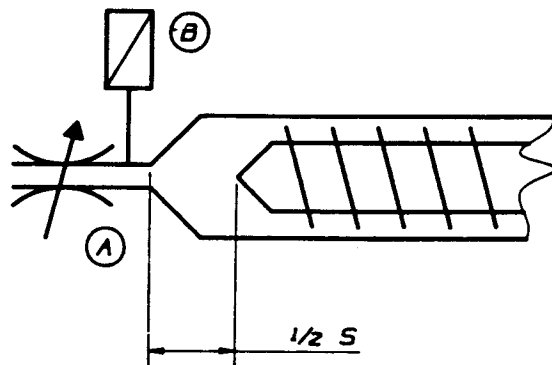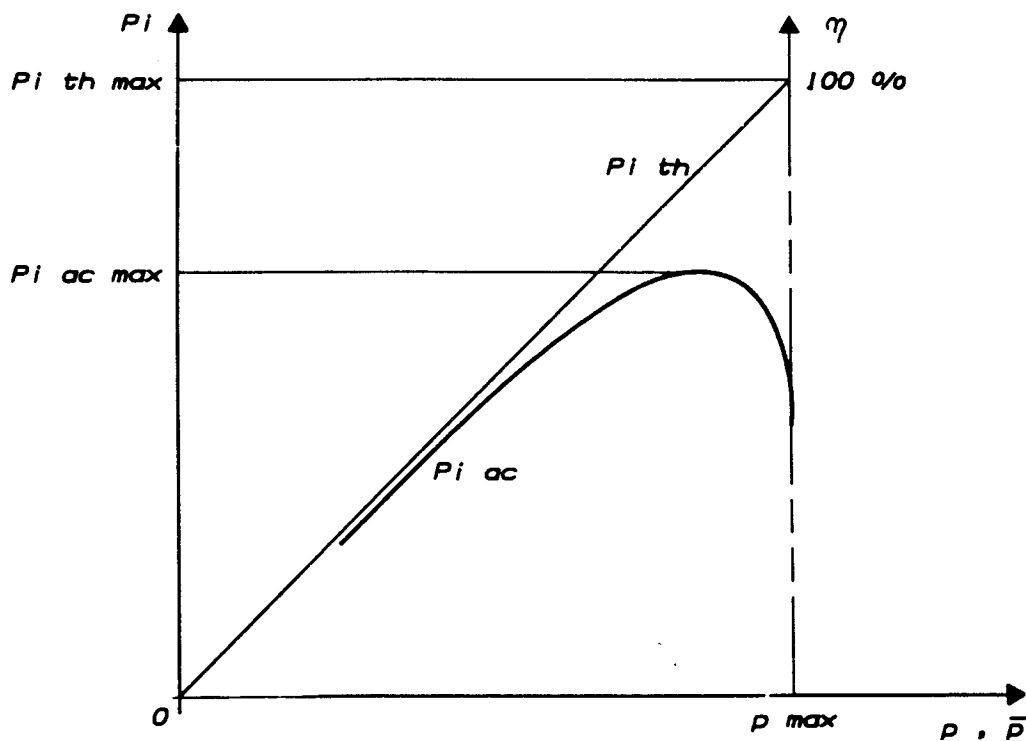| EUROMAP 4	Injection moulding machines
	Determination of the actual injection efficiency

This **recommendation** has been prepared by the Technical Commission of EUROMAP.

Figure 1: Test arrangement

Figure 2: Injection power and a coefficient of efficiency as a function of the average pressure

1. Scope

This recommendation defines the determination of the theoretical injection capacity and the coefficient of efficiency for comparison reasons.

2. Definitions

2.1 Theoretical injection capacity

Product (cm³/s) of cross section of screw/piston and maximum theoretical axial screw/piston speed.

2.2 Maximum theoretical injection power $P_{i\ th\ max}$

Product (kW) of theoretical injection capacity and maximum injection pressure p_{max} as defined in EUROMAP 1.

2.3 Maximum actual injection power $P_{i\ ac\ max}$

Value (kW) achieved by method described below.

2.4 Coefficient of efficiency (max. value) η_{max}

Ratio of maximum actual injection power and maximum theoretical injection power.

3. Measuring method

3.1 Measuring apparatus

The measuring apparatus consists of an adjustable orifice nozzle (A), a pressure sensor (B) and instruments for measuring time and stroke (see figure 1).

3.2 Test material

The test shall be carried out with unmodified and uncoloured HDPE with a melt index MFR 190/2,16 (acc. to ISO 1133) = 3...4 g/10 min.

The temperature of the melt shall be 240 ± 5 °C.

3.3 Measurements

The test shall be carried out at various pressures p which are adjusted by means of the adjustable orifice nozzle (A). Several measurements with the adjustable orifice nozzle differently adjusted shall be carried out. The screw/piston shall be displaced from standstill from 50 % to 0 % of the designed maximum stroke. The average speed for this movement and the average pressure $\bar{p}$ have to be determined.

4. Evaluation

The actual injection power $P_{i\ ac}$ (kW) shall be calculated as the product of cross section of screw/piston and its average speed and the average pressure $\bar{p}$ at this average speed.

The values thus obtained shall be graphically represented as the function of the average pressure $\bar{p}$ (see figure 2). The maximum value obtained from the graph is the maximum actual injection power $P_{i\ ac\ max}$.

The maximum value of the coefficient of efficiency η_{max} shall be calculated.

5. Indication of values

In technical documents the theoretical injection capacity and the maximum value of the coefficient of efficiency η_{max} shall be given for comparison reasons only.

Examples: Theoretical injection capacity (EUROMAP 4) : 243 cm³/s

Coefficient of efficiency (EUROMAP 4) : 0,78

EUROMAP

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