

# **TECH DATA - SHORT STROKE HYDRAULIC & PNEUMATIC CYLINDERS**

## **GENERAL CLASSIFICATION**

SHORT STROKE CYLINDERS ARE DEFINED AS A FAMILY OF CYLINDERS WHERE PISTON STROKE IS A FRACTION OF THE DIAMETER. TECHNICALLY DEFINED AS  $S/D < 1.0$ .

## **INSTALLATION**

KEY CONSIDERATION FOR LONG SERVICE LIFE INCLUDE CAREFUL ALIGNMENT AT INSTALLATION AND MAINTAINING CLEAN FLUIDS. CYLINDERS SHOULD BE CENTERED WITH THE THRUST LINE OF THE WORK LOAD WITHIN A FEW THOUSANDS OF AN INCH AND SQUARE WITHIN A FRACTION OF A DEGREE.

## **FORCE OUTPUT**

CYLINDER THRUST IS SIMPLY THE PRODUCT OF OPERATING PRESSURE (psi) TIMES NET PISTON AREA (sq.in.). REDUCTION IN THRUST FROM FRICTION WITHIN A CYLINDER CAN BE IGNORED EXCEPT FOR VERY SMALL PISTON AREAS OPERATING AT LOW PRESSURE. THERE IS PHENOMENON CALLED "STICTION" (high breakway friction) WHEN CYLINDERS STAND IDLE FOR EXTENDED PERIODS. SEAL FRICTION QUICKLY RETURNS TO MUCH LOWER LEVELS FOLLOWING THE FIRST FEW CYCLES. A PRACTICAL RULE OF THUMB IS TO SELECT A CYLINDER WITH OUTPUT WHICH IS SLIGHTLY HIGHER THAN REQUIRED TO OVERCOME THE LOAD.

## **CONTROL CIRCUITS**

DIRECTIONAL CONTROL VALVES ARE READILY AVAILABLE IN MANY CONFIGURATIONS FROM MANY SOURCE. STANDARD THREE WAY VALVES PROVIDE CONTROL FOR SINGLE ACTING CYLINDERS WHILE FOUR WAY VALVES ARE USED FOR CONTROLLING DOUBLE ACTING CYLINDERS. MANUALLY OPERATED VALVES ARE COMMON FOR WORK CLOSE AT HAND WHILE SOLENOID OPERATED VALVES ARE PREFERRED FOR CONTROL FROM A REMOTE LOCATION & FOR PROGRAMMING AS PART OF AN AUTOMATED PROCESS.

## **ADVANTAGES**

THE OBVIOUS ADVANTAGE TO SHORT STROKE CYLINDERS IS COMPACTNESS. SHORT STROKE CYLINDERS NOT ONLY REDUCE SIZE AND INITIAL COST OF FIXTURES AND RELATED EQUIPMENT BUT PROVIDE ENERGY SAVINGS FOR THE LIFE OF THE PROJECT. RELATIVE THICK CYLINDER WALLS WHICH PERMIT INTERNAL FLOW PASSAGES IS ANOTHER ADVANTAGE. AN EXAMPLE IS A CONFIGURATION WITH END TREPANNED PORTS FOR POCKET MOUNTING WHERE FEED LINES ARE ELIMINATED IN THE WORK ZONE.

## **DISADVANTAGES**

SHORT STROKE CYLINDERS CAN NOT TAKE LARGE SIDE LOADS AND MOMENTS FROM WITHIN THE CYLINDER STRUCTURE. THIS IS PARTICULARLY TRUE FOR SINGLE ENDED VERSIONS. CYLINDERS WITH DOUBLE ENDED PISTONS WILL SUPPORT SIDE LOADS AND MOMENTS BETTER BECAUSE OF BEARING SURFACES AT BOTH ENDS. ELIMINATING OR REDUCING SIDE LOADS AND MOMENTS TO A MINIMUM WITH THE USE OF EXTERNAL GUIDES WILL EXTEND CYLINDER LIFE, REGARDLESS OF TYPE, SIZE AND STROKE. BASICALLY, HYDRAULIC & PNEUMATIC CYLINDERS ARE LINEAR FORCE DEVICES AND NOT INTENDED TO FUNCTION AS GUIDES.



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