NPTC
Registered Charity No. 1096429

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LEVEL 3

CERTIFICATE
IN
AUTOMATIC TURF IRRIGATION SYSTEMS

ASSESSMENT SCHEDULE

Candidate Information

Introduction
The scheme will be administered by the NPTC.

NPTC will:

- Publish scheme regulations
  assessment schedule
  assessment material
- Approve centres to co-ordinate and administer the scheme
- Set standards for the training of Verifiers and Assessors
- Recruit, train and deploy Verifiers
- Manage verification
- Issue certificates to successful Candidates

The Certificate
Certificates will be awarded to Candidates who achieve the required level in all Units.

Instruction
Attendance at a course of instruction is not a pre-requisite for an application for an assessment but potential Candidates are strongly advised to ensure that they are up to the standards that will be expected of them when they are assessed.

NPTC does **not** hold a register of instructors; however instruction will normally be available from recognised training providers and/or centres of further or higher education active in the areas covered by this certificate. Further information on training may be obtained from the local Assessment Centre.

Access to Assessment
Assessment Centres will be responsible for arranging assessment on behalf of a Candidate. Assessment may only be carried out by an Assessor approved by NPTC for that scheme. Under no circumstances can either instructors involved in the preparation of candidates, or the candidates work place supervisors**,** or anyone else who might have a vested interest in the outcome**,** carry out the assessment.

The minimum age limit for Candidates taking certificates of competence is 16 years. There is no upper age limit.

Assessment
The assessment, taken in the form of a written question paper, is a process by which it is confirmed that the Candidate is competent in the Units within the award to which the assessment relates. It is a process of collecting evidence about his/her capabilities and judging whether that evidence is sufficient to attribute competence.

The candidate must be registered through an NPTC approved Assessment Centre for this qualification prior to assessment.

The result of the assessment will be recorded on the Candidate Assessment Report Form.

The schedule of assessment contains the criteria relating to assessment of knowledge and understanding

A list of registered Assessment Centres is available from NPTC. (www.nptc.org.uk)

Verification
Verification is a process of monitoring assessment; it is an essential check to confirm that the assessment procedures are being carried out in the way that NPTC has laid down. The overall aim of verification is to establish a system of quality assurance that is acceptable in terms of both credibility and cost effectiveness.

A selection of written papers marked by the Assessor will be evaluated by an NPTC approved Verifier.

Compliance with the verification requirements will be a pre-requisite of Assessors remaining on NPTC's list of approved assessors.

Complaints and Appeals
NPTC and its Assessment Centres have a formal Complaints and Appeals procedure. In the event of any dissatisfaction with the arrangements and conditions of assessment, the candidate should first contact the Assessment Centre through whom the assessment was arranged and submit the complaint in writing.

For further information on NPTC's Equal Opportunities Policy and Complaints and Appeals Procedures, please refer to www.nptc.org.uk

Learning Outcomes
The candidate will be able to demonstrate knowledge:
1. Of the function of various component parts of an irrigation system
2. About the different features found in sprinkler heads and what advantages found
3. Of the function of solenoid valves, their various features and how they fit into the control system
4. About the potential sources of water and appreciate the regulations covering its use.
5. About the various control system component parts associated with irrigation systems and the efficient use of water
6. On common types of pipe material used in irrigation systems. Methods for joining them. Precautions that must be taken to protect underground pipe work. Function of associated valves and pipe fittings found in a typical irrigation system
7. Of the procedure to undertake simple fault finding
8. About the typical procedure for winterising and opening up irrigation systems
9. Of potential hazards associated with irrigation systems

In addition candidates will also be able to calculate:
10. Run times for sprinkler from information obtained from precipitation rates for sprinklers
11. Precipitation rates

Assessment takes the form of a written question paper to establish knowledge and understanding.

Guidance Notes for Candidates and Assessors

The assessment contains 4 compulsory units:
The compulsory units are:

Unit 1.	Component parts of an automatic irrigation system
Unit 2.	Environment, water and its efficient use
Unit 3.	Precipitation rate and run time calculations
Unit 4.	Safe Operation and Maintenance of Turf Irrigation Equipment

Candidates must successfully achieve all Assessment Activities.

Additional Information:
May be sought from the relevant Health and Safety (HSE)/BTLIA publications.

Unit 1: Component parts of an automatic irrigation system	
ASSESSMENT ACTIVITES	**ASSESSMENT CRITERIA**
1. Demonstrate knowledge of the function of various component parts of an irrigation system taking into account	To apply water evenly to a specific area
Triple swing joints	To enable the sprinkler to be moved up or down so that it is a grade level To protect the lateral pipe work below from heavy weights
Solenoid valves.	To turn off or on the water to the sprinklers remotely via an electrical current To enable the pressure at the sprinkler to be adjusted by using flow control Control maximum pressure when they are pressured regulated
Items in a valve box associated with a golf green, tee or sports area	Solenoid valve(s) Decoders Hose point Isolating valve
Isolating valves	Turn water off to enable servicing of sprinklers or solenoid valves Enable leaks in pipe work to be located Enable pipe work to be repaired Used to enable commissioning of a system Used to drain the system
Where isolating valves are likely to be found	Found in Greens valve boxes Found in 'Tee' valve boxes Found around the course especially at junctions in pipe work Found in Pump Houses Found in mains water supplies
Air release valves and where they may be found	To enable air to be released from the highest points in the system
Equipment that might be found in a pump house	Irrigation pump(s) One way valves/non return / check valves Pressure relief valve Pressure gauge Isolating valves Controller
One way valve	To protect the pumps against reverse rotation To help maintain pump prime

ASSESSMENT ACTIVITES	ASSESSMENT CRITERIA
2. Demonstrate knowledge about the different features found in sprinkler heads and what advantages found taking into account:	Impact drive Gear Cam Crown
Sprinkler head delivery mechanisms	Piston Two Pass Ball Dolphin
Sprinkler head	Have pressure control Have low drainage check valve
Sprinklers with low drainage check valve	Prevents the water from high sprinklers flowing to lower situated ones
Pressure regulation sprinklers	Limits the maximum nozzle pressure Ensures even nozzle pressure across the course
Digging around a V-I-H sprinkler head	Small bore pipe between the bottom valve and solenoid control Low voltage control cable
3. Demonstrate knowledge of the function of solenoid valves, their various features and how they fit into the control system taking into account: BSP/ACME Adaptor PTFE Tape	a) enables BSP & ACME threads to be joined together b) enables a water tight threaded joint to be made .
Alternatives to a V-I-H system	Block Split Block
Operating a solenoid valve	Using an external bleed screw. Rotate external cam through 90º Rotate coil through 90º
Flow control wheel	Can be used to reduce the flow and hence reduce the nozzle pressure
Pressure regulated solenoid valves	Accurately limits the maximum nozzle pressure. Ensures even nozzle pressure across the course
Minimum solenoid coil voltage	19 volts approximately
If a solenoid coil is working	Check the electrical resistance [12-50Ω] Check using a coil tester

Unit 2: Environment, water and its efficient use	
ASSESSMENT ACTIVITES	**ASSESSMENT CRITERIA**
1. Demonstrate knowledge about the potential sources of water and appreciate the regulations covering its use taking into account: The Environment Agency	To control the efficient use of water To manage the resource efficiently for all
Using mains water	The water is clean, free from contamination both chemical and organic and has known ph No large scale storage facility is required
Restrictions that might be applied to the use of water	Amount abstracted Time of year for abstraction and cost Limited use in drought
Sources of water	Rivers Streams Wells Bore holes Springs Lakes and ponds Grey water
Prevention of contamination of mains water supplies	Gap not less than 20mm and at least twice the size of the bore of the inlet pipe' Use of back flow devises
2. Demonstrate knowledge about the various control system component parts associated with irrigation systems and the efficient use of water taking into account: Low voltage control cable	To transmit an electrical current sufficient to operate the solenoid coil To transmit the control signal to the decoder
Maximum usable cable voltage	50 volts
The decoder	Receive the control signal to switch on or off the solenoid coil
The controller	Controls the time the sprinklers are operational In none pressurised system, the controller will switch on or off the pumps
Sensors associated with the control system	Low level water switch Rain switch High wind switch Sustained low pressure switch Low sensor Pressure switches Flow sensor
The action to take if precipitation rate is higher than infiltration rate	Apply the water in multiples of smaller run times
Immediate operational action to take if excessive wind speeds encountered	Turn the system off
Location of control cable	Just above the pipe work

Unit 3: Precipitation rate and run time calculations	
ASSESSMENT ACTIVITES	**ASSESSMENT CRITERIA**
1. Calculate the precipitation rates taking in to account:	15mm/hr
Square spaced sprinklers spaced at 20 metres and a flow of 100 litres/minute and with a 360º rotation	
Row space for a triangular configuration if the head space is 18metres	18 x .866 = 15.58
Maximum head space according to BTLIA Standards for triangular spacings for 5 mph wind speed when the sprinkler data states that the radius of throw is 20metres	20 x 2 x 55% = 22metres
The formula to enable the precipitation rate for an in-line configuration to be calculated at 360º rotation	$\frac{\text{l/m x 60}}{\text{HS x [HS x 2 x 866]}}$ = mm/hr
Standard % diameter spacings for square **and** triangular configurations for wind speeds up to 5mph	Square 50% of diameter Triangular 55% of diameter
Precipitation rate for triangular sprinklers at 55% of radius of 18metres and a flow of 80 l/m full circle	HS = 18 x 2 x 55% = 19.8m RS = 19.8 x .866 = 17.1 m $\frac{80 \times 60}{19.8 \times 17.1}$ = 14.2 mm/hr
Precipitation rate for 90º rotation for a sprinkler that has a precipitation rate of 10mm/hr full circle	40mm/hr
Action needed to counter wind speeds above 5mph during the design stage	Reduce the head speed by 5% per 5 mph
Maximum wind speed that irrigation should <u>not</u> take place	15 mph
2. Calculate the run times for sprinkler from information obtained from precipitation rates for sprinklers taking in to account: The run time if the precipitation rate is calculated at 14mm/hr, full circle and the required precipitation is 25mm/week	$\frac{25/7 \times 60}{14}$ = 15.3 mins [15 mins]
The run time if the precipitation rate is calculated at 30mm/hr, half circle and the required precipitation is 25mm/week	$\frac{25/7 \times 60}{30}$ = 7.1 mins [7 mins]
The run time if the precipitation rate is calculated at 10mm/hr, full circle and operates at 90º part circle and the required precipitation is 17mm/week	Precipitation rate 10 x 4 = 40 mm/hr $\frac{17/7 \times 60}{40}$ = 3.6 mins [4 mins]

Unit 4: Safe Operation and Maintenance of Turf Irrigation Equipment	
ASSESSMENT ACTIVITES	**ASSESSMENT CRITERIA**
1. Demonstrate knowledge on common types of pipe material used in irrigation systems. Methods for joining them. Precautions that must be taken to protect underground pipe work. Function of associated valves and pipe fittings found in a typical irrigation system taking into account:	Clean pipe of dirt etc. and cut to length and remove burrs Apply cleaner to pipe and fittings Apply cement to pipe and fittings using correct techniques. Push home pipe fully to pre marked position and hold firm for one minute Remove excess cement from joint Allow time to cure according to recommendation
The pocedure for making a uPVC cement joint	
Advantages for using uPVC pipe work	Wide range of pipe fittings available Does not corrode but joints may age.
Advantages for using MDPE pipe	More flexible which is better in unstable ground conditions More reliable quality joints More resistant to damage
Advantages for using HPPE pipe	Thinner walled pipe capable of carrying more water for the same OD
Methods of joining PE pipe work together	Electrofusion Butt weld Mechanical joint
Minimum depth for mains pipe work to meet the water bylaws	650mm cover
BTLIA recommended minimum depth of cover for mains and lateral irrigation pipe work	450mm cover
Initial installation angle of the long arm of a triple swing joint	45º
Method of checking air release valves during refilling	Air should be heard escaping from the valve
Drain down valves and where they may be found	Found at the end and lowest points in the pine work system Enables water to be removed from the pipe work for repairs to be carried out Enables water to be removed from the pipe work to prevent frost damage
Position and function of one way /non return /check valves in a complete system	Prevents water flowing back to source Prevents from contra rotation on switching off Found at the bottom of lift suction pipes After each pump Before the water leaves the pump house
Hose points	For hand watering Hose points breaking off. High pressure water
2. Demonstrate knowledge of the procedure to undertake simple fault finding taking into account: Pipe leaks	Pressurise system, switch off and check the pressure gauge drop with time
Isolating valves	Check each section of pipe between isolating valves for pressure drop
Position of mains and sub main pipe locations	Use a 'CAT' type cable locator assuming cable laid with pipes
Cable faults	Check the controller for cable fault test facility Use cable fault test equipment

ASSESSMENT ACTIVITES	ASSESSMENT CRITERIA
3. Demonstrate knowledge about the typical procedure for winterising and opening up irrigation systems taking into account: Storage tanks	Turn of water supply Lower water level Place slab of polystyrene into tank Check tank roof for leaks and tightly fitted
Frost and mechanical damage	Remove drain plug and drain Electrically isolate the pump motors Consider artificial heat from thermostatically controlled heater
Mains and lateral pipe work	Open drain valves Open hose points slightly to allow air into the system Blow out water with compressed air
Damage from frost if not drained down correctly	Damage to: Pumps Pressure relief valves Pressure switches Pipe work Solenoid valves Sprinkler heads Air release valves
Refilling pipe work Operation of sprinklers	Fill slowly and remove air Sprinkler rise and fall Sprinklers rotate at an even rate Sprinklers are rotating to the correct arc The arc settings are correct That there are no leaks The water issuing from the nozzles look similar Check the radius of throw
Effect of jet of water issuing from a nozzle if very low pressure Appearance of jet of water issuing from a nozzle of over pressurised	Produces a donut effect Generates a lot of mist and has reduced throw
4. Demonstrate knowledge of potential hazards associated with irrigation systems taking in to account: Making solvent joints for uPVC pipe	Working in confines space with insufficient ventilation when handling cleaner and cement Protect hands from cleaner and cement
Incorrect refitting of sprinkler snap rings	Sprinkler head drive mechanism blowing out of the ground
Removing the bottom valve in V-I-H sprinklers Advice prior to working in trenches or holes	Isolate the sub main and reduce pressure in the sub main Follow HSE Guide Lines
Working near mains voltage electrical equipment with water present Pointing jets of water towards overhead electrical cables	Isolate electrical equipment Avoid spraying water in a pump house Electrocution
Aluminium pipes close to overhead power lines	Electrocution