

# Technical Specification: Fully Electric Injection Molding Machine

## 1. Introduction:

The purpose of this technical specification is to define the main requirements for a fully electric injection molding machine to be used in the project “Cross border business model in industry for energy efficiency implemented by Bimex tel Ltd and BG Plast Ltd – EnEfProducts.” The machine will be designed to meet the strict standards of efficiency, precision, and sustainability expected in the European Union.

## 2. Machine Overview:

The injection molding machine will be powered by a fully electric system using electric servo motors for all major functions, including material injection, mold opening and closing with clamping, and dosing of the molten material. This design ensures high precision, energy efficiency, and reduced environmental impact compared to hydraulic counterparts.

## 3. Key Specifications:

### 3.1 Clamping Force:

- The injection molding machine will have a clamping force capacity ranging from 1750 kN to 1900 kN.

### 3.2 Injection Capacity:

- The injection capacity defines the total weight of the injected material per production cycle and is measured in  $\text{cm}^3$ .
- The injection capacity must range between 50 and 190  $\text{cm}^3$ , but not less than 20  $\text{cm}^3$ .
- The injection speed must be no less than or equal to 350 mm/s.
- Minimum injection pressure – 220 MPa.
- Minimum screw rotation speed during material preparation – not less than or equal to 400 rpm.

### 3.3 Distance Between Tie Bars:

- The distance between tie bars must be optimized to accommodate molds of various sizes while ensuring structural integrity and stability during operation.
- Minimum distance between tie bars: 460x460 mm.
- Maximum distance between side rails: 600x600 mm.

### 3.4 Platen Size:

- Platen sizes must range from 600x600 mm to 1000x1000 mm.
- The clamping mechanism platens must be designed such that the total machine length does not exceed 5.20 meters.

### 3.5 Opening and Closing Stroke:

- The mold opening and closing stroke must be no less than 400 mm.

#### 5. Compliance and Certification:

- The injection molding machine will comply with all relevant EU directives and standards, including but not limited to the Machinery Directive (2006/42/EC) and CE marking requirements.
- The manufacturer will provide documentation certifying compliance with applicable safety, quality, and environmental standards.

#### 6. Warranty and Support:

- The machine will be covered by a comprehensive warranty of at least 36 months.
- The manufacturer will offer training and technical support.

#### 7. Additional Components Supporting Energy Efficiency:

- Energy regeneration during platen opening and closing.
- Energy regeneration during deceleration and pressure release.
- CNC-controlled machine.

<b>Summary of the technical characteristics of the injection molding machine</b>		
<b>Characteristics</b>	<b>Value Minimum/maximum</b>	<b>Unit of measurement</b>
Clamping force	1750 / 1900	kN
Injection capacity	20 / 190	cm <sup>3</sup>
Injection speed	350 / 450	mm/s
Injection pressure	220 / 250	Mpa
Injection rotation speed when dosing in rpm	400 / 500	rpm
Tie-bar distance	460x460 / 600x600	mm
Platen sizes	600x600 / 1000x1000	mm
Machine maximum lenght	5.0/5.2	m
Opening and closing stroke	400 / 700	mm
Warranty period	36 / 60	months

<b>Number of machines</b>	<b>Total budget for fully electric injection modling machine</b>
1	130 566.67 €

## Technical Specification for Air-Cooled Chillers

### 1. Introduction:

Air-cooled chillers with scroll compressors are essential components in various industrial and commercial applications where precise cooling is required. This technical specification defines the main operating principles of air-cooled chillers with scroll compressors and provides key technical data for procurement purposes.

### 2. Operating Principle:

Air-cooled chillers operate on the principle of heat transfer from a process via a refrigeration cycle. Key components include a scroll compressor, condenser, evaporator, water expansion tank, and refrigerant. The process begins with the compressor compressing the refrigerant gas, increasing its temperature and pressure. The high-pressure, high-temperature gas flows into the condenser, where it releases heat to the environment and condenses into a liquid. The liquid refrigerant then passes through an expansion valve, undergoing pressure reduction, which lowers its temperature. This cold refrigerant circulates through the evaporator, absorbing heat from the process or the cooled space, and then returns to the compressor to repeat the cycle.

### 3. Technical Data:

For the needs of our enterprise and in relation to the participation of BG PLAST Ltd in the project “Cross border business model in industry for energy efficiency implemented by Bimex tel Ltd and BG Plast Ltd – EnEfProducts,” we intend to purchase 2 (two) chillers with different cooling capacities. These next-generation chillers are up to 30% more energy efficient compared to the current units to be replaced.

The technical characteristics of the two separate cooling systems are as follows:

#### Chiller 1 – Cooling Capacity:

- Minimum: 15 kW
- Maximum: 30 kW

#### Chiller 2 – Cooling Capacity:

- Minimum: 25 kW
- Maximum: 50 kW

<b>Technical specification summary</b>			
<b>Position</b>	<b>Technical characteristic</b>	<b>Value Minimum / maximum</b>	<b>Unit of measurement</b>
<b>Chiller 1</b>	Cooling capacity	15 / 30	kW
<b>Chiller 2</b>	Cooling capacity	25 / 50	kW

#### 4. Additional Features:

- Efficiency: The chillers must be designed for high efficiency to reduce energy and operational costs.
- Compact Design: Units must have compact dimensions to optimize space usage.
- Noise Level: Chillers must operate with minimal noise to avoid environmental disturbance.
- Control System: The user interface must be easy to use while offering advanced monitoring and operational parameter adjustment.
- Serviceability: Units must be easily accessible for maintenance and service, with main components easily serviceable.
- Tank Material: The chillers' tanks must be made of stainless steel.

Number of air-cooled chillers	Total budget for air cooled chillers
2	25 894.94 €

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