



**Gauteng Branch
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Rescom (Residential and Commercial) irrigation design course

With the formation of the LIA in 1983, one of the prime objectives was to establish standards and professionalism for the landscape and turf irrigation industry. To this end minimum standards, now termed “*Code of Standards*” were drawn up to ensure that the design of irrigation systems would make the most efficient usage of water. To ensure longevity of the components i.e. piping, valves and pumps, the relative engineering norms and best practices for the installation of the irrigation equipment was included in the Code of Standards.

To provide training for the industry the relevant educational institutions were approached, for assistance. Unfortunately as the landscape irrigation industry was in its fledgling stage, these institutions had neither the facilities, knowledge nor the experience to present irrigation design courses.

It was accordingly incumbent on the association to provide the required training. To ensure that the proposed syllabus would meet the skills requirements, the relevant subjects were identified and the course content was duly constructed. This was then benchmarked against the courses offered by the IA (United States Irrigation Association). Consequently minor additions / changes were made to align the Rescom with the US material.

The Rescom was first presented in 1987 to members of the LIA in Gauteng. The industry embraced the course to the extent that “*Principle*” membership of the LIA could only be obtained once the course was successfully completed.

The course has been continually updated to include the technological advances made in irrigation. The course is now available to all sections of the green industry and employers often request that potential employees have successfully completed the Rescom course as a precondition for employment. The Rescom course fulfills the design needs for all but large sports turf and commercial irrigation systems. The course is well respected and regarded throughout the “green industry”. Successful completion of the Rescom is a prerequisite for any person wishing to attain “*Principle*” membership of the LIA

The Rescom course focuses on providing delegates with the knowledge and skills to produce energy efficient irrigation designs through the selection and usage of the most suitable equipment to suit the site conditions and plant material.

Delegates are exposed to a wide spectrum of subjects, each covering a particular section of an irrigation design.

Curriculum

1. Hydraulics

- Properties of liquids
- S I units used in irrigation
- Static pressure
- Dynamic pressure
- Determination of friction losses
- Conducting pressure and flow tests

2. Irrigation piping

- Low density polyethylene – characteristics, pressure ratings & usage
- High density polyethylene – characteristics, pressure ratings & usage
- PVC – characteristics, pressure ratings & usage
- Copper piping – characteristics and connections to irrigation mainlines
- Polycop piping – characteristics and connections to irrigation mainlines
- Galvanised piping – characteristics and connections
- Installation requirements for irrigation piping
- Usage of SANS rated piping vs. “no name brands”

3. Plant & water relationships

- Soil types and their characteristics
- Pore spaces in soils
- Infiltration rates and water retention of soils
- Capillary action
- Water content in soils – saturation, field capacity, wilting point & available moisture
- Water usage and losses in soils – evaporation, transpiration & ET
- Measuring the water content in soils
- Irrigation best practices

4. Sprinklers & emitters

- Operational characteristics of emitters – drip & bubblers
- Usage of emitters and their advantages in landscape irrigation
- Designing a drip irrigation system
- Static sprinklers – operational characteristics, spacing & usage
- Rotary sprinklers – operational characteristics, spacing & usage
- Sprinkler distribution profiles
- Determining the rate of precipitation and run times
- Irrigation efficiency – distribution uniformity, co-efficient of uniformity & scheduling co-efficient

5. Irrigation valves

- Manually operated valves - gate valves, ball cocks, stop cocks & diaphragm
- Direction control – foot valves, non return
- Pressure reducing valves – usage and various types available
- Pressure relief valves - usage and various types available
- Air release valves – necessity & location of ARVs
- Hydraulic control valves
- Low voltage solenoid valves

6. Pumps

- Pumping conditions – flooded suction & suction lift
- Determination of pumping duties – flow rates & manometric heads
- Types of pumps and their unique characteristics – positive displacement & dynamic
- Single & multistage pumps
- Self priming pumps – features & operational limits
- Pump selection – pump curves & selection criteria
- NSPH – required & available
- Cavitation – causes and methods to prevent / minimise
- Pump efficiency and power absorbed
- Typical pumping plant layouts & design criteria

7. Well points (W Cape & KZN)

- Features & operational limits of well points
- Selection of pumps and ancillary equipment
- Typical well point installations & design criteria

8. Boreholes

- Structure of a borehole – overburden, bedrock, aquifers, and fault zones
- Yield and water levels in a borehole – static head, dynamic head, draw-down, recovery rate & cone of depression
- Recommended pumping rates & the danger of over pumping
- Types of borehole pumps and their specific advantages – positive displacement & dynamic
- Determination of the pumping duty for a borehole pump
- Pump selection – pump curves & selection criteria
- Typical borehole installations and protective control equipment

9. Low voltage electrical

- Basic electrical concepts – AC, DC, amps, volts, ohms, watts
- The characteristics of double wound isolating transformers – 240v to 24v
- The necessity of using use 24v for all irrigation and pump controls – relays, float & pressure switches.
- The maximum allowable volt drops in irrigation cabling and the methods of calculating these.
- Recommended waterproof cable joints and the necessity of using these
- Lightning protection – the role that good earthing plays in minimising lightning damage and the recommended methods of installing these
- Types of lightning arrestors and their specific characteristics.

10. Filtration

- The role that filtration plays in the protection of irrigation equipment.
- Recommended grades of filtration and the recommended ratios of aperture to nozzle sizing
- Types of filter elements their usage and advantages

11. Fertigation

- Benefits of installing fertigation
- Types of fertigation equipment
- Integrating a fertigation system in an irrigation reticulation

12. Storage tanks

- Sizing a tank / reservoir
- Surface mounting of a storage tank
- Partial burial of a storage tank
- Installing level controls and “dry pumping” protection

13. Cross connections

- Potential risks of contamination through the creation of cross connections
- Precautions to prevent a cross connection between borehole and potable supplies
- Procedures to create an “air break” between multiple feeds to a storage tank

14. Pressure tanks

- Functions of a Pressure vessel
- Characteristics & operation of Hydro pneumatic pressure vessels
- Characteristics & operation of Hydrospheres

15. Irrigation controllers & scheduling

- Types of controllers and their functions
- Creating an efficient irrigation schedule

16. Irrigation design

- Techniques to measure a site for the design of an irrigation system
- Working with existing site plans
- Working with google earth
- Selection & placement of sprinklers
- Selection of suitable flow rates for stations
- Selection of routes for mainlines and spraylines
- Placement of station control valves
- Features to be incorporated in an “as built” drawing

17. Design assignment

The assignment consists of an irrigation design, complete with all calculations and material selections for a large domestic garden. The following items are included:

- A detailed drawing showing the position of sprinklers, sprayline piping, mainline piping, solenoid valves, storage tank and pumps is produced
- All friction calculations and pipe selection for spraylines, mainlines, borehole header and delivery pipelines are tabulated
- The rate of precipitation and run times for all stations are calculated and listed
- The volume of an irrigation cycle is calculated and a tank suitable to store this is selected
- The booster pump duty is calculated and the most efficient pump is selected
- Calculations and pipe selection of the header and delivery piping are tabulated
- The borehole pump’s duty is calculated and the most efficient pump is selected
- Input and output volumes are calculated and the correct size of storage tank is selected
- A weekly irrigation schedule is constructed, illustrating the number of cycles per week and station run times for the four seasons

Delegates receive a comprehensive training manual that covers all the subject material covered in the course. In addition, an electronic version of the notes and irrigation catalogues are provided on a CD.

During the course, time is allocated to practice and apply the design elements for each section of the course. To ensure that delegates attain the required competency, they will be mentored and guided in these sessions.

The assignment, that includes all facets of irrigation design, will be completed in the last 5 days of the course. Delegates may either produce hand drawn designs or complete these on their laptops.

Final assessment of the delegate's competency is gauged through two exams, theory and practical.

Successful candidates will receive the LIA's certificate in "Residential and Commercial Irrigation Design".

It is advisable that candidates have at least a Grade 12 (Matric) Certificate or equivalent from a Technical College.

Delegates should bring the following:

- An assortment of pencils and koki pens
- A scale ruler
- A simple calculator
- Drawing compass
- Notepad