

EUROMAP 60.2	Injection Moulding Machines Determination of Product Related Energy Consumption
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Version 3.0, January 2013
7 pages

This recommendation was prepared by the Technical Commission of EUROMAP.

History

Date	Changes
April 1995	1st edition of EUROMAP 60 (Version 1.0)
June 2009	2nd edition of EUROMAP 60 (Version 2.0)
January 2013	3rd edition of EUROMAP 60 (Version 3.0) Completely revised – splitting in two parts: Part 1: Determination of Machine Related Energy Efficiency Class Part 2: Determination of Product Related Energy Consumption

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1 Introduction

1.1 Scope and application

This recommendation defines the determination of electrical energy consumption for

- a specified machine
- for manufacturing a specific product
- with a specific process

for comparison.

The machinery is split into 5 blocks which have to be reported separately:

Block 1 – machine (drives for main movements) and control

Block 2 – tool axes

Block 3 – barrel heating

Block 4 – peripheral devices, cyclic operated (e.g. pick and place devices) (optional)

Block 5 – peripheral devices, variable operated (e.g. dryers, temperature control units) (optional)

1.2 References

Short name	Title	Version
EUROMAP 60.1	Injection Moulding Machines – Determination of Machine Related Energy Efficiency Class	2013-01
IEC 62053-22	Electricity metering equipment (a.c.) – Particular requirements – Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)	2003-01

2 Definitions

The same definitions as in EUROMAP 60.1 shall apply.

3 Energy consumers

The following shall be included:

- all drives for the main movements (mould closing/opening, locking/unlocking, clamping/unclamping, ejection, metering, injection, applying/maintaining of contact force, lifting)
- injector movements
- ejector movements
- control
- internal maintenance devices (supplied by the machine manufacturer), e. g. cooling of electrical components, grease systems, cooling of the hydraulic fluid
- heating and, if applicable, cooling of the barrel

The following may be included (optional)

- energy consumption of peripheral devices (block 5), e.g. conveyors, hot runners, metering devices
- tool/mould axes, core movements (where applicable) and mould heating
- pick and place devices (block 4)

The following shall be excluded:

- external supply of fluids, e.g. water temperature control, compressed air, vacuum.

4 Measuring method

The information provided according to this recommendation should be obtained through reliable, accurate and reproducible measurement procedures that take into account the recognised state-of-the-art measurement methods.

4.1 Measuring equipment

The power measurements shall be performed using instrumentation compliant to the IEC 62053 family of international standards. More specifically, the instrumentation shall be certified accordingly to IEC 62053-22:2003.

4.2 Product quality

The product quality shall meet the customer requirements.

4.3 Measurement

4.3.1 Measurement conditions

Measuring of the specific energy consumption shall be carried out only in automatic mode when the machine has reached a stable condition, i. e.:

- stable automatic operation without the necessity of a manual intervention for at least 15 min
- for hydraulic machines: when a stable oil temperature (within specification) has been reached.

4.3.2 Energy measurement

The reproducibility shall be $\pm 2\%$.

Recommendation:

- Measuring of drive energy in steady condition over at least 5 cycles.
- For accumulator driven machines at least 1 charging cycle.

For the measuring of the heating energy the change of the medial heating power shall be taken as a guide – the changing of the digital signal shall serve as measuring criteria; the permissible tolerance shall be $\pm 1\%$.

Recommendation: Measuring over 10-15 cycles.

The measuring time shall be at least 3 minutes.

5 Documentation

To determinate the product related specific energy consumption for comparison, several facts shall be indicated. Therefore the documentation shall include at least: (* = given by customer)

General machine data

- detailed designation of the machine
- (serial) number of the machine
- year of manufacture
- relevant machine properties:
 - installed driving/heating power
 - drive concept per machine axis
 - screw diameter and type
 - cylinder isolation (yes/no)

Process data

- part name*
- part weight*
- shot weight*
- maximum flow path*
- wall thickness (min/max/average)*
- projected part surface*
- detailed material name*, supplier of material*
- material input temperature and drying condition*
- mould name*
- mould weight*
- number of cavities*

- Cycle data
 - total cycle time (minimum*)
 - cycle time in detail
 - moving times (closing, opening)
 - injection time*
 - holding time*
 - cooling time*
 - others

- injection pressure
- holding pressure
- clamping force*
- opening stroke*

- Temperatures
 - melt temperature*
 - cylinder temperature
 - mould temperature*

Energy measurements

- measurement time/number of cycles
- product related specific energy consumption
- average power (kW) (separated into blocks)
- idle power
- power factor

Remarks

- Remarks of customer
- Remarks of manufacturer

The template provided by EUROMAP may be used for documentation.

EUROMAP

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