
Design Guidelines for Hydraulic Load Locking Valves for Use in Coal Mines

MDG 10

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Note This is an extract of the Mine Safety and Health Administration of the U.S. Department of Labour issued on 17th October, 1980

1. Scope

All hydraulic cylinders used to elevate cutting heads and conveyor boom loading machines and continuous mining machines shall be equipped with hydraulic load locking valves meeting this criteria.

2. Requirements

The hydraulic cylinder assemblies which elevate conveyor booms and cutting head shall be equipped with load locking valves to prevent unintentional fall of the boom or cutting head in the event of hydraulic circuit failure. If the boom or cutting head is elevated to more than one cylinder, each cylinder shall be equipped with a load locking valve capable of holding the boom or cutting head in position.

Each cylinder load locking valve must meet the following requirements:

1. The load locking valve must be attached directly to the cylinder port that is subject to the hydraulic pressure induced by the weight of the boom or cutting head.
2. The rated working pressure of the load locking valve must be greater than the system operating pressure.
3. If the load locking valve has over-pressure relief capability, the pressure needed to support the static weight of the boom.

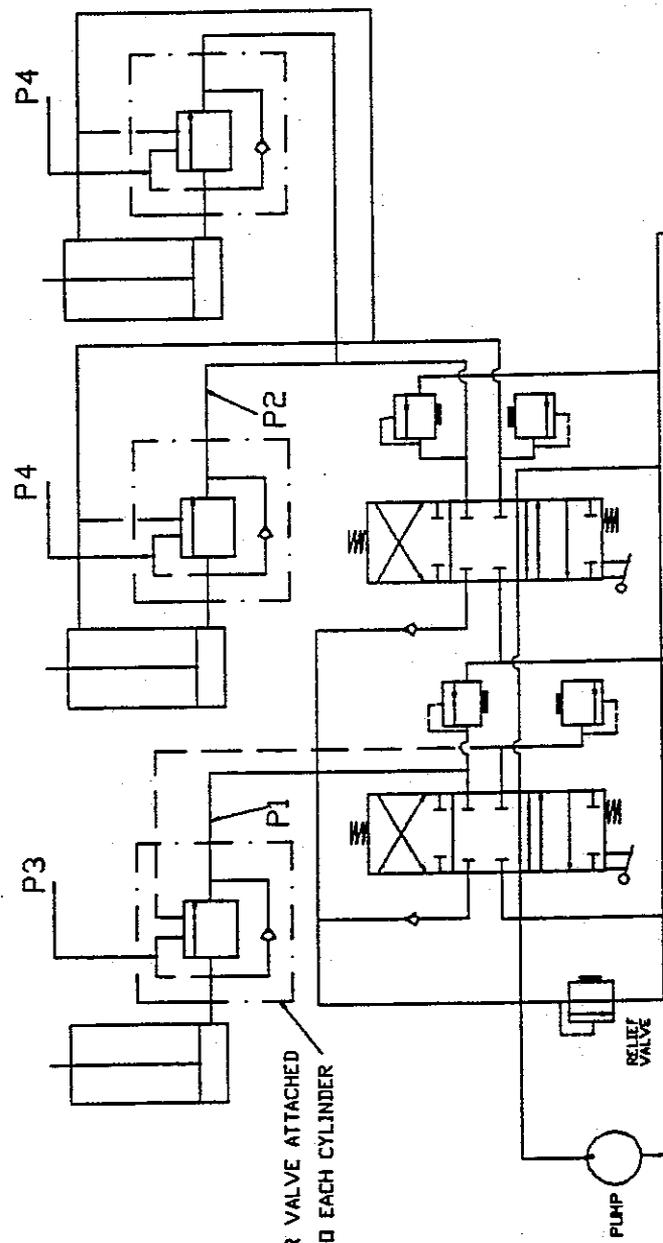
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Locking Valves On Mobile Cranes**

4. If the load locking valve is pilot operated, the hydraulic system shall ensure that the residual pilot pressure will not hold the load locking valve open when the control valve (located in the operator's compartment) is in the neutral position.

L.J. Roberts
Senior Inspector of Mechanical Engineering
for Chief Inspector of Coal Mines

2 DOUBLE ACTING HEAD ELEVATE CYLINDERS
WITH AN OVERCENTER VALVE DIRECTLY ATTACHED
TO EACH CYLINDER

SINGLE ACTING CONVEYOR BOOM
ELEVATE CYLINDER WITH AN OVERCENTER
VALVE DIRECTLY ATTACHED



OVERCENTER VALVE ATTACHED
DIRECTLY TO EACH CYLINDER

NOTE
P1, P2 = SYSTEM PRESSURE, MAX.
P3 = OVERPRESSURE RELIEF (CONVEYOR)
P4 = OVERPRESSURE RELIEF (HEAD)

LOWER
NEUTRAL
RAISE

BOOM ELEVATE CONTROLS
IN OPERATOR'S COMPARTMENT

EXAMPLE OF CONTINUOUS MINING MACHINE CONVEYOR
BOOM ELEVATE AND CUTTING HEAD ELEVATE
HYDRAULIC SYSTEM USING AN OVERCENTER VALVE ON
EACH CYLINDER

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