

2.7 Leak Rate. When the piston gage is connected to a leak tight system and the piston set into rotation, the piston will fall slowly as a result of the leak between it and the cylinder. The rate of fall will depend upon the clearance, length of crevice, diameter of the piston, pressure, viscosity of the fluid and concentricity of the piston and cylinder. Re-entrant cylinder piston gages should have a fall rate maximum at a pressure about one half of the range. Simple cylinder piston gages usually have fall rates which increase with pressure. However, at very high pressures most pressure fluids exhibit a very rapid increase in viscosity with pressure so that the fall rate may not increase as rapidly as expected.

2.8 Ageing Effects. A dimensional change of the piston or cylinder which affects the effective area significantly will be accompanied by a large change in the rate of leak of fluid between the piston and cylinder. The leak may be measured by observing the rate of fall of the piston when the gage is connected to a tight system of small volume.

2.9 Fluid Viscosity. The effective area of the piston is not affected by the viscosity of the pressure fluids, but the sensitivity, fall rate, and wear rate are affected by the viscosity. The best viscosity is one that will be high enough for a reasonable fall rate but not so high as to make the spin time too short and cause sluggish operation.

2.10 Leaks. Leaks other than that between the piston and cylinder, may result in pressure drop in connecting lines or in excessive fall rate either of which might result in significant measurement error.

2.11 Line Restriction. Long or small diameter connecting lines or other restrictions may result in significant pressure drop when leaks are present. Ordinarily small diameter lines are not objectionable when the piston gage is connected to a tight closed system. When two piston gages are to be balanced against each other a restriction between them may result in slow insensitive operation. This nearly always is true when oil is used to transmit the pressure. An air lubricated piston gage connected to a large volume system or to another air lubricated piston gage may oscillate between the piston stops. The oscillations can be reduced by introducing a restriction in the line to obtain sufficient damping of the system so that a balance can be achieved.