

# Engel Injection Molding Machine

**ES 400**  
**TOGGLE**  
Data Sheet

## TECHNICAL SPECIFICATIONS - ES 400 TOGGLE INJECTION MOLDING MACHINE

### CLAMP

Clamp force	US tons	400
Clamp opening force	US tons	57
Clamp stroke (max.)	inches	27.56
Mold height (min - max)	inches	11.81 - 33.94
Daylight (min - max)	inches	11.81 - 61.50
Platen size (HxV)	inches	47.24 x 47.24
Distance between tie bars (HxV)	inches	33.07 x 33.07
Tie bar diameter	inches	5.51
Hydraulic ejector stroke	inches	9.45
Hydraulic ejector force	tons	8.9

### INJECTION

		2050	2050	2550
Screw diameter	mm	60	70	80
Screw diameter	inches	2.362	2.756	3.150
Shot size <sup>1+2</sup>	oz	27.5	37.5	50.5
Injection capacity	in <sup>3</sup>	51.8	70.5	95.1
Recovery rate <sup>1+2</sup>	oz/sec	2.2	3.2	3.0
Plasticizing capacity <sup>1+2</sup>	lbs/hr	485	728	683
Injection rate at max. press. <sup>3</sup>	in <sup>3</sup> /sec	16.4	22.4	24.9
Injection rate (regenerative) <sup>3</sup>	in <sup>3</sup> /sec	19.7	26.9	29.2
Injection velocity at max. press. <sup>3</sup>	in/sec	3.8	3.8	3.2
Injection velocity (regenerative) <sup>3</sup>	in/sec	4.5	4.5	3.8
Screw stroke	inches	11.81	11.81	12.20
Injection pressure (max.)	psi	30000	25810	23751
Injection pressure (regenerative)	psi	24979	21491	20205
Screw speed range (min=25)	rpm	262	262	175 <sup>6</sup>
Screw torque <sup>4</sup>	ft-lbs	1305	1305	1950 <sup>6</sup>
Screw L/D ratio		20:1		
Nozzle stroke	inches	25.59		
Nozzle force	US tons	12.4		

### HYDRAULICS

Pump capacity (required)	gpm	58.1
Oil reservoir capacity	US gal	204

### ELECTRICS

Power supply available	volts	208 / 230 / 460 / 575 - 3PH / 60Hz
Total rated horsepower	HP	60
Number of heat control zones		4+Nozzle
Total heating wattage	kw	25.3    29.4    33.5

### GENERAL

Dry cycle performance <sup>5</sup>	sec	2.6
Water requirements (max)	gpm	12
Machine dimensions (LxWxH)	inches	346 x 88 x 102
Machine weight	lbs	44000/16000 <sup>7</sup>
Hopper capacity	lbs	163
Suitable Engel robots		ERC 53 - 63

#### NOTES:

1. Based on polystyrene material.
2. Calculated
3. Can be increased with accumulator.
4. Can be increased.
5. Per Euromap 6 standard.
6. With high torque screw drive.
7. Split base - two piece shipping

(N/A=Not Available)

All data subject to change without notice  
Per Rev. 22, 010807

**ENGEL**

**STANDARD EQUIPMENT****Injection**

- Nitrided barrel and screw
- Non-return ring check valve
- 10 step injection speed profiling
- 10 step holding pressure profiling
- 5 step back pressure profiling
- 5 step screw speed profiling
- Digital screw speed (RPM) display
- Digital injection time monitoring
- Screw recovery time monitoring
- Boost cut-off: time, stroke, and hydraulic pressure dependent (switch-over by cavity pressure is optional)
- Automatic cushion monitoring and control
- Cold start protection
- Injection unit swivel
- Quick barrel change
- Precision linear bearings for carriage movement
- Hopper discharge chute
- Feedthroat prepared for water-cooling
- Feedthroat with thermometer
- Increased wattage ceramic heater bands
- Quick disconnects for heater bands
- Increased injection speed (regenerative circuit, screen selectable)
- Programs for sprue break, decompression, and intrusion

**Clamp**

- SPI mold mounting and ejector pattern
- Multi-stroke hydraulic ejection, speed and pressure controlled
- Heavy tie bars, large bearing surface support for moving platen
- Split base design
- Center ejector rod
- Mechanical safety dropbar
- 3 speed opening and closing
- Hydraulic, electric and electronic safety gate interlocks
- Automatic mold protection: self learning mold protection for optimum cycle time and set-up efficiency on CC100 models. (optional with EC100)
- Smooth, fast acting 5-point double toggle
- Adjustable support under moving platen
- Automatic central lubrication with pressure system protection
- Stationary platen prepared for water cooling
- 5 speed/pressure/position mold protection on EC100 models

**Hydraulics**

- Closed loop injection speed, injection pressure and screw back pressure; via single 'smart' pump technology on EC100 controlled models; (via double 'smart' pump technology on CC100 controlled models)
- Independent ejector/core motion/carriage movement on CC100 controlled models (corepull hardware optional)
- Fully proportional linearized hydraulic system
- Automatic calibration of proportional hydraulic valves and transducers
- Closed loop oil temperature regulation with prewarming system
- Clogged filter indicator

**Hydraulics (cont'd)**

- Oil level indicator with level switch
  - Pressure selector gauge
  - Proportional clamp valve for accurate clamp positioning
- Controls, Electrics & Electronics**
- Microprocessor control with high resolution flat color screen
  - Micrograph plus for CC100 control (optional with EC100)
  - RISC Multiple processor architecture (distributed intelligence)
  - Built-in disk drive for data up/down loading. Mold set-ups stored via machine CPU.
  - Quick machine set-up via single screen
  - Help text system
  - Linear transducers for measurement of the clamp, injection, carriage & ejector positions
  - Networking capability via "Teleservice/Engel Monitoring System" ethernet connection on CC100 models. (optional on EC100 models)
  - Automatic cycle monitoring and analysis
  - Digital display of all actual values
  - Current function display
  - Self-diagnostics, monitoring, alarm & calibration
  - Automatic screen shut-off
  - Automatic balancing of heat zones during warm-up
  - Auto barrel stand-by temperature when machine in alarm condition
  - Automatic reject selection
  - Additional screen selectable languages (Spanish/French) (other languages available upon request)
  - US/metric units conversion (A03 controls only)
  - User-defined programmable text pages. Keyboard optional.
  - Self-tuning temperature controls
  - History reporting of alarm conditions and set-up changes
  - Resettable cycle and non-resettable hour counters
  - Ventilated, filtered control panel
  - Energy-efficient, totally enclosed fan cooled motor

**General**

- Easy access to motors, pumps & hydraulics
- Large, open drop area for automation
- Ergonomic design for operator ease and safety
- Optically isolated control system (protection from outside noise)
- Analog/digital conversion to minimize signal noise on linear position transducers.
- Manufactured to ANSI/SPI B151.1 safety regulations

**OPTIONAL EQUIPMENT****Injection Unit**

- Hardened screws and bi-metallic barrels
- Specialty screws and screw tips for a wide variety of applications
- LIM, Thermoset, PVC, PIM, Gas-inj., MuCell and other packages
- Smaller than standard injection units
- Increased wattage & air-cooled heaterbands
- Shut-off nozzles

**Injection (cont'd)**

- Electric screw drive for increased energy efficiency
- Insulating blanket for barrel
- Hopper or drawer magnets

**Clamp**

- Platen prepared for water cooling
- Mold locating ring on the moving platen
- Mold venting program
- Quick mold mounting systems (hydraulic or magnetic)
- Semi- or fully auto. mold change system
- Air blow-off valve
- Mold support assembly
- SPI safety key switch for clamp, ejector and core movement
- Extended tie bars
- Automatic clamp force control (std. with CC100)

**Hydraulics**

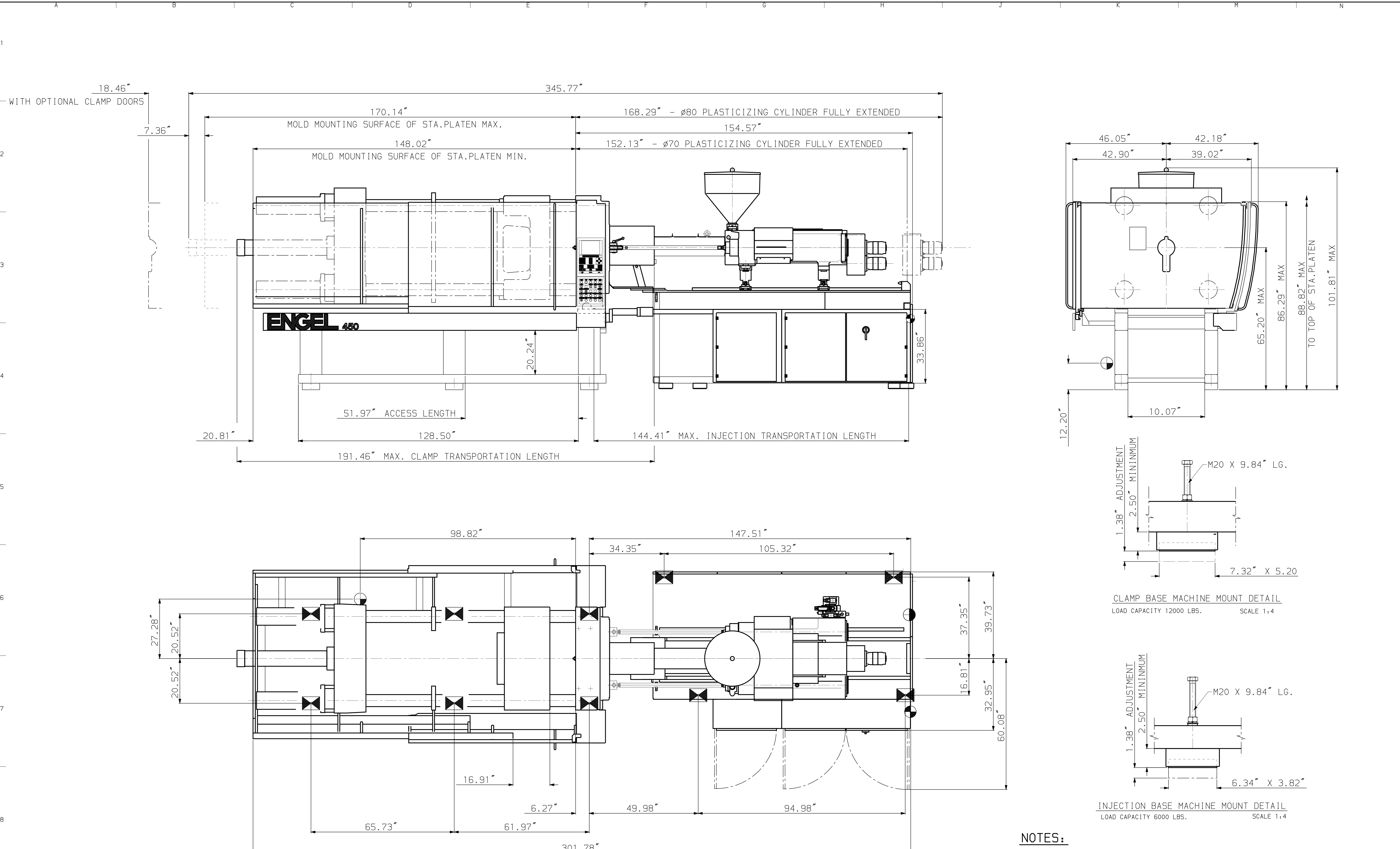
- Increased hydraulic drive for increased plasticizing and injection speeds
- Corepull(s) and unscrewing
- Hot runner valve gate control (pneumatic or hydraulic)
- Independent plasticizing
- High torque screw drive
- By-pass oil filtration
- Accumulator for increased inj. speed

**Controls, Electrics & Electronics**

- CC100 microprocessor control with high resolution flat color screen.
- Microplast and Microflow software pkgs.
- Micrograph for EC100 Control (standard with CC100 Control)
- Process data graphics and reports
- Magnetic security card access
- SPC (Quality Data Statistics)
- Auto. barrel/nozzle heat-up (7 day, 24 hour time)
- Power factor capacitors
- Robot interface
- Auxiliary electrical outlets
- Host computer & SPI auxiliary device interface
- Automatic shutdown for "lights out" operation (ghost shift program)
- Hot runner PID temperature controls
- Melt temperature monitor
- Melt pressure monitor
- Closed loop feedthroat cooling
- Cavity pressure dependent boost cut-off (Kistler/RJG/Dynisco)
- Graphics printer
- Power supply available: 208 / 230 / 460 / 575 volts, 3Ph / 60Hz
- Ammeters for barrel and nozzle zones

**General Options**

- Machine levelling/vibration mounts
- Water manifolds and flow controls
- Special painting of machine to customer specs
- Multi-injection
- Alarm bell in addition to alarm light
- Air and water service routing
- Spare parts packages
- Engel robots
- Training programs
- Engel monitoring system



**NOTES:**

1. ALL DIMENSIONS ARE IN INCHES UNLESS SPECIFIED OTHERWISE.
2. TECHNICAL DATA SUBJECT TO CHANGE WITHOUT NOTICE

- ☒ -MACHINE MOUNT
- ⊙ -STD.ELE.UTILITY ENTRANCE
- ⊕ -AIR CONN.-3/8"NPT-120 PSI MAX.
- ⊖ -COOLING WATER CONN. IN & OUT 1"NPT.

RELEASED  
MICROFILM  
REV. # 0

0 2000000224 NEW		29-JUL-00	J.S.
REV#	ECOM	DATE	NAME
SCALE DESCRIPTION		REVISION	
1:10	MAIN DIMENSIONS	ENGEL GUELPH - CANADA	
MATERIAL =		NAME	DATE
OUTDCK CODE =		DR. N.	J.S.
BREAK SHARP CORNERS -		CHK. D.	J.S.
SIZE	TO	REPLACES	COPY FROM
FROM	0.5 6 30 120 315 1000 2000		
TO	8.0 30 120 315 1000 2000		
FINE #	0.05 0.1 0.15 0.2 0.3 0.5 0.8		
MEDIUM #	0.1 0.2 0.3 0.5 0.8 1.2 2.0		
COARSE #	0.2 0.5 0.8 1.2 2.0 3.0 4.0		
DIM. TOL. IN MICR.		DRAWING NO.	
METERS COARSE #		9785.005.9531E	
PART WEIGHT IN Kg.		SHEET	REV.#
		2 of 2	0

