

### 2.1.5 Characteristic Flow Curve

To ensure the maximum spool stroke is fully utilized, corresponding control groove openings are defined for various nominal flow rates.

The following example illustrates this statement and facilitates understanding of the characteristic curves.

The following system data are provided:

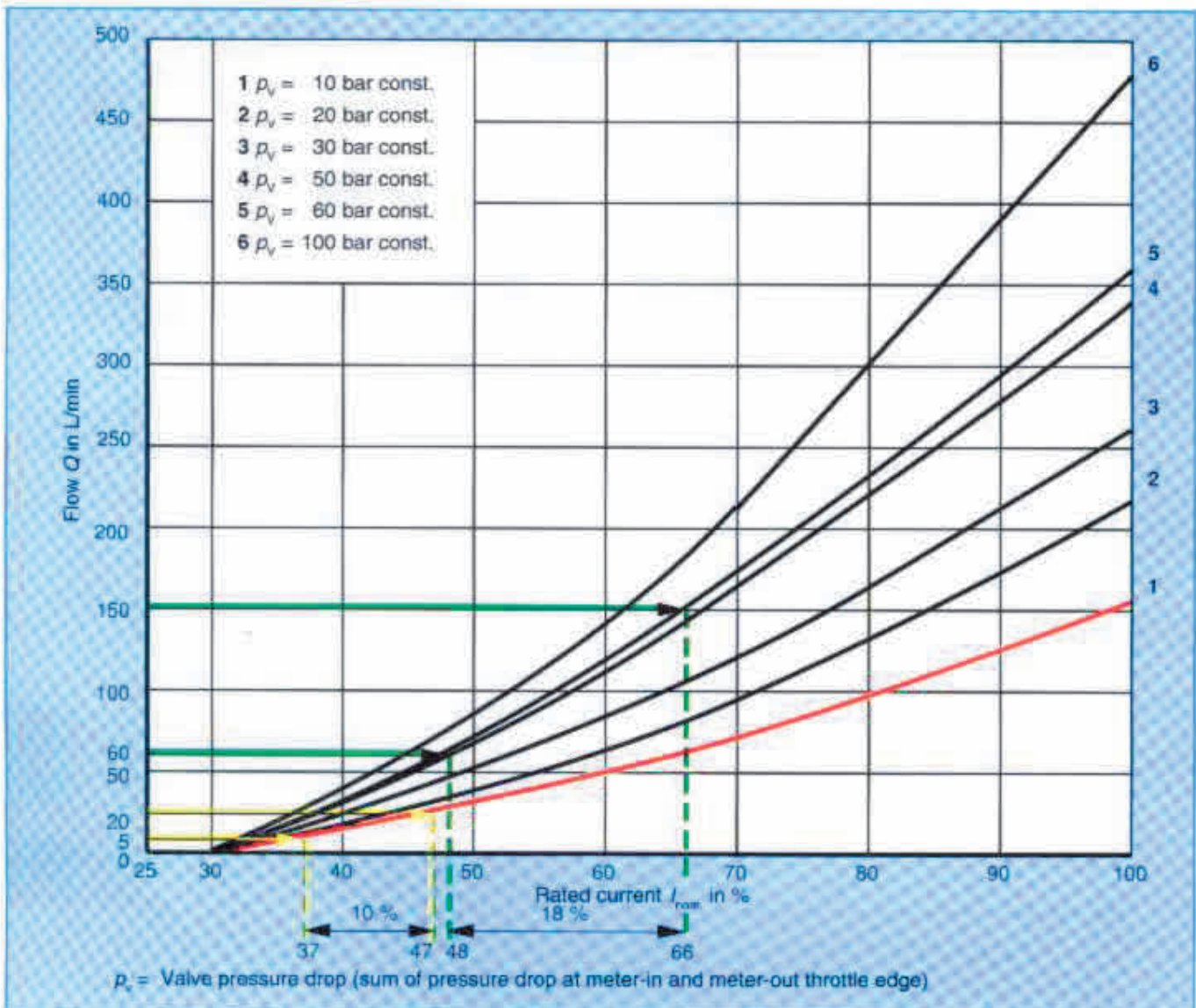
- Defined system pressure  $p = 120$  bar
- Load pressure at operating speed  $p = 110$  bar
- Load pressure at rapid traverse  $p = 60$  bar
- Required flow rate for operating speed range  $Q = 5$  to  $20$  L/min
- Required flow rate for rapid traverse speed range  $Q = 60$  to  $150$  L/min

Let us assume that a proportional valve has been selected in the same way as a standard switching valve (for  $Q = 150$  L/min nominal flow). This mistake, which unfortunately is made all too often, would lead to the following values:

- Valve pressure drop during rapid traverse  
 $p_v = 120 - 60 = 60$  bar  
 $Q_{req. \text{ for rapid traverse}} = 60$  to  $150$  L/min
- Valve pressure drop during operating cycle  
 $p_v = 120 - 110 = 10$  bar  
 $Q_{req. \text{ for op. cycle}} = 5$  to  $20$  L/min

#### Rapid Traverse

Referring to *diagram 5*, and allowing a pressure drop of 60 bar across the valve, a 66% signal allows a flow of 150 L/min, whilst 60 L/min is given by a signal of 48%. The effective control range is, therefore, reduced to  $66 - 48 = 18\%$  of the full range.



Diag. 5: Flow/rated current curve for a nominal flow rate of 150 L/min at 10 bar valve pressure drop