

The Unseen Irrigation System

Adrian Handbury offers some excellent advice to ensure the irrigation pipes that go into your golf course measure up

Do you recognise the following scenario?

After years of telling the management committee that the irrigation system is not cost effective and providing the figures to prove that repair costs are a five figure sum annually, it has been decided that something must be done.

The Course Manager spends hours consulting with the Green Committee and Secretary on one side and the internet and manufacturers' brochures on the other. Too much information has been gathered, so the Club narrows it down to quotes from three different irrigation contractors. However, the prices differed by 200%, so the services of an irrigation consultant are procured. The consultant dismissed all the quotes, designed a system and invited five further contractors to submit a tender for a bill of quantities. This has generated five quotes, each with three different manufacturers. Presentations are made to the committee/club, and then finally, with, recommendations from the Course Manager and Consultant, a contractor and a branded product are chosen.

So the moment has finally arrived, the decision has been made and the contract signed. A start date is agreed, and materials begin to arrive on site. Two articulated lorry loads of pipe pull onto site, and this is unloaded behind the sheds. Five huge reels of cable in lurid colours are placed in the shed (you know how valuable copper is at the moment!). Three pallets of Brand X sprinklers and valves are put in the shed for safe-keeping. So we have the origins of a superb new Brand X irrigation system.

Or do we?

Do we know what the average breakdown of the irrigation system materials can be?

As we can see from table (inset), the greatest material input is the one which will probably be the one to which the client has the least knowledge of, or control of, within the specification.

What is actually known about this commodity apart from it is nowadays usually 'poly' (polyethylene) rather than u-PVC (unplasticised polyvinylchloride)?

What questions should the Course Manager or committee be asking about this important com-



BREAKDOWN OF THE IRRIGATION SYSTEM MATERIALS

• Pipe	33%
• Rotors	30%
• Control	12%
• Pump Set	9%
• Cable	8%
• Valve Assemblies	5%
• Water Storage	3%

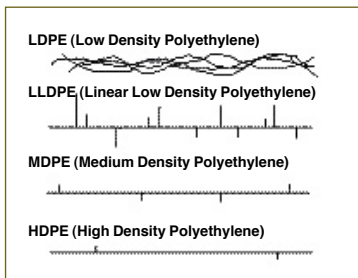
(Breakdown based upon breakdown of average components used in an 18 hole greens, tees and fairways installation)

modity, which will soon disappear under the course and hopefully never be seen again?

The most common material that is used today is polyethylene (PE) which is often known as 'blue pipe' by the greenkeeping fraternity. However, the product, polyethylene, is a manufactured hydrocarbon which may be manufactured into many different products which include drink bottles, carrier bags or water pipes.

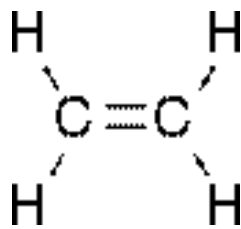
The expected lifetime of the irrigation system is at least 15 years, and so it is imperative that the correct grade of polyethylene is used in the pipe which is used for the pipe in the irrigation system.

ABOVE: Replacement fairway irrigation installed by mole-plough at Carnoustie Links



The structures of the various grades are made up as shown.

These lines represent the make-up of the internal structure of the different types of PE. The LDPE is made up of random strands of the hydro-carbon which are loosely connected. This makes for a very



The bonded hydrocarbon molecule polyethylene

flexible but relatively weak pipe – usually suitable for pressure applications up to 4 bar. As the density of the PE increases, the strands of the compound become more linear and tightly woven which increases the strength of the pipe. The denser the material becomes, the greater the wall strength. This also means that the wall thickness can be reduced so that the flow through the pipe can be greater.

The simplest breakdown of the pipes types specified for irrigation systems are MDPE (Medium Density Polyethylene) and HDPE (High Density Polyethylene). When PE was first used in irrigation systems it was manufactured from relatively

low grade material, and was usually black. The colour black was specified for two reasons

1. It was more cost effective as there were no particular standards required for irrigation

2. Drinking (potable) water is carried in blue pipe which should carry a kite-mark to show conformity to regulations

Nowadays there is a greater variation of pipe colours available:

Black - often using recycled or reground plastic in its manufacture.

Blue - usually thicker walled MDPE for drinking water use.

Black with Blue Stripes – usually thinner wall HDPE; use as above.



Black with Green Stripe – HDPE specifically designed for irrigation use and to be installed by mole-plough.

As PE pipe became more common for irrigation systems, and also more contracts were consultant led, it became usual to find standards for pipe to meet in order to be deemed suitable for a pressurised irrigation mainline. As the irrigation industry is too small to demand its own standards, these were borrowed from the drinking water industry. These standards are designed to cover the requirements of all of the water authorities for both the installation of the pipe and also the quality of water that reaches the end customer. They cover the colour of the pipe, and the effect of sunlight on it. The long-term stress-crack resistance and some also cover the pipe's suitability for welding.

The requirements that are most prevalent for the greenkeeping market are primarily longevity of the pipe which includes the joints and associated fittings, and the ability to withstand the rigours of installation by mole-plough. This is a quality which is especially important in soils with high adhesion properties, and also in stony ground.

The former is due to the pipe being gripped by the resistance of the soil which may cause the pipe to be stretched. The latter may inflict scores in the pipe as it is pulled into

the ground and so compromise the wall strength.

So how do we determine how strong the pipe is? As with many other industries, the watchword can be traceability. Any reputable supplier should be able to provide provenance of the pipe which would include the maintenance of a sample of the raw material for 10 years. Any pipe which is manufactured to the European standard EN12201 will have this provision. If at all possible, the pipe should be available with a proof of performance such as a written warranty. In addition, if the pipe is manufactured with a green stripe then this will be manufactured with catalysers which will improve the pipe performance for mole-ploughing.

Replacement fairway irrigation installed by mole-plough at Carnoustie Links.

If at all possible, the pipe should be available with a proof of performance such as a written warranty. The pipe should also be confirmed as having a suitable pressure rating. If the installation is to be on a relatively flat course then a 10bar pipe will be more than sufficient as approved pipe (manufactured to EN12201) will have a high safety margin. If there is undulation across the course in excess of +/- 15m then a higher pressure rating should be used.

One final word of caution when a new irrigation system is installed.

“It may be prudent to think ahead in these litigious times and ensure that the pipe is marked so that it may not be mistaken for mains drinking water”

Occasionally it is decided to install drinking fountains around the course for the refreshment of golfers. If the plans have not been maintained for irrigation mains supply then it may be possible that pipes are found which are not known if they are for irrigation or mains drinking water. If the pipe found is either blue or black with a blue stripe then it may be assumed that this is for potable water and connected to the drinking water supply.

This may not be the best assumption to make, especially if the irrigation system draws water from a borehole, reservoir or possibly grey water supply. Even a mains water supply to an irrigation system will have a great volume of water sitting in the pipes – especially if there is a wet year and the system is not used for prolonged periods. It may be prudent to think ahead in these litigious times and ensure that the pipe is marked so that it may not be mistaken for mains drinking water.

In conclusion, there is more to the largest component of an irrigation system than just being a bit of 'poly' pipe. We have generally left the days when pipe is glued together on the Monday and pulled in on the Tuesday, and so lush green patches every 6m down the rough are not as common. But a client should arm themselves with as much reassuring material as possible to get the best system available.

ABOVE: The end result – do not touch for 50 years!