

*DESIGN OF A PIPING SYSTEM FOR IRRIGATION
PURPOSES AND SELECTION OF A SUBMERSIBLE WATER PUMP*

Project Report submitted by

C H R Y S O S T O M O S T H E O D O R O U

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Project Supervisor : Mr. P. Demetriou
 Lecturer H.T.I.

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A B S T R A C T

This project deals with various types of pumps in General and then deals for a specific usage of pumps for agricultural purposes.

A specific plot of land of area 200 x 50m will be used for selection purposes.

C O N T E N T S

ABSTRACT

CHAPTER 1

PUMPS CLASSIFICATION

- 1.1. Introduction
- 1.2. Classification of pumps

CHAPTER 2

THEORY OF PUMPS

- 2.1. Centrifugal pumps
- 2.2. Axial flow pumps
- 2.3. Mixed flow pumps
- 2.4. Energy losses
 - 2.4.1. Hydraulic losses
 - 2.4.2. Volumetric losses
 - 2.4.3. Mechanical losses
 - 2.4.4. Overall efficiency
- 2.5. Performance characteristics

CHAPTER 3

USEAGES

- 3.1. Sources of water
 - 3.1.1. Surface water
 - 3.1.2. Groundwater
- 3.2. Agricultural usage
- 3.3. Ground-water wells
 - 3.3.1. Site selection
 - 3.3.2. Types of pumps used
 - 3.3.3. Use of booster pumps within distribution systems

CHAPTER 4

PUMP DRIVERS

- 4.1. Type of motors
 - 4.1.1. Alternative current motors
 - 4.1.2. Seallers pump motors
- 4.2. Engine selection and application
 - 4.2.1. Basic design variations
 - 4.2.2. Power ratings
- 4.3. Fuel Ratings
 - 4.3.1. Gasoline
 - 4.3.2. Diesel
 - 4.3.3. Cooling systems
- 4.4. Use of gears with pump drivers
 - 4.4.1. Types of gears
- 4.5. Adjustable speed belt drives
 - 4.5.1. Operating principle
 - 4.5.2. Other belt drives
 - 4.5.3. Final selection of drives
- 4.6. Couplings
 - 4.6.1. Coupling types used in pump drive systems
 - 4.6.2. Rigid couplings
 - 4.6.3. Applications
 - 4.6.4. Flexible couplings
 - 4.6.5. Flexible drive shafts
 - 4.6.6. Half-twisted v-belts driving arrangement
 - 4.6.7. Half-twisted flat-belts driving arrangement

CHAPTER 5

SELECTION OF PUMP AND PUMP DRIVER

- 5.1. Pump characteristics
- 5.2. Fluid characteristics
- 5.3. Pump materials
- 5.4. Driver type
- 5.5. Pump specifications
 - 5.5.1. Specification types
 - 5.5.2. Economic life
 - 5.5.3. Spare parts
 - 5.5.4. Maintenance costs

CHAPTER 6

INSTALLATION - OPERATION - MAINTENANCE

- 6.1. Well Conditions
- 6.2. Transport and storing of pump parts
- 6.3. Unpacking
- 6.4. Installation equipment
- 6.5. Bore hole and foundation
- 6.6. Installation
- 6.7. Checking the rotation
- 6.8. Coupling Installation
- 6.9. Pulley Installation
- 6.10. Operation
- 6.11. Maintenance

CHAPTER 7

CALCULATIONS

- 7.1. Pressure losses in main line
- 7.2. Pressure losses in secondary line
- 7.3. Pressure losses in Distribution lines
- 7.4. Correction of pressure losses
- 7.5. Total pressure losses
- 7.6. Pressure losses of galbanised pipes
- 7.7. Total pump pressure
- 7.8. Selection of pump

CHAPTER 8

APPENDIX

APPENDIX 1.

Table 1. In this table the pressure losses of galvanized pipes are shown.

APPENDIX 2.

Table 2. In this table the pressure losses in % of polythene pipes are shown.

APPENDIX 3.

Table 3. In this table the number of secondary lines and the relevant co-efficient is shown.

APPENDIX 4.

Table 4. Table 4 is the performance table of the selected sprinkler.

APPENDIX 5.

Table 5. In this table the equivalent length of valves and fittings is shown.

APPENDIX 6.

Table 6. Pump characteristics

APPENDIX 7.

Table 7. Pump Graphs.

APPENDIX 8.

Layout drawings.