power system is the hydraulic motor. The motor is responsible for converting the hydraulic energy into mechanical work. The energy is usually supplied from a hydraulic pump, which is driven by the engine or the vehicle's transmission. The pump is the source of hydraulic fluid, which is used to transmit power from the motor to the working elements.

The fluid power system comprises the following components:

1. **Hydraulic Pump**: Converts the rotational energy of the engine into hydraulic energy.
2. **Hydraulic Motor**: Converts hydraulic energy into rotational energy or linear motion.
3. **Hydraulic Control Valve**: Controls the flow and direction of hydraulic fluid.
4. **Hydraulic Lines and Fittings**: Transports the hydraulic fluid from the pump to the motor and other components.
5. **Fluid Power Components**: Used to build up pressure, control flow, and regulate the amount of power delivered to the motor.

There are many applications for fluid power systems, including:

- **Construction Equipment**: Excavators, bulldozers, cranes, and more.
- **Trucks and Trailers**: To control functions like steering, braking, and lifting.
- **Agricultural Machinery**: Tractors, harvesters, and other farm equipment.
- **Marine Applications**: Boats, ships, and submarines.
- **Aerospace**: Aircraft and spacecraft.

The fluid power system is designed to efficiently and safely transmit power from the engine or transmission to the working elements. The system must be designed to handle high pressures, high temperatures, and high flow rates to ensure reliable operation and long service life.

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Recommended distance between support clamps shown here are standard values and should be used as a guideline. Consult manufacturer's specifications for specific recommendations.

Recommended Distance Between Pipe and Tube Supports

Basic Mounting Instructions

Hose Miniend Bend Radius

The minimum bend radius of a hose refers to the minimum radius that the hose may be bent through while operating at the required pressure and temperature. The minimum bend radius is the distance between the hose bend and the beginning of the bend. It is important to provide adequate bend radius to prevent damage to the hose and ensure safe operation. The bend radius is defined by the following formula:

\[
R_{\text{min}} = \frac{D}{m}
\]

where:
- \( R_{\text{min}} \) is the minimum bend radius, ft
- \( D \) is the diameter of the hose, in.
- \( m \) is a safety factor

Factors that affect the minimum bend radius include:

- **Hose Diameter**: Larger hoses require a larger minimum bend radius.
- **Operating Pressure**: Higher pressures require a larger minimum bend radius.
- **Operating Temperature**: Higher temperatures require a larger minimum bend radius.
- **Hose Material**: Different hose materials have different recommended minimum bend radii.

To ensure safe operation, the hose must be bent through an arc that is at least equal to the minimum bend radius. This ensures that the hose is not over-angled or过度弯曲, which can lead to damage or failure.

Safety Factor

The safety factor is a multiplier used to ensure that the hose is not subjected to excessive stresses. A safety factor of 1.5 is recommended for most applications. The safety factor is calculated as:

\[
FS = \frac{R_{\text{max}}}{R_{\text{min}}}
\]

where:
- \( FS \) is the safety factor
- \( R_{\text{max}} \) is the maximum radius of the bend, ft
- \( R_{\text{min}} \) is the minimum bend radius, ft

The minimum bend radius should be at least 10 times the inside diameter of the hose bend and the beginning of the bend. This ensures that the hose is not subjected to excessive stresses and is designed to handle the required pressure and temperature.