8-1-1979

Irish H & V News

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Recommended Citation

doi:10.21427/D7WT5F
Available at: https://arrow.dit.ie/bsn/vol18/iss6/1

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MARLEY SINGLE STACK LAYOUT part of today's most successful soil and waste system. Saves time, cost and space. Make your pipe dreams come true—write or phone for full details and literature, to:

Marley Plumbing

Manufactured in Ireland and marketed by MARLEY Flooring and Plumbing Ltd., Lucan, Co. Dublin. Telephone: 01-280691.
The BTU golf stories come from Woodbrook and Dun Laoghaire where all previous records were broken by the number of players completing the courses. The results and pictures on page 9.

Cover Story

To try and clarify exactly what customers are entitled to and what the back boiler grant covers, see page 10.

New P.M.P.A. Offices

This month our project profile looks at the P.M.P.A. offices in Wolfe Tone Street, Dublin, which were recently completed. STW/A designed the services for the building using a VAV system for the air conditioning, which has proved most successful with perimeter heating supplied by Runtalrad low level convectors. With everyone so energy conscious the advantages of the VAV system are discussed on page 12.

The Law and Building Design

Ben Costello looks this month at the law and theatres, halls and other public places, to see what should go on in the flies see page 18.

Pipeline

Pipeline has a look at some of the news that makes the headlines and some that doesn't, see page 34.
The makers of the country's best-selling range of industrial warm air heating have just introduced the best new industrial ventilation range in the country.

We took our not inconsiderable experience of industrial atmospheres, allied it to some of the highest engineering standards, and produced a new ventilation range with one thought in mind: it's got to be the best.

So we produced better designs, using better materials, and jig-built units wherever possible. We went right through the range and produced a better basic specification, building everything to the closest possible tolerances.

New polypropylene fans
We're using a fan with a die cast aluminium hub and polypropylene vanes. These vanes make for a light assembly with a low resistance to starting, thus reducing the starting load on the motor. And because of the accuracy of the polypropylene moulding process, the vanes are virtually perfect aerofoils, with each vane nearly identical in weight.

New I.E.C. standard motors
Powering our new fans are foot-mounted motors with overall dimensions to I.E.C. standards, and Class F insulated to withstand higher operating temperatures. On our Powrvent units the motor is mounted up in the body of the unit, keeping it out of harm's way. It's mounted on a rigid frame, which is in turn resilient-rubber mounted to the body of the unit, further aiding smoothness and quietness.
New modular ducting
The ducting is one of the great strengths of our new ventilation. Aluminium alloy sheet is used for the body of the duct, combining lightness with strength. The flanges are made of aluminium alloy bar, formed into angle strips, argon arc welded on a jig and bolted to the duct body. Each flange is pre-drilled for easy, versatile installation, using bolt-up fastening for the strongest possible joint.

The quality of the flange construction means a good seal at every flange. Our ducting also comes in five sizes to match up with the fans, namely 470, 620, 770, 920 and 1,150 mm.

New input units
There are two different input methods. The first is the Powrvent input unit with the fan/motor assembly mounted within the unit. Suitable for roof or wall mounting, it offers excellent weather protection, thanks in part to the new cowl profile, which has a large overlap with the body of the unit.

Secondly, there is a new inline fan unit, also featuring the new fan/motor assembly and designed for use with a separate cowl.

Both the Powrvent and inline fan are available in all five fan diameters.

New extract units
There are also two different extract methods. The first is the Powrvent, the extract equivalent of the Powrvent input unit. Obvious differences are that the fan operates in the opposite direction, and close-fitting weather doors with hard-rubber bump stops are added.

For heavier duty applications, especially to cope with particle-laden atmospheres, there is the new Powrjet unit. Features include tough, close-fitting glass-fibre weather doors, a bonded-in glass fibre rain gutter across the centre of the unit and an underhung motor.

New filter boxes
Open the snap-action catches on the access doors of our new filter boxes, and you'll discover a rigid polyurethane filter element. It just slides out for easy cleaning, then slides back again in no time. As with all our new duct components, our new filter boxes are made of aluminium alloy sheet and flange mounted.

New heater batteries
These batteries maintain our desire to use only the highest quality components. They're a new self-contained design, with the flanges as an integral part of the body of the heater battery, rather than having the entire unit encased in ducting. This means that the maximum possible portion of the unit is readily visible and accessible for inspection.

New distribution heads
To match our new ducting, we've got new distribution heads. Available in 1, 2 and 4 way versions, they use high-quality grilles, with solid aluminium, adjustable, aerfoil-shaped vanes and rigid, solid aluminium frames.

Same old service
Hopefully, by now we've gone some way to convincing you that our new industrial ventilation is worth all the space we've devoted to it. But perhaps it's fitting at this point to reassure you that some things are just as they always were. We've still got a lot of the best installers in the business (why change a good thing?). And they're backed by the Powrmatic organisation, with its resident experts, a fund of knowledge and a big stock of spares.

Can we tell you more?
We've produced a system that covers most industrial applications with a whole selection of input and extract units. And because it's a specialised industrial ventilation system, it hasn't a lot of extravagant frills. So it doesn't carry an extravagant price tag.

All in all, it's everything you've come to expect from number one.

Not only in heating, but now in ventilation.
A real one-two.
A new firm of heating and plumbing merchants, called Mercon Supplies Limited, has commenced operations from headquarters at Airton Road, Tallaght, Co. Dublin. A subsidiary of Temperature Control Services Limited, the company will supply a full range of heating and plumbing materials to contractors and merchants. Managing Director of Mercon Supplies Limited is John Hamilton. One of the best known personalities in the heating industry, he joined the Temperature Control Services organisation after many years experience with Dockrells and O.B.C.

Operative from the beginning of June last Mercon Supplies Limited is geared to supply the full range of merchandise to the heating and plumbing trade. Extensive stocks include radiators, boilers, pumps, pipes and fittings, controls, tanks, valves etc. The Company operates it's own delivery service as well as providing counter sales at it's Tallaght premises. Other Mercon directors are Gerry Curran, Joe Brennan and Vincent Céller all of whom are also Directors of Temperature Control Services Limited.

It was announced recently in Cork by Atlas Oil Recyclers Limited, the well known nationwide collector and recycler of waste oil, that they were initiating a new intensive campaign to mop up all the small drop dumps of waste oil. The exercise has been given the name of "Operation Clean Sweep". The Atlas company mounts this campaign on the occasion of their opening a new regional office in Cork. The company started nine years ago by Mr. Fred Duffy, has steadily spread from very humble beginnings until it now covers every county in Ireland with a fleet of ten modern bulk oil tankers. It provides a free collection and recycling service for waste oil throughout Ireland.

Mr. Fred Duffy, Managing Director of Atlas, pointed out that waste oil is a luxury the nation can no longer afford and that the intensive campaign mounted on the new Cork regional office would encourage even more Munster people to save all waste oil for recycling.

The Department of the Environment has pointed out that there is now legislation which prohibits the dumping of waste oil and that an offender can be fined up to £5,000 and given a three year jail sentence.

The new concept of "Operation Clean Sweep" just initiated, means that a fleet of small specialist oil tankers capable of getting into previously inaccessible areas can call to back street and even private houses for as little as twenty gallons of waste oil. These small developmental tankers then off load the oil into large "mother ship" tankers. The tankers will rendezvous under radio control with the larger ones.

Mr. Fred Duffy, Managing Director, pointed out that waste oil is a luxury the nation can no longer afford and that the intensive campaign mounted on the new Cork regional office would encourage even more Munster people to save all waste oil for recycling.

The new office and sales facility operated by Atlas is at Granville Place, Cork City and the temporary telephone number is Page Boy Cork 23177 Unit Number.

Temperature Control Services Limited has been awarded the contract to supply and commission a Staefa automatic air conditioning control system at the new Jefferson Smurfit head office complex at Clonskeagh. On this project TCS is working in conjunction with consulting engineers Varming Mulcahy Reilly and Associates and air conditioning contractors Climate Engineering Limited.

Coolair Limited has completed the installation of specialist Air Conditioning equipment in the computer rooms of the Waterford Co-op in Dungarvan. Airedale air conditioning equipment, for which Coolair is the Irish distributor, is being used in both projects. Coolair Limited has also recently completed the second and third phase of a contract to supply air conditioning equipment to the Topps Chewing Gum plant at Ballincollig, with the installation of Searle air cooled condensers on the roof and Daikin reciprocating water chillers in the plantroom. Coolair also supplied equipment for the first phase of the installation, which now totals 400 T.R. (Tons Refrigeration).

Coolair Director, Tony O'Leary stands next to the extensive Searle condenser units mounted on the roof of the Topps plant.

Brennan Airconditioning Limited has relinquished its Hitachi airconditioning distributorship and will concentrate instead on McQuay Europa and Friedrich equipment.

When asked if there was anything wrong with the Hitachi equipment, J. Brennan, Managing Director, was very quick to point out that the equipment was excellent but that his distributorship was a sub-agreement with the main U.K. distributor and this did not suit Brennan Airconditioning Ltd marketing policy.
FINHEAT LIMITED

Sole agents/stockists of MYSON

Air Distribution Equipment.

DEFLECTO*
Grilles and registers, single and double row.

VARICORE*
Fixed core extract grilles and registers.

NON-VISION
Sightproof grilles for relief, transfer and circulation.

ADJUSTAVENT*
Square and circular diffusers with volume control.

VARIENT* CIRCULAR
Fully adjustable circular diffusers

LINIAJUST*
Linear diffuser with adjustable air flow rate.

RIBBON LINE
Sturdy linear grilles for floor, ceiling, wall and sill mounting.

STYLOVENT*
Fixed deflection square diffusers for suspended ceilings.

You won’t make a better choice of grilles, registers and diffusers than Myson.

The famous RCM range has a model to cover every ventilation and air conditioning application. Each is carefully designed for correct aerodynamic performance and minimum noise generation. And each is superbly made from extruded aluminium with mitred and welded corners — for a perfect finish. And for a more economical job there’s our ‘E’ range, made from satin anodised extrusions. You need only ask.

FINHEAT LIMITED

34 Watling Street, Dublin 8. Phone: 778109/778120 Telex: 30751
IHVN NEWSDESK

Pictured (left to right) at the new Sisk Santry Industrial Estate in Dublin was officially opened by Raphael Burke T.D. Minister of State at the Dept. of Industry Commerce and Energy, also pictured Mr. George Sisk, joint Managing Director John Sisk & Son, Mr. David Allman, director Sisk Industrial Estate Division.

M.A.R.C. MEMBERS OPT OUT OF INTERBUILD

M.A.R.C. members have opted out of this year’s UK Interbuild exhibition, promising to redirect the ‘substantial amount’ of money which would have been spent during the run of the show into satisfying existing markets for radiators and convectors.

M.A.R.C. - the Manufacturers’ Association of Radiators and Convectors - is the independent body formed by the U.K.’s top six radiator manufacturers governing the performance, quality and reliability of equipment sold in the U.K. The association is a member of Eurorad, and has representation on British Standards Institution Committees and the International Standards Association.

A M.A.R.C. spokesman said that all six members had reached their decisions independently and that the £100,000-plus previously allotted in direct and indirect costs would be better spent in improving the service to existing customers instead of trying to win new ones. "The priority now is in shortening delivery dates on current orders" he said. "Delivery is still protracted and in such a climate, the time is right to dig in and say ‘we owe it to our customers to give you the best possible deal’. That’s precisely what we’re doing in pulling out of Interbuild - even though we wish every success to the exhibition and its exhibitors”.

He added that in his opinion, the power of the big national exhibition was waning in favour of smaller, more specialised trade events in areas where they really count.

EXHIBITION AT OTTER HOUSE

The pipeline valves and metering division of Modern Plant Ltd., recently held a well attended exhibition on their premises at "Otter House", Naas Road, Dublin. The products displayed were directed to engineers in the power and process industries, where questions on energy conservation, steam metering, pollution control, valve actuation, and many other queries were answered by the eleven specialist engineers in attendance.

Of the many new products on display, particular interest was shown in Yarway's introduction of their Aldrain Valve, this product protects water systems from freezing, also Sparling showed their Series 500 Ultrasonic Flow Meter for liquids and slurries. Arkon Instruments introduced their new System 10 range of electronic liquid flow recorders with integrators and transducers, suitable for remote transmission.

The Exhibitors were - Alexander Controls Ltd., Arkon Instruments Ltd., F. Bamford & Co. Ltd., Samuel Birkett Ltd., Serck Audco Valves., Sparling Ltd., Yarway Limited.

CROSS IN THE DOUGH AND THE JAM

Extensive refrigeration equipment, part of an expansion programme designed to make Lydon House the most modern bakery in the country, has been installed at the company's Galway premises by Cross Refrigeration Limited.

The installation includes dough retarders and provers, blast freezing, chill storage and deep freeze storage facilities. In addition, Cross has installed extensive blast freezing and deep freeze storage facilities at Lydon's sister company in Dublin, Tea Time Express, which is based on the Sandyford Industrial Estate.

Lamb Bros. (Dublin) Limited, the fruit preserves manufacturers, have had the installation of a new freezing plant at their Naas Road headquarters which was also completed by Cross. The new development, which comprises blast freezing equipment, will be used specifically for the storage of the raw fruit used in the manufacture of jam.

CRANE IN BELFAST

The Pump Division of Crane Ltd., have requested that, following our list of Pump companies in Ireland in the April/May issue, we point out that as well as representing them in the Republic, Pump Services Ltd., represent them in Northern Ireland and can be contacted at: 56 Distillery Street, Belfast BT125BJ. Tel: 28136.

Death of Al Fitzgerald

Albert Fitzgerald, 24, of B Lynch & Co. Ltd., was killed in a car crash on August 11th. Al was well known in the heating trade and had previously worked with John R Taylor Ltd., and in the heating department of P J Matthews Ltd. His tragic death cuts short a very promising career in the H & V trade where he had gained so much experience over the last eight or nine years.

IHVN and the trade wish to extend their condolences to his wife on her bereavement.

Interconnecting High-Output Backboilers

Arising out of our short article on interconnecting in last months issue a number of questions were posed about the diagram shown in the article. It must be remembered that the drawing is diagrammatic and not intended to represent an actual system. As mentioned reference should always be made to the compile paper by Hugh C Maguire, Consulting Engineer, and further information is available from Hugh at 44 Sydney Ave., Blackrock, Co Dublin, Tel: 888384.
The IDHE have run an associate membership diploma course leading to AMIDHE for a number of years. The course is of two years duration and is held two evenings a week in the School of Technology, Bolton Street, Dublin. The classes will start in early October with enrolments starting in September.

The following is the general syllabus of the course and further information is available from: the Education Officer IDHE, 191 Killester Avenue, Dublin 5.

Heat
- Definition of work and power, the watt and the joule.
- Specific heat.

Water
- Water supply and sources.

Hot-water systems
- Direct and indirect systems of hot water supply. Faults in systems. Combined systems of hot water supply and heating. Sizing primary circulating pipes for both gravity and pumped systems.

Domestic heating systems

HYDRAULIC SYSTEMS

Equipment
- Pumps

Controls

Fans

Safety
- Controls to heating units. Fan limits and fan controls. Room thermostats and zone controlling. Secondary and high limit controls.

Filters

WARM AIR SYSTEMS

WARM WATER SYSTEMS
NEW IMAGE FROM CROSS

NEW STACK FOR CAVAN

As part of the drive for better controls over environmental pollution the first industrial steel stack fully complying with current European regulations has been built at the Irish Dairy Complex for Killeenshandra Co-operative plant, Co. Cavan. The 3 core stack which stands 25 metres high left Whessoe Steelworks plant early one Friday accompanied by a Police escort. The stack arrived on site on the Saturday and was erected on the Sunday morning. The first of its kind in this inland area the free-standing stack was recommended by the Institute for Research and Standards. It has an internal stairway, illumination, access to roof, roof handrails and was made from corten steel — no painting is required.

The picture shows two of the new service vans of refrigeration specialists Cross Refrigeration Limited painted in the colours of the company's bright new house style. Each van is painted in two shades of blue separated by a white band and the new style is also reflected in all Cross stationery, cards and labels.

PEMEC '79

Fuel conservation, better energy management, improved movement and handling of products and materials inside the factory, adequate levels of heating and ventilating, safety and health ..., all these pressure points are the responsibility of factory management. And all find expression at PEMEC 79, the fifth annual Factory Management and Maintenance Engineering Show and Conference at the National Exhibition Centre, Birmingham, from 22-26 October 1979. The concurrent PEMEC Conference divides into 10 discrete half-day sessions at which over 40 papers will be presented on a wide range of subjects including: industrial plant efficiency; improving energy management; microprocessor applications; controlling downtime and adapting the maintenance function to the demands of new technology. Full details may be obtained from the PEMEC 79 Conference Secretariat, Monks Hill, Tilford, Farnham, Surrey GU10 2AJ. (Telephone: 02518 2066 or 3143).

H & V HEADLINES

While many merchants were bitching about the inaccurate reporting on fuel supplies in the daily newspapers few did anything about it. Some exaggerated reports appeared in one Sunday newspaper of a solid fuel back boiler system running 14 radiators and the rads were too hot to touch. One of the few who took action were Hecvac Ltd. and they supplied a very detailed account of the options open to a consumer when either oil or gas fired heating is installed or when no heating system exists. The article was published in the Irish Times on July 19th. Well done.

Kevin Long of P.J. Matthews went one further with a front page leader heading "Face cowboys Danger", who can now say the heating trade can't get publicity.

George Clark and N.E.M. Ltd., have announced the appointment of I.E.S. Industrial (Ireland) Ltd., as their agent for the sales and distribution of the well-known range of Maxecon and Westgarth Shell Boilers through Ireland. Over the years the Maxecon and Westgarth range has become established as one of the premier boilers, with a reputation for high efficiency, coupled with trouble-free and long life construction.

Maxecon and Westgarth combined all requirements in the case of Maxecon and Westgarth from 3000 kg/hr to 35,000 kg/hr, at a standard pressure of 150 lbs/sq.in, while the Maxecon range is 4500 kg/hr to 29,490 kg/hr, with pressures up to 250 p.s.i. Boilers are of the package type and may be oil, coal or gas fired, but modifications from standard will be undertaken to meet clients' requirements.

I.E.S. Industrial (Ireland) have their office at 41 Dawson Street, Dublin — Telephone 710142 — the local manager being Mr. Sean Halligan, who has had a long connection with the engineering industry. In addition to the boiler range, I.E.S. are agents for a number of internationally known companies, including Drayton Castle Ltd., leading manufacturers of hospital sterilizers, a number of which are in operation with hospital boards throughout Ireland.

I.E.S. are also agents for Fram filters, Peerless Pumps Varley F.M.C., Auto-Diesel Ltd., and Ruston Diesel standby generators, Clayton steam generators, and they also represent Foundry Equipment International Ltd., whose name indicates their product range; Rimmer Birlec Ltd., specialists in air-drying; Smurfit; and Middeley Water Engineering Ltd., for sewage treatment, and their associate company, Neckar Water Engineering for water treatment of all types, with other agencies to be announced. I.E.S. Industrial (Ireland) Ltd., are in a unique position as, with an office and staff at 81 Rosetta Road, Belfast 6, they are able to supply a full sales service backed with a technical and after-service throughout Ireland.

A member of the John Kelly Group, the chairman of I.E.S. is Mr. W. Devlin; Mr. J.S. Robinson is Managing Director and Mr. F.R. McBride, Director.
Records continue to be broken as the number of players increase from 70 at the Woodbrook outing, which in itself was a record, to 74 at the Dun Laoghaire outing, credit is therefore due to the committee and especially to Eddie Egan, the Hon. Sec., for doing such a good job.

The results for the Woodbrook outing sponsored by Pump Services Ltd were as follows:

Overall winner: Aubrey Moriarty (7) with 38 pts, he was out early and held the lead all the way home.

Class 1 - 1st: Eddie Reynolds (5) 36 pts; 2nd: Tony Delaney, (5) 35 pts.
Class 2 - 1st: John Ennis, (15) 35 pts (last 6); 2nd: Eamonn McGrattan, (11) 35 pts.
Class 3 - 1st: Liam Dillon, (19) 36 pts; 2nd: John Lavelle, (17) 33 pts.
1st 9 - 1st: John Hunter, (9) 20 pts; 2nd: Tony Gillan, (9) 18 pts (last 3).
2nd 9 - 1st: Alf Synnott, (11) 20 pts (last 3); 2nd: Don Drennan, (12) 20 pts.
Visitors - 1st: John Goulding, (6) 38 pts; 2nd: Arthur Dobson, (11) 38 pts (last 6).

BSS Ireland Ltd came to the rescue and brought their sponsorship forward to the Dun Laoghaire outing when the sponsor for the venue had to withdraw. Many thanks to Brendan Stack for his cooperation.

The winner on the day was that well-known almost professional golfer Pat Mahon who was in top form and scored 38 pts (13) just ahead of Mike Askey on the back 9, with business as it is how does Pat get the time to practise?

The results were as follows:

Class 1 - 1st: Tony Gillan, (9) 36 pts; 2nd: Liam Stenson, (10) 34 pts (last 6).
Class 2 - 1st: Mike Askey, (14) 38 pts (back 9); 2nd: John Ennis, (13) 36 pts.
Class 3 - 1st: Ray Byrne, (21) 37 pts (back 9); 2nd: Pat Walsh, (18) 37 pts.
1st 9 - 1st: Martin Kelly, (16) 20 pts (last 2); 2nd: B Conlon, (18) 20 pts.
2nd 9 - 1st: Eamonn Cullen, (13) 19 pts; 2nd: Tony Jennings, (7) 18 pts (last 3).

Visitors - 1st: Billy Hughes, (9) 38 pts; 2nd: P. Brennan, (21) 37 pts; 3rd: J Glennon, (14) 37 pts.
Most people took the Minister for the Environment at his word when he announced, before the local elections, a grant for the installation of solid fuel back-boilers and that it did not matter if you had already got a home improvements grant in the last ten years. Then shortly after the elections officials of the Department told grant seekers that the policy was that they would not qualify if they had been given grants previously. This was later denied but caused much confusion to the general public and indeed to the trade. To clarify the situation we are reproducing the Memorandum H.A.2A for “House Improvement Grants to Reduce Dependence on Oil” issued by the Department for the Environment, Housing Grants Section, O’Connell Bridge House, Dublin 2.

House Improvement Grants to reduce dependence on oil

You can get a special house improvement grant of £600 or two-thirds of the cost, whichever is the less, towards the cost of the following works commenced on or after 1st June, 1979:

- If you have oil/electricity/gas central heating but no fireplace, back-boiler or solid fuel burning appliance — the installation of a solid fuel central heating burner, or the installation of one fireplace, including a back-boiler, or the installation of one solid fuel burning appliance such as a stove or cooker (which will provide a domestic hot water supply).
- If you have oil/electricity/gas central heating and at least one fireplace but no back-boiler or other solid fuel burning appliance — the installation of a solid fuel central heating burner, or the installation of a back-boiler, or the installation of a solid fuel burning appliance such as a stove or cooker (which will provide a domestic hot water supply).
- If you have no central heating or back-boiler, but a fireplace — the installation of a back-boiler, or the installation of a solid fuel burning appliance such as a stove or cooker (which will provide a domestic hot water supply).

Where a back-boiler is being installed, the cost of necessary plumbing connections i.e. flow and return piping, special tank and pump and the cost of repairing damage caused to the fireplace in the course of the installation, e.g. tiles surround, etc. are reckonable for grant.

You cannot get a special house improvement grant towards the cost of:
- The installation of an oil fired central heating burner,
- The installation of a solid fuel central heating burner, where there is no existing central heating system in the house,
- The installation of central heating radiators,
- The installation of an additional fireplace, back-boiler or solid fuel burning appliance,
- The replacement of an existing fireplace, back-boiler or solid fuel burning appliance,
- The connections from a back-boiler or a solid fuel burning appliance to radiators,
- Work relating to the housing of equipment and storage of fuel,
- Work eligible for special grant as specified in this memorandum carried out in a new house or in a house completed within 12 months prior to commencement of the specified works,
- Work costing less than £100,
- Work carried out in a house not used as a place of normal residence e.g. a holiday house.

Applications for the special grant:

You should normally apply for this grant on the special application form (coloured blue) after the work is completed. You should enclose with your application a certificate from the Contractor or Installer setting out details and cost of the grant-aided work and stating that it has been carried out in a satisfactory manner (S.L. 103).

If you have doubts about your eligibility for a grant, you may contact the Department. In general, a decision on eligibility for a grant will be made on the basis of the completed application form and supporting documents and payment will be made as soon as possible. The Department, however, reserves the right to carry out inspections at any time prior to payment and to seek additional information if it is considered appropriate. In this connection, the Department strongly advises that work should be carried out by competent people; it is particularly important that a back-boiler system should be suitably vented and also fitted with a safety release valve.

The making of a special grant implies no warranty on the part of the Minister in regard to the proper installation of a system or to any damage to the house that may arise from the installation and subsequent functioning of the system.

Other aspects of the grant scheme:

1. A special grant means that payment of a grant at any time in the past does not debar you from getting a special grant now (except where a new house grant was paid in the 12 months prior to commencement of work specified in this memorandum) and that payment of a special grant now does not debar you from getting a further grant (other than a special grant for the types of work specified in this memorandum) at any time in the future.

2. The seven points standard applying to certain other forms of house improvement grant-aided work does not apply to this special grant.

3. If a tenant of a private or local authority house wishes to obtain the special grant, he should get the consent of the owner or local authority and meet the net cost (i.e. the total cost less the grant).

4. A tenant purchaser of a local authority house does not require the consent of the local authority in order to qualify for the grant.

5. A means test does not apply to this special grant scheme.

6. Expenditure under this scheme does not qualify for income tax relief under the scheme of residence-related employment operated by the Revenue Commissioners.
Our Air Handling Units
Have Raised Quite A Few Eyebrows

And that's quite something, since companies and institutions like I.C.I., Leyland, Shell, Debenhams and the Royal Navy aren't usually taken by surprise. But then again, it's not every day that someone comes up with an air handling unit which meets their exacting demands right down to the last detail.

We did it for them and for many other famous names, too. Because here at Matthews & Yates we've the facilities and the know-how to custom build air handling units to suit any customer's requirements. Apart from that, we also make a full range of standard units in 14 sizes with a comprehensive choice of extras and adaptations so they're suitable for all types of air conditioning systems.

Isn't it time you discovered more about Matthews & Yates? When you see how much we can do for you, it could be quite an eye-opener!

Matthews & Yates Ltd.,
Cyclone Works, Swinton,
Manchester M27 2AB.
Tel: 061-794 7311.
When P.M.P.A. decided to build an office block in Wolfe Tone Street, Dublin, they had to plan for many facets of their business including their interest in McBirney's the drapery store and so it was decided that the ground floor would be allocated for retail outlets. This meant that only basic services were required in this area and the other three floors would be fully air conditioned by a variable volume system and an independent air conditioning system in the board room.

The building was designed with mild steel curtain walling incorporating fixed 6 mm solar grey float glass single glazing covering over 85% of the outside wall area, and with full open plan floors with provision for future partitioning. The major floor areas, first and second floors, each comprised nearly 1,800m² (19,000 ft²) of open plan office space with two inner cores, one incorporating lifts, stairs, utility rooms, and services shafts, the other comprising male and female toilet blocks. The upper, or penthouse, floor comprised nearly 390 m² (4,100 ft²) arranged in similar manner. Mechanical services air handling and refrigeration plant was located at this level on the second floor roof. As with similar developments the need from the initial concept was to suit the clients present and possible future needs of space arrangement anywhere in the building with sufficient flexibility of services to achieve this.

Partitioning was a fact incorporated during the construction stage, the Penthouse housing a computer suite with ancillary offices, the second floor accommodating executive office suites, boardroom, kitchen and dining areas, whilst only minor partitioning occurred on the first floor housing a telex centre and a small number of individual offices. On this basis of maximum flexibility coupled also with the desire to provide the most economic owning and operating costs the constant temperature/variable volume system was selected as best meeting these requirements.

**Terminals**

The principle of the constant temperature/variable volume air conditioning system is to deliver only that amount of conditioned air required to offset the cooling load at any given time in any given zone or area. Proprietary terminal units are available for this purpose, although, not all achieve the desired economy of operation ensuing, some indeed merely bypassing conditioned air back into the room through the terminal outlet. Entrained ambient air is drawn over a thermostatic element within the terminal to ensure fast and accurate response to room temperature changes.

Both terminals and the A.C. system normally operate well below their peak capacity since this is only of short duration throughout the operating year, hence operating costs of fan horsepower and refrigeration are greatly reduced. An A.C. system employing this type of terminal is inherently self-balancing, using the static regain method of duct sizing, runs of units taken from main distribution ducts actually comprise the branch duct runs due to their built in, acoustically lined, plenums, and the entire system operates to minimum pressure requirements. Complete flexibility is assured, merely involving a repositioning of terminals and possible re-arrangement of master and slave in-built packages with the terminals to suit office planning requirements. 374 supply air terminals as described above were installed.

**Type of Fans**

From the above it will be seen that the requirements of the air handling system are to supply varying quantities of conditioned air at minimum energy cost. Reference to the fan laws demonstrates that in an ideal system absorbed fan HP varies as speed³, such that for a reduction in peak speed and air quantity of one half the peak fan HP is reduced to one eighth. Unfortunately system pressure is also reduced since pressure is proportional to speed². Of the various types of fans available centrifugal fans with inlet guide vane control show only modest power reduction at reduced airflow, fans with speed control have high initial cost and although showing better power reduction than the centrifugal cannot be used in systems with minimum pressure requirements. Multi-stage or step controlled axial flow fans show further improvements in power reduction but again have limitations as to minimum pressure requirements and flexibility.

The type selected for this installation was the 'Varofoil' variable pitch axial flow fan made and supplied by G.E.C. (Woods) Ltd. This fan, operating at constant four pole speed, has the advantages of constant pressure, reduction in fan HP closely following the ideal curve, a wide range of stepless control down almost to zero, compact size requiring minimum plant room space.
lower initial costs compared with other systems and readily responds to low pressure (0-20 p.s.i.) pneumatic control systems, with an additional bonus of reduced sound levels at reduced airflow. It is believed that this installation is the first to use this type of fan in the Republic of Ireland.

**Air Handling Unit**

The fan is incorporated in a Woods Airpac air handling unit of maximum capacity 18.4 m³/S, (39,000 CFM), incorporating a mixing box with a modulating outdoor and a fixed minimum outdoor air damper, a filter section, a pre-heat coil, silencer, axial plenum, Varofoil fan, diffuser plenum, silencer, diffuser plenum, cooling coil and eliminator section. The insertion of the direct drive fan and motor downstream of the pre-heat coil ensures that the fan and motor heat gain is available to reduce the heat input to the pre-heat coil in winter, whilst being upstream of the cooling coil the heat gain becomes a load on the chillers and not an additional room load. This is an important consideration - especially with high HP fans and motors in the airstream.

**Eliminators**

Observations are to be kept on the drainage from the eliminator section since it is questionable whether eliminators are needed at all with this type of fan. At peak load, with high sensible heat ratios and with modest coil face velocities of the order of 2.25 to 2.75 m/s, (say 450 to 550 f.p.m.), moisture carry over is not normally a problem, it is in spring or autumn when, due to the absence of solar and transmission heat gains, and to the fact that latent heat gains emanating from the occupants remain fairly steady, that the sensible heat ratio decreases from 0.9 or greater down to 0.6 or lower, such that problems of moisture carry over arise with constant coil face velocity deriving from constant volume plants. In the case of variable volume plants such as this however, coil face velocities drop to such a low level as to raise the question of whether eliminators are required at all.

**Return Air Handling Unit**

A similar, slightly smaller, return air handling plant of maximum capacity 13.2 m³/s (28,500 C.F.M.), is also used, incorporating an inlet silencer, axial plenum, Varofoil variable pitch axial flow fan, diffuser plenum, silencer, mixing box with front return air, and top spill air, modulating dampers.

**Automatic Controls**

Both the supply and the return air fans are equipped with blade angle pilot positioners interlinked pneumatically to provide parallel operation in response to control signals. At approximately one third of the distance from the far end of the main branch duct on each of three floors, a static pressure sensor/transmitter is provided, feeding back to a minimum pressure selector switch, through a receiver controller and to each of the two fans pilot positioners thus controlling the blade angles of the variable in pitch fans parallel and maintaining the pre-set system static pressure. Early morning boost, low limit time clock over ride, constant supply air dry bulb temperature, economy cycle using an enthalpy logic centre, an outdoor air dry bulb detector to start the chilled water pumps and then the chillers, - through chilled water flow switches, are some of the other features of the automatic controls systems supplied and installed by Johnson Controls Systems Ltd. Also provided is an electrical "fireman's switch" arrangement to enable the return and extract fans only to be operated to evacuate smoke in the event of an outbreak of fire, the return air fan exhausting through the spill air damper.

**Chillers**

Three air cooled liquid chillers were supplied by Walker Air Conditioning Ltd., Carlyle models 30 GA 055 each.
having a capacity of 47 tons of refrigeration when cooling water from 10 degrees C (50 degrees F) to 4.4 degrees C (40 degrees F.). Each chiller has in-built capacity control, all 3 are also arranged to operate in sequence thus providing further economy in operation. Chilled water piping is arranged as a reverse return system, and flow switches are installed at each chiller to prevent their operation until a water flow is first established.

Ducting

Standard C.R.C.A. galvanised M.S. ducting was used for distribution mains, with neoprene covered steel wire armoured flexible ducting use for branch runs out, the terminal units' plenums forming the final branch runs. Feed offtakes of 90 degrees are preferred to Y or angled fittings and all offtakes sized on equal velocities for run out connections. These may be sized on velocities of up to 10.2 m/s (2000 fpm) although in P.M.P.A. offices offtake velocities were limited to 8.2 m (1600 fpm) to limit noise levels. Higher velocities, to 11 m/s (2160 fpm) were used in the main header. All supply air ducting was vapour sealed and insulated using Cape Insulation Ltd.'s Ductwrap AF 32 comprising 25 mm thick rockwool fibre with glass reinforced aluminium foil facing.

Perimeter Heating

To offset the perimeter heat loss low silhouette Runtalrad type C2 convectors/radiators were installed just inside the glazed curtain walling, one 3,000 mm long element in each 3,600 mm module. The elements were especially made with flow and return connections taken up inside the element for aesthetic purposes. Similarly the flow and return branch mains were run on the subfloor with sheet steel covers extending the length of the building and taken up to finished floor level. The radiators are supplied with low pressure hot water, the flow temperature being scheduled in relation to the outdoor temperature, i.e. the flow temperature is directly proportional to the heat loss at any given time.

Ancillary Equipment

Other installations include an independent A.C. plant for the boardroom to enable this to operate only as and when required, a computer suite A.C. plant with underfloor plenum, and a ceiling mounted warm air plenum system serving the ground floor entrance foyer. Heating and domestic hot and cold water and hosereels systems all originate in a basement plant room housing two low pressure hot water heating boilers each at 600 KW (2,000,000 BTU/hr) by Messrs. Hartly & Sugden, their models SCP 200, one no. 2.3m3 (500 galls.) H.W.S. calorifier, water pressure booster set by Lowara (I) Ltd., and duplicate heating accelerators supplied by Messrs. Hofeld Ltd.

Norsen automatic hosereels are provided at each floor, wall mounted in voids at the back of the stairs with outlets neatly concealed behind indicating outlet boxes.

Toilet and local extract ventilation systems are provided, e.g. to the boiler room, oil tank room, etc. also Ozonair fire dampers at all points where ducting is taken through structural walls.

The Design Team

Quantity Surveyors: Seamus Monaghan and Partners.
Structural Consultants: Ove Arup and Partners.
Mechanical Services: SWT/A mechanical section

Contractors

Main Contractors: John Sisk & Son Ltd.
Mechanical Services Contractor: L. Lynch & Co. Ltd.

Our thanks to Charles Jenkins, STW/A mechanical section who prepared the text of this profile.
The Department of Commerce have announced that the Department of Energy has allocated £12m to be available as grants for a new scheme to encourage the more efficient use of energy. Under the scheme financial assistance will be available towards the cost of projects which demonstrate new or improved methods of saving energy. The scheme is open to organisations in industry and commerce of all sections and eligible projects will include new or improved equipment, its application and research into its use. The scope of the scheme is wide and for those who believe that they have something to offer this may provide the means.

The Strangford Arms Hotel, Newtownards was once again the venue chosen by the Institute of Domestic Heating Engineers, Northern Ireland Branch for their Annual Dinner. Over 60 members and guests were welcomed to the function by the Northern Ireland Chairman Mr Ian Morrison who in his speech gave a resume of the past years activities.

The principal guest was Mr John Bean, National Organiser of the Home Heating Group of the Heating and Ventilating Contractors Association. As is the usual form at this dinner an excellent cabaret followed the formal section of the Dinner.

Central Merchants Ltd one of the largest established plumbing wholesalers have opened a new bathroom boutique in their Queen Street premises in the centre of Belfast. At the opening Mr John Dowling, Managing Director expressed the view that this was going to be the year of the bathroom and that many people were desirous of up-dating this room in their house. In the new showrooms, public and trade will be able to see "under one roof" the most up to date equipment and fittings available.

Attending the function were representatives of the major suppliers of bathroom, shower and toilet equipment together with architects, plumbing contractors and specifiers.

Mr Bob Jordan, Area Manager of Esso in their Belfast office presented the prizes in Dublin at the Irish Schools Athletic Association sports, which were sponsored by his company.

Mr Jordan told me how impressed he was with the enthusiasm and endeavour of the youngsters.

One of the most respected persons in the plumbing trade retired recently after
practically fifty years with the one firm. Mr Tom Young received a number of gifts at his retirement, which were presented by Mr John McVicker, Director and Mr Esdale Dowling, Managing Director. Tom, had spent a major portion of his working life in what used to be known as the stove department of "Blairs" or to give them their full title McNaughton Blair Ltd. He recently told me that within the last few years he had seen a complete turnaround in public demand. A few years ago sales of solid fuel appliances were at an all time low, oil was the thing, but now the scene has changed, solid fuel cookers, open fires, room heaters were in ever increasing demand and so the knowledge and expertise he built up over the years was once again in demand. His many friends wish him a pleasant and long retirement and fine weather for those marathon walks of his.

Central Merchants Ltd, have announced the appointment as a Director of the Company of Mr Charles Hughes. Mr. Hughes has been with the company for 20 years and has served in various capacities through the years.

The Northern Ireland Energy Managers Group held its inaugural meeting in the Dunadry Hotel, Co. Antrim. Mr. R. Dennes of the Department of Energy, London, addressed over 60 senior representatives of various companies in Northern Ireland explaining the workings of an energy managers group. These basically are formed to allow thorough discussions, meetings and visits. Senior Management to be aware what can and what is being done in the field of energy conservation. The seriousness of the situation was illustrated by the fact that the representatives included directors, accountants, managers, group and senior engineers, all of whom had been charged with the job of saving energy.

The Group, of which there are already over 50 in Great Britain, has the full support and assistance of the government, though they take no active part in the running of the Group. Mr R. Burdon, Head of the Energy Division of the Department of Commerce, addressed the meeting, explaining his divisions involvement and also the support which they were prepared to give.

Mr Burdon announced that the Department had invited Mr. Eric McBride, Chief Fuel Technologist of John Kelly Ltd to act as convener of the group, explaining that in addition to being Hon Secretary of the Institute of Energy, Mr McBride had been involved in the field of energy conservation for over twenty five years.

On taking the chair Mr McBride explained what his views and hopes for the future were. Mr Wilson, Head of the Department of Applied Science at Belfast College of Technology. The group would be, stating that the price of fuel had risen to such an extent that energy costs were now a major part of the total cost of most end products. It would appear that the rising cost of fuel has at long last made management aware of the needs for efficient steam raising and utilisation and maybe new attitudes would change. It was agreed to hold another meeting at an early date at which the group would get down to work, and a formal committee formed.

The Northern Ireland company — Uni Ray Installation of Long Cottage Bryansford, Newcastle, Co Down have been appointed agents for the Elvaco heating and ventilating system. The system offers a controlled heating and ventilating system both for domestic and commercial application. Tested and approved by the Electricity Council Appliance Testing Laboratories, the system has already been adapted by many local councils.

Brendan McKenna has joined the staff of Potter Cowan & Co (Belfast) Ltd. A well known figure in the heating and ventilating industry Mr. McKenna will be responsible for the Heatrave range of products which includes C.I. boilers, on flow heaters and immersion heaters.

Readers are reminded that the Health & Safety at Work (Northern Ireland) order came into operation on the 1st May 1979. Many employees have either ignored the fact or have dismissed it as of little consequence. Study of the order will soon dispel this sense of apathy. The order lays down clearly the joint and individual responsibilities of both the employer and the employee. While already much legislation exists under various acts this order brings them all, as it were, under the same umbrella.

No longer can one adapt an attitude of indifference to the Health and Safety of an employer, as in many ways the order is loaded against the employer for as it states it is his duty to ensure that an employee is carrying out his work and is employed in a Healthy and Safe manner. Failure to ensure compliance with the order will not be excused by "Buck passing" or saying it was someone else's responsibility, for the order eventually holds the principal managing director or chief executive as the person who should have ensured that the order was being complied with. It does not matter where an employee is working, whether it be inside or outside someone is responsible, as is the employee if he fails knowingly to carry out the rules and conditions of the order. It is the duty of an employer to inform an employee of his company's acceptance of the order and to issue a policy document to form safety committees, to appoint within this organization a health and safety officer (this can be an employee who takes on this extra duty), to list obvious hazards e.g. shot blasting or screens when welding.

Areas of hazards must be designated and notices posted e.g. shot blasting or switch rooms. The order is such that every condition under which an employee works must be looked at to ensure that the person can carry out their work in a healthy and safe manner. Whether it be trailing leads in an office from electric typewriters, a storeman having to lift or manoeuvre heavy boxes or items of equipment by hand, men climbing ladders, loading and off loading of lorries, welding and burning, working in confined areas, these are only some of the obvious everyday things that are no longer excused.

Failure to comply with the order may lead to heavy fines and in some cases imprisonment. Compensation claims have already started and some of the awards have been frightening in the amount for what appeared minor claims, this in turn is having a serious affect on insurance premiums to the extent that in one or two cases small businesses have been put out of action. Union participation is also called for in the working of the order and they will be entitled to representation on Safety committees.

The foregoing is only a brief survey of what is involved in the order. If you have ignored the order up to date, get in touch with the Stationary Office and get a copy of the order.
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This section is divided into two parts; part I which deals with the special needs of Theatres and Hotels and part II dealing with fire precautions and buildings in general.

Regulations governing fire protection are contained in the following four documents:

The New Building Regulations anticipate the fire hazards associated with modern building layouts. These hazards may not be as obvious as those associated with Hotels and Theatres; where specific instances of loss of life and property are within the living memory of many, but are nevertheless increasingly evident. Regulations dealing with structural fire protection and facilities, together with those concerned with the hardware of fire fighting, occupy one third of the main body of the building regulations.

New rules have been introduced to deal with modern trends in building, particularly in the Dublin area. Deep plan structures with totally internal stair-wells, high rise office buildings with underground car parks are examples of building types unknown in this country before 1960. Prior to the publication of the Draft Building Regulations some control was exercised through the requirements of the fire officer and planning authority. The new regulations will, for the most part, enable architect and engineer to anticipate these requirements and will, hopefully, lead to a reduction in late revisions.

Regulations dealing with fire protection in Theatres are contained in the 1934 document. The authors due, no doubt, to sad experiences were much concerned with the danger of fire from installed heating and electrical systems. The section dealing with the electrical installation is extremely detailed and specific and far from irrelevant; this is in recognition of the fact that many fires were caused by poor wiring practice and exposed electric and gas heaters.

At a first reading some of the rules may seem dated and a few totally obsolete. The principles which the regulations embody, however, remain and when dry powder and carbon dioxide extinguishers are substituted for sand buckets; and hose reels for water buckets their use becomes evident. Much of the regulations are, nevertheless, directly applicable to a modern theatre or cinema building.

THEATRES (refer to document No. 4 see above).

Definition "... places of resort within the City of Dublin to be kept open for the public performance of stage plays and any homes, rooms or other places ... containing a superficial area for the accommodation of the public of not less than 500 square feet to be kept open for public dancing, music or other public entertainment ... ."

A. Structural Requirements of Exits

4(b)Partitions intended only for the purpose of separating one portion of the premises from another may be constructed of "brick and steel or of concrete not less in any case than three inches thick. No timber partition whether plastered or not shall be constructed."

5(a) The floors and tiers of the premises shall be entirely of fire resisting materials.

6(a) All doors and openings ... shall be clearly indicated by the words Way Out ... .

10(b) "Two separate exits shall be provided from every tier or floor which accommodates not more than 500 persons, and where a tier or floor accommodates more than 500 persons and additional exit shall be provided for every 250 or part of 250 persons above 500.

(c) "Two of the exits from each tier or floor shall deliver into different thorough fares or ways where practicable."

(e) "In the case of any premises or portion of premises where accommodation for the public is 40 feet or more above pavement level, the width of the exits provided shall, in no case, be less than 5 feet."

(i) "In the case of theatres and music halls ... where the principle fire risk is on the stage, the exits from each part of each tier or floor shall be so arranged ... in a position remote from the stage ... ." (one such exit for a floor capacity below 500, two
such exits for a floor capacity above 500).

B. SERVICES.

1. Fire Ventilation

13(d) "An exit leading other than by way of the stage shall be provided from the stage basement and permanent ventilation to the basement shall be provided direct to the open air".

14(b) "The stage shall be adequately ventilated direct to the open air".

15(b) "A ventilated lobby, constructed of fire resisting materials, shall be provided between the stage and the dressing room block . . ."

15(c) "Ventilation, direct to the open air shall be provided to the corridors in the dressing room block".

16. At premises in which there is a stage, suitable scene stores, workshops, property stores, painting rooms and wardrobes shall be provided; shall be separated from the remainder of the premises and from one another by brick stone or concrete and fire proof construction, and shall be adequately ventilated from the highest point direct to the open air.

20(b) Ventilation shafts from kitchens shall be constructed so as to allow frequent cleaning.

20(c) Flues from kitchens and services and over grills shall be frequently cleaned.

2. Fire Protection

14(m) "Woolen (?) blankets, buckets filled with water, and suitable chemical fire extinguishers shall be kept ready for instant use on the stage and in the flies, scene stores, and dressing rooms and attention shall be directed to them by notices fixed immediately above them."

23(a) "Fire appliances for the protection of the premises shall be provided."

23(b) "Fire mains and hydrants shall be provided in theatres and music halls. Suitable chemical extinguishers shall be provided in all premises."

23(c) "Hydrants shall be provided with the Dublin Fire Brigade standard fitting."

23(d) "A sufficient number of bib cocks shall be provided for the purpose of filling buckets."

3. Mechanical Services Installation

24(a) "Any method of heating the premises which may be employed shall be (i) Low pressure hot water

(ii) Low pressure steam

(iii) Any electrical heating system in which the heating element is totally enclosed and substantially protected electrically and mechanically.

25(b) . . . "(boiler) rooms shall be permanently ventilated direct to the open air and shall be drained.

25(c) "Each boiler and calorifier shall be examined by a boiler insurance company at least once every twelve months"

25(e) "Detailed construction relative to the workings of the boilers and heating apparatus shall be posted in the boiler room . . ."

26(d) Convenient means of access to all fans motors, control gear, and other apparatus shall be provided and the starting mechanism shall be adjacent to or in sight of the machinery which it controls.

27(b) "Any lift shaft shall be enclosed with fire resisting material and shall be ventilated from the highest point direct to the open air. . . ."

27(e) "Any electrical passanger lift installation shall be maintained and inspected at least once every three months by a competent lift engineer . . . ."

4. Lighting

12(j) "Steps leading from any tier or floor to an exit shall, if necessary, be screened from such tier or floor by fire resisting materials and shall be adequately lighted".

13(c) Whenever the safety curtain is lowered, sufficient lights shall be immediately lighted in addition to the minimum lighting, to give good general illumination in the auditorium.

51(a) "All portions of the premises, to which the public have access shall be provided with two independent systems of lighting and the lighting points necessary to comply with this bye-law shall be indicated on the plans."

51(b) "In the auditorium or main hall the degree of lighting maintained on each system shall be not less than is sufficient to enable the public to see their way along the row of seats and gangways and to see their way out of the premises at any time."

51(b) II "In all portions of the premises to which the public have access, other than the auditorium or main hall, good general lighting shall be maintained during the whole of the time that the public are on the premises.

56(a) "Each notice indicating an exit shall be adequately illuminated by a light on each system . . . ."

56(b) "The lighting to exit notices shall not in any circumstances be extinguished or dimmed while the public are on the premises.

57(a) Corridors and staircases which form the means of escape from any stage or platform or from any dressing or retiring rooms . . . shall be provided with two independent systems of lighting . . . ."

58(a) "Lamp shades of readily combustible material shall not be provided."

(c) "Suitable guards to prevent contact with scenery or other combustible material shall be fitted to all lamps, lanterns, lighting appliances . . . ."

5. Electrical System

60 "The installations . . . shall be in accordance with the regulations of the Electricity Supply Board . . . and with the regulations of the Institution of Electrical Engineers for the electrical equipment of building . . . ." (with certain exceptions see regulation 60 (b) through (m).)

62(a) The main switches, meters and other electrical apparatus . . . shall be installed in an enclosure . . . of fire resisting materials and shall be ventilated to the open air . . . and used exclusively for the accommodation of such apparatus and water and gas pipes shall be excluded therefrom.

66(i) "Any secondary battery which may . . . be provided for supplying either of the lighting systems required . . . shall be (a) capable of carrying the full load on that system for at least twelve consecutive hours when the battery is connected so as to maintain the load continuously by itself . . . or (b) be capable of maintaining the load for three consecutive hours if the battery is floated across the generator of an independent motor guarantee set and so connected that in the event of the motor generator shutting down the battery automatically picks up the load . . . ."

68 "Any transformer on which there is or may be a pressure exceeding 250 volts and also the necessary cables switches and fuses in connection there with shall be installed in an enclosure. . . ."
The enclosure shall be constructed of fire resisting materials, shall be ventilated to the open air, shall be in a dry position, and water and gas pipes shall be excluded therefrom . . .

69(d) "Local switching for lighting shall be avoided as far as practicable in all parts of the premises accessible to the public."

69(e) "The rating of switches which are liable to frequent operation shall be for currents 50% in excess of the maximum current of the mains circuits or sub circuits controlled."

71(a) "Wiring shall not be run in a Ventilation duct, flue or air shaft, or installed in a lift shaft unless it is essential for the operation of the lift."

72(d) "Arc lamps shall not be used for the illumination of the premises."

91 At least one bucket filled with dry sand or a chemical extinguisher of a type approved by the Corporation for the purpose shall be provided and kept readily accessible in the following positions, viz. intake rooms, main distribution rooms, motor generator rooms, near stage switchboards and in such other positions as the Corporation may consider necessary.

HOTELS

(see Fire Protection for Hotels, Dept. of Local Government)

These recommendations were prepared in 1966 for existing hotel buildings following a number of serious hotel fires. These recommendations have been embodied in more general terms in both the Fire Protection Standards and the Draft Building Regulations. However they merit mention here in that they deal with the special risks of hotel buildings; which may often house a large number of guests unfamiliar with the building layout, and indeed may be located country areas not within easy reach of a full time fire service. The problem is even greater with seasonal hotels, many of which are converted buildings, with timber staircases and floors, outside fire escapes and fire retarding doors fitted between corridor and stairs.

Structural Precautions:

Stairs and Corridors

At least two escape routes with preferably internal stairs will usually be necessary.

Corridors and passages should lead directly and clearly to exits and should not decrease in width at any point.

Staircases, lift shafts and service ducts should be enclosed. "Where, in the opinion of the fire authority, smoke stop doors are required they should be capable of closing automatically from all angles of swing and they should be fire resistant in every part, including the glazing . . . No door should open immediately upon a step or steps; the landing should be at least three feet in depth. Fanlights over bedroom doors, which connect to a corridor, should be fixed and not capable of being opened."

Suspended Ceilings

"Where there is a space between the lining and the wall or ceiling it covers . . . such cavities should be broken up by fire stops and should not contain any combustible materials beyond the small amount of combustible insulation or electric wiring."

Chimney Flues

All chimney flues should be properly lined and be free from cracks. "Where it is intended to convert an existing flue to take another type of fuel-burning appliance, such as an oven, oil burner or stove, every care should be taken beforehand to ensure that the flue is suitable."

Boiler Rooms

"In the case of large boiler installations, the boiler compartment and ancillary chambers should be separated from the rest of the hotel by six inch solid non combustible floors and roofs with walls of not less than nine inches thickness or equivalent fire resisting construction. Where complete permanent separation from the remainder of the building is not possible, the doorways connecting the boiler and ancillary chambers to the remainder of the building should be fitted with self closing fire resisting doors, these doors to be fitted with counter-weighted closing gear for normal use and with provision for automatic operation by fusible link."

Emergency Lighting

"Emergency lighting points in corridors and on both internal and external escape stairs . . . could be served by batteries or an emergency generator. If the emergency system is not always in operation after dark, it should be designed so that it would automatically come into operation in the event of a failure of the mains installation."

Electrical System

"Care should be taken to see that the capacity of the main installation of the building is not overloaded. Installations and equipment should be inspected and tested at least once every five years and whenever alterations are made, and faults should be corrected immediately when discovered."

Kitchens

. . . "Deep fat fryers should be especially protected. In large kitchens, the advice of a competent authority should be sought on the installation of oil-fired equipment, venting hoods, extractor fans and grease filtering devices."

Fire Fighting Equipment

"The equipment should be located in prominent positions at central points such as stair landings, so that it is readily available for use in a number of directions. It should be concentrated at such points rather than scattered haphazard throughout the building."

Water extinguishers, buckets, foam extinguishers, carbon dioxide extinguishers, dry powder extinguishers and asbestos blankets should be available as required.

"The normal scale of distribution of water extinguishers is one extinguisher of two gallon capacity for every 2,250 square feet of floor area. There should be at least two extinguishers on any storey and the maximum travel distance to the nearest extinguisher should be 100 feet."

"Hose reels . . . should be of non kinking rubber tubing and have an internal diameter of ¾" and should have a nozzle attached of 3/16" or ¼" internal diameter. Spray type nozzles or dual purpose spray/jet nozzles are not generally recommended. The most effective lengths of hose are between 60 to 100 feet and the radius of action from the supply point may be taken as the length of hose on the reel plus 10 feet. Water supply and pressure should be sufficient to produce a minimum flow of 5 gallons per minute from the hose. Reels should be installed so as to cover adequately all points on each floor, including roof spaces, to which convenient access should be provided."
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<td>851990</td>
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<td>Aelrad</td>
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<td>Dimpco Ltd</td>
<td>13 Moss Street, Dublin 2</td>
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<td>A Gallagher</td>
<td>Belview, Mullingor, Co Westmeath</td>
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<td>Hevac Ltd</td>
<td>Lomond Avenue, Dublin 3</td>
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<td>5627</td>
<td>Francis Hoval</td>
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<td>Thorn, Warmstyle</td>
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<td>P J Matthews Ltd</td>
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<td>Stelrad, Veha</td>
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<td>Green Street East, Dublin 2</td>
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<tr>
<td>Runtalrad Ltd</td>
<td>Beech Hill, Clonskeagh, Dublin 14</td>
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<td>Semret (N.I.) Ltd</td>
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<td>Veha Ltd</td>
<td>Wicklow, Co Wicklow</td>
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<td>Also at: Little Island, Cork</td>
<td>021  54268</td>
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<td>Earl's Island, Galway</td>
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<tr>
<td>Wyse &amp; Ballentine Ltd</td>
<td>62 Woodbine Park, Dublin 5</td>
<td>317553</td>
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<td>Thermalrad, Thermalpanel</td>
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Index compiled from information received from companies and companies not included should contact us as soon as possible.
Radiator or Convector?

It was always a misnomer to call what is commonly known as a radiator, a radiator, as most of the heat comes from convection but in the last few years many kinds of heat emitters have come on the market calling themselves radiators when they should really be called natural convectors but the term radiator like the litre, which is not a true S.I. unit, has been accepted by common usage and would probably cause confusion if it were ever changed.

The main reason for increased sales of high convection output radiators has been simply public demand for a slimline product which would blend more easily into the decor of a room. As it is not possible to cut down on size and maintain output required, the only solution is to either increase mean water temperature or increase exposed surface area by the addition of fins of corrugations. Some manufacturers have gone back to the old design of natural draught convector and modified it to come in line with modern technology and manufacturing methods.

To increase mean water temperature is not difficult especially if the increase is not too large for example from 82°C to 92°C M.W.T., this can easily be done by using a boiler thermostat with increased calibration and sealing the system with an expansion vessel. This does not seem a popular idea particularly with many of our new installers in the domestic end of the business, but this may be due to a lack of knowledge on their part as sealed systems operating at high temperatures have been used by industry for many years. In retrospect in these days when some so called 'installers' are unable to install a back boiler correctly maybe it's as well the idea is unpopular.

The industrial market as already mentioned is by now well versed in medium and high temperature hot water systems and the associated equipment as American and European based clients, many of whom have set up factories here, specify sealed or pressurised systems as standard.

There is no doubt that in terms of running costs low water content radiators with quick response to thermostatic control are more economical but with greater initial installation costs of higher temperature systems the simple solution is to use convector type 'radiators'.

Current demand for solid fuel back boiler systems has of course caused an enormous increase in the sale of the conventional panel radiator and in fact there is a shortage at the moment but as demands for greater economies are called for, the controllability of the convector type radiator will come into it's own.
**RADIATORS**

The following is a review of the main radiators on the Irish market compiled from information received from the manufacturers.

**BIDDLE**

Suitable for use with low, medium or high pressure hot water from a two-pipe accelerated system, the Slim Conrad is available in 25 sizes, with top or front outlet. All models are only 52 mm deep.

The heater is made from hand aluminium sheet channel modules 50 mm wide, 50 mm deep and 380 mm or 480 mm high. The whole assembly is held together rigidly by a serpentised seamless copper coil hydraulically and mechanically depending on the length. The extreme maximum conductivity from the heating medium to the formed front panel is rigidly by a serpentised seamless copper high. The whole assembly is held together between coil and modules is such that permanent and the

**BARLO**

Barlo radiators are manufactured in accordance with BS 3528-74 from a high grade steel to a rolled top design. Each radiator is tested under water at 100 p.s.i. air pressure — twice the stipulated standard — and they are designed for closed circuit or indirect systems only.

The stock range comes in heights of 16", 20", 24", and 28" with 113 sizes in standard panels. A stock range of 45 sizes in convectors panels is also available and this range is presently being expanded.

Barlo radiators are shrink wrapped in heavy gauge polythene with cardboard ends to ensure they arrive with the

**DIMPCO**

The Glen "Sorrento" range of radiators, which are completely manufactured at Dunleer, Co. Louth, are now available in three sizes, 750W, 1000W and 1500W. Each model in the Sorrento range is thermostatically controlled so that when the radiator reaches the selected temperature it cuts out until the temperature has dropped sufficiently for the element to be switched on again. Glen radiators can be run from a normal switch socket and require little or no maintenance. The oil is permanently sealed and does not require changing or re-filling. Under normal operation they cannot overheat nor will they soil or burn fabrics.

The radiators are supplied as free-standing units but can be fitted with castors for easy movement or may be wall mounted if desired.

Further information from:— Dimpco Limited, 13 Moss Street, Dublin 2. Tel: 714410/714073.

**Runtal**

Runtal for people who can't wait to get their hands on a radiator.

The most advanced radiator in the world

Runtal have created radiators so advanced that they completely revolutionise our whole concept of radiators. Specify them for all your clients, be it for the home, commerce or industry. Choose from a complete range of radiators. There's a Runtal radiator to meet every conceivable need. They're easily maintained! They give more heat! And are immediately available from stock!

75% more heat

Most Runtal radiators, such as the HL, have unique Swiss-designed fins that dramatically increase the radiators output by up to 75% compared with conventional panel radiators of the same dimensions.

Immediate delivery

Runtal HL radiators, made from 1.5 mm gauge steel, in a wide range of sizes, all guaranteed for 5 years, are available from stock now!

There's no delay! Delivery from our depot is immediate!

For details use the coupon below or telephone us at (01) 694300.

https://arrow.dit.ie/bsn/vol18/issue1/DOI: 10.21427/D7WT5F
Danfoss radiator thermostats give individual and constant room temperature wherever central heating is used. Danfoss radiator thermostats reduce heating bills by preventing overheating and by exploiting free heat gains. Danfoss radiator thermostats are single trade fixing, non-electric, modulating controls.

**Operating Quality**
Control accuracy and long life expectancy are vital in choosing radiator thermostats. Danfoss sensitive sensing heads and advanced gland seal design are two of the many reasons why they are the product to meet the demands of good engineers seeking operating accuracy and long-life.

**Quality Products & Wide Range**
The Danfoss achievement which speaks for itself. A range which will meet all demands for individual room control regardless of temperature, location or pipe size. A quality which will satisfy even the most critical customer and which is fundamental to saving fuel. A product which automatically controls space temperature. Danfoss radiator thermostats carry the accumulated know-how which your customers deserve, which good Automatic Controls demand and which is essential for fuel economy. This makes Danfoss the Ideal Partner for you.

**Coupon**
Please send me further information on the Danfoss Radiator thermostats type RAVL.

Name/Position

Company

Address 23027**

J. J. SAMPSON & SON LTD.
12 A, Wexford Street
Dublin 2
Telephone: 75 23 17, 75 23 18

Published by ARROW@DIT, 1979
RADIATORS

QUADRANT

The Buderus FKR radiators are designed, manufactured and tested in accordance with the German DIN specification 4720 and 4703/1. The standard radiator (HD4) is designed for hot water systems having a maximum operating pressure of 414 kN/m² (60 lbf/in²). Optionally available in hot water radiator (HD6) which is suitable for operating pressures up to 620 kN/m² (90 lbf/in²).

FKR radiators can also be supplied for use with steam and operate at pressures of 212 kN/m² (30 lbf/in²) or 414 kN/m² (60 lbf/in²), details of which can be provided upon request.

Each section is tested at a pressure of 724 kN/m² (105 lbf/in²) (HD4) or 1241 kN/m² (180 lbf/in²) (HD6). The sections are then assembled and the test repeated. To avoid damage in transit, radiators are despatched with not more than 12 sections assembled. Final assembly and testing is carried out on site.

All radiators are coated with a primer and each is complete with screwed nipples, high temperature joint rings, flow and return bushings, sealing plug and vent plug (drilled 3/8" BSP). A range of optional accessories is also available.

The Buderus steel column Stabulo range of radiators is available in a variety of forms to suit both large and small rooms. They are already painted at the factory which ensures a more durable product with a better finish. They are available as type H (basic panel), type HC (basic panel with convector plate at the back to increase heat emissions), type HL (basic panel with extra deep convector plate increasing heat emissions of the panel by up to 95%), type C convector radiators (with convector plate on both sides of the Panel), and type R modern elegant column radiators.

All Runtal products are custom made to customers' requirements, a range of the most popular sizes is available as standard ex-stock. Special features are as follows:

1. They can be supplied to customers' exact requirements being available in lengths from 600mm to 6000mm in heights from 70mm to 980mm and in heat output from 100 to 20,000 watts.

2. In addition to the standard range a large variety of special types are available on application.

3. Single panel high output HL type may be used to replace conventional double and treble panel radiators.

4. Low water content gives a shorter response.

5. Heavier wall thickness (1.5 mm) ensures a more durable product with longer life, allowing Runtal to offer a 5-year guarantee on its' radiators.

6. These units may be connected in series using same end connections to eliminate pipework.

7. For larger installations, larger units may be used reducing the total number of heating units needed and thereby making for a faster, more economical installation.

8. Due to the flexibility of construction modular sizes may be obtained giving a uniform appearance but varying heat outputs.

Further information is available from Runtalrad Ltd., Beech Hill, Clonskeagh, Dublin 14. (Tel: 694300).

HEVAC

Hevac Ltd., now have large stocks of the Francia Hoval, Europano range of steel panel radiators. The panel pattern is in contrast to the conventional panel and this gives a very slim appearance to the radiator.

There are four types in the range, S, SA, D2A and D, the latter two being double panels and the former singles, the A types have convector surfaces fitted to increase the output by convection. The four heights available are 420, 580, 820, and 908mm with twenty one lengths from 04.4m to 2m.

A white semi-gloss paint finish is protected by a shrink wrapped plastic film and the radiator is supplied with all fitting accessories.

Further information from: Hevac Limited, Lomond Avenue, Fairview, Dublin 3. Tel: 373796.

RUNTAL

Runtal quality radiators and convector plates offer a versatility and elegance otherwise unobtainable. They are constructed from flat oval tubing which gives Runtal products their distinctive and pleasing appearance. They are available as type H (basic panel), type HC (basic panel with convector plate), type HL (basic panel with extra deep convector plate increasing heat emissions of the panel by up to 95%), type C convector (with convector plate on both sides of the Panel), and type R modern elegant column radiators.

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Further details available from Runtalrad Ltd., Beech Hill, Clonskeagh, Dublin 14. (Tel: 694300).

A. BELL & CO

A Bell & Co are the sole agents and distributors in this country for Hurseal oil filled electric radiators.

The idea of oil filled electric radiators dates back to the 1930's, but it was not until about 1945 that this form of electric heating became commercially viable — Hurseal being the pioneers in the UK market. Today, the company offers one of the most comprehensive ranges available, be it for the home, commercial premises or industrial installations.

All Hurseal's are made of 18 gauge steel and are optimum oil filled to ensure additional heat (up to as much as 15 or 20 minutes) once the radiator has been unplugged. Finishes are either high gloss stove enamel or, in the instance of the 130 watt towel rack, chrome. Each of the radiators carries a five year guarantee which covers the shell, the element, and the thermostat.

Of special interest to commercial and industrial users are Hurseal's flameproof panel type, oil filled radiators which have been especially designed for use in hazardous conditions. A dust-proof model is also available on request.

Further information is available from A. Bell & Co (Eire) Ltd., rear 136 Botanic Road, Dublin 9. Tel: 301777.

Danfoss

The rising costs of heating have lead consumers, more than ever before, to seek the most rational way of meeting their outlay on heating. To meet this aim the heating branch of industry must be ready to install plant which is cheap to run.

Fortunately, they are in a position to do so at once — for the last twenty years the means have been at hand, namely: the radiator thermostat. Previously, radiator thermostats have been sold to meet the demands of comfort, i.e. to provide a constant, individual room temperature. The energy situation has immediately brought home the fact that just to have this form of comfort is synonymous with saving up to 20% in energy consumption.

A heating plant with radiator thermostats is thus both better and cheaper in operation, it requires an investment which means have been at hand, namely: the radiator thermostat. Previously, radiator thermostats have been sold to meet the demands of comfort, i.e. to provide a constant, individual room temperature. The energy situation has immediately brought home the fact that just to have this form of comfort is synonymous with saving up to 20% in energy consumption.

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For further information on Danfoss thermostat radiators please contact J. J. Sampson & Son Ltd., 12a Wexford Street, Dublin 2. Tel: 752317.
THORN

Thorn Radiators, tested to full MARC standards, combine a high output efficiency with good appearance. They are made from 18 s.w.g. steel and each individual radiator is pressure tested to 100 p.s.i. — twice the stipulated standard.

Radiators are manufactured in 15", 21" and 27" heights and in lengths of 21" to 117" — 74 sizes both single and double.

The Thorn Radiator has an elegant roll-top with no unsightly top weld, to collect dirt, cause damage to drying washing or indeed cause injury. It also has a clean line down the depth of the radiator with no bulging top and bottom manifold, and with no air restriction between the panels; this means a higher heat emission per square foot — on a long double, saving can be as much as 5 square footage with no manifold, weight is reduced, thus making handling easier.

Because the blank ends and air-cocks are factory fitted the edges are kept smooth, and the installer is saved time and effort in fixing them on site, and in addition removing the possibility of a bad fit producing leaks.

Fitting brackets are totally concealed and there is only one size of bracket for all radiator sizes giving a common fitting distance on each. The bracket has spring clips to hold the radiator firmly, yet allowing expansion and contraction to take place. The strap allows back and forward movement during installations.

The radiators are despatched in a hard white stove enamelled primer, which will resist finger-marks, and make subsequent gloss-painting easier.

Further details available from: Andy Gallagher, Belview, Mullingar. Tel: 044-80104.

VEHA

Veha of Wicklow continue to expand and improve on their broad service to the heating industry. Developments include, panel convector radiators, low level high output radiators and oil filled electric radiators.

The standard panel convector radiators have already proved successful. They are supplied in the same large range as Veha panel radiators, ie 11", 15", 19", 23" and 27" heights and in the standard lengths from 18" to 116" and in special over-lengths up to 231".

The low line "V" radiator is a specially designed 6" high radiator providing high-output figures by the use of deep fins, providing space and output requirements where conventional radiators cannot be used.

Following the success of the initial launching of the Veha range of oil filled electric radiators, they are likely to make a noticeable impact on the Irish market.

Veha radiators are also available through stockists and also through their distribution centres at Cork and Galway.

Further information is available from Veha Ltd’s, Dublin depot at Long Road, Dublin 12, (Tel: 783466).

QUADRANT ENGINEERS LTD

Buderus Steel Column «Stabulo» Rads

BUDERUS «<STABULO>>
RADIATORS ARE AVAILABLE IN MANY SIZES AND CAN BE EXTENDED TO ANY LENGTH TO MEET ANY HEAT REQUIREMENTS

Other Quadrant Products

* Buderus Boilers  
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For Details Contact us at:

Green St, East, Dublin 2. Tel: 771411/2. Telex: 5283
The problems encountered in cooling systems are many and varied. As in boilers, hardness salts can cause scaling. These deposits can occur in heat exchangers, in pipework and also in the cooling tower. In the same way that the boiler feed system and condensate system can suffer from corrosion due to carbon dioxide and oxygen, so can a cooling system. However in a cooling system not only does one have to beware of dissolved carbon dioxide and oxygen causing corrosion one also has to be aware that the corrosion rate can be affected by other factors, such as flow rate and microbiological and airborne deposits. An additional problem that is encountered in cooling systems, but not in steam raising plant, is fouling, both airborne and microbiological. Microbiological fouling caused by small microorganisms if not dealt with expeditiously can cause cooling towers and heat exchangers to foul and result in reduced efficiency if not plant shut down.

The systems under consideration in this paper are:—
(a) Steam Boilers Systems,
(b) Cooling Systems — Open Evaporative,
(c) Closed Chilled Water and L.P.H.W. Systems.

STEAM BOILER SYSTEMS

Scale in Steam Boiler

Deposits in boilers are chiefly caused by hardness salts coming out of solution. All deposits have a much lower thermal conductivity than does boiler metal which means that they do not transmit heat well. This thermal barrier reduces the rate at which the boiler will steam and consequentially its efficiency. This loss in efficiency may justify supplying water treatment, even without any other consideration. Much more important is the effect of these deposits on the metal temperature. Boiler metal loses its mechanical strength at about 900°F when it begins to creep and deform. This temperature is considerably less than the furnace temperature, which may be well over 2,500°F in the early stages of combustion. The metal is, however, kept at nearly the same temperature as the boiler water by removal of heat in the form of steam bubbles and by circulation of water. If deposits form the metal is separated from the water by an insulating barrier and if this barrier approaches a certain thickness, then the temperature will increase until it approaches 900°F and the metal will then be distorted and may collapse.

Bicarbonates

Bicarbonates are termed alkaline hardness (temporary hardness) while calcium/magnesium are termed non alkaline hardness (permanent hardness). Deposits are formed when the concentration of hardness salts is above their solubility limit. This can happen in several ways:
(1) By concentration.
(2) By reduced solubility due to temperature increase.
(3) When steam is taken from a boiler the dissolved salts are left behind and concentration in the boiler will rapidly produce a quantity in excess of the solubility limits.
(4) There will be more calcium sulphate in the feed water than will be soluble in the boiler, for this salt exhibits a retrograde solubility being more soluble in cold water than hot. The solubility at 100°F is about 2000 ppm whereas at 360°F it is 80 ppm.
(5) When heated bicarbonate decomposes, the relatively soluble calcium bicarbonate forming insoluble carbonate

\[
\text{Ca(HCO}_3\text{)}_2 + \text{H}_2\text{O} \rightarrow \text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2
\]

Magnesium carbonate is also formed in this way. Silica will also form deposits and can be very difficult to remove. Iron oxide can also be a problem being brought into the boiler in the condensate by corrosion of the metal pipes.

Getting the Treatment

It is a fact that some compounds are less likely to form a hard scale, and more likely to form a sludge. If Sodium Carbonate can be added or phosphate, which form calcium carbonate or phosphate with the hardness salts, they precipitate as a sludge. If the organic materials are also added, called sludge conditioners, the carbonate or phosphate sludge can be kept in suspension in the boiler water and it does not really settle out and form an insulating layer. The sludge now present in the boiler can be removed in the blowdown. This is termed "Internal Treatment". By returning a high proportion of clean condensate, the amount of hardness brought into the system in raw water can be kept down. However the bulk of the hardness must be removed before the feed water enters the system. We call this "External Treatment". However, the best external treatment allows some hardness to escape into the system. This is dealt with by internal conditioners.

ION EXCHANGE

This process uses a bed of special resin beads which contain chemically active groups capable of exchanging with ions in the water. By selecting the type of resin, an exchange can be made that gives a more favourable type of water. The simplest is a base-exchange where calcium/magnesium in the water is removed and replaced by sodium. Nothing else is changed so total solids remain the same. When the resin is exhausted it can be re-generated with a strong solution of sodium chloride and the calcium/magnesium run to waste. This is an excellent process especially for low pressure boilers, but not all types of water are suitable for base-exchange. A frequent problem is that a high alkaline hardness water is converted to highly-sodium-alkaline water, which results in far too much caustic soda in the boiler. Dealkalisation uses a resin in acid form. It is capable of exchanging alkaline hardness into a corresponding acid (carbonic acid), but not non alkaline hardness. The carbonic acid is blown out in a degassing tower and the water adjusted for alkalinity with some caustic soda. Total solids are thus reduced by the amount of alkaline hardness, and where the raw water was predominantly mostly alkaline hardness a feed water of low hardness results. Any permanent hardness can be removed in the base exchange plant. Regenera-tion is by sulphuric acid.
Demineralisation

Demineralisation uses two types of resin. One resin removes all the metal ions (calcium, magnesium, sodium etc.) and the other removes all the acid ions (sulphate, chlorides, bicarbonates, silica etc.). The result is water virtually free of salts although not free of dissolved oxygen or other non-ionised substances. Where the water available is very high in impurities, such as brackish estuaries, or even sea water, then chemical pre-treatment becomes un-economic. In this case evaporation is often employed, the distilled water produced being virtually free of all impurities.

NOTE: Silica can not be treated by base exchange plant. However if the silica content is less than half the caustic alkalinity, then the silica will not dissolve out of solution in the boiler water.

A more recent method is reverse osmosis, which in effect means pumping the water at high pressure through a special membrane which lets through the water but not the dissolved solids. This process is about 90% effective and is useful as a pre-treatment before a chemical process, although the water may have to be pretreated to preserve the efficiency of the resin. However external treatment is used, there will always be a certain amount of hardness leaking through which is then treated by internal treatment measures.

Sludge Conditioning

Insoluble solids in boiler water will consist of precipitated hardness salts and corrosion products, the latter arising from corrosion in the boiler feed or return system, although correct choice of chemical conditioning and treatment will reduce the quantity and improve the quality of these precipitates so that they are as non-adherent as possible and can be removed in the blowdown. Additional measures must be taken to overcome the tendency for them to form heat resisting deposits. Various organic materials generally of a colloidal nature have been used (i.e. natural and modified tannins starches, alginates and others). However at high pressures they may carbonise and form deposits of carbon. Because of these deficiencies, synthetic materials have been developed (i.e. polymers). These have been carefully selected molecular weights to give the optimum effectiveness. Blends of polymers with sequestrants such as organic phosphates have even better sludge dispersing and scale-inhibiting properties. Another method is the use of chelating agents and these have been discussed earlier under internal treatment.

Corrosion

The most important condition leading to attack is the presence of oxygen in the water. Oxygen reacts with iron to give ferric oxide (rust), which will not protect the metal from further attack and metal is continually dissolved. The attack can be very localised and the result is a deep pit, leading to perforation. A small amount of oxygen is capable of causing pin holing, as only a little amount of metal has to be removed from a small area to cause a tube to fail, and attack becomes particularly severe at pressures above 200 p.s.i. The answer of course is to keep oxygen out of the feed water. Apart from absence of oxygen, good corrosion control required a high boiler water pH value; the magnetic film is at its most stable when the pH value is between 10.5 and 11.5. These pH conditions will normally be achieved by the methods used for scale control. Oxygen is removed from the water by physical or chemical means or by both together. By heating the water as it is sprayed through a current of steam, very low levels of oxygen can be achieved: this is a process of de-aeration. Even simple heating in the feed tank can remove a large amount of oxygen. With modern boilers particularly when the make up water is softened, oxygen removal is necessary with low pressure boilers. Heating the feed water followed by chemicals is all that is needed to withstand corrosion. However with H.P. boilers deaerators are installed and the final traces of oxygen are removed by chemicals. Here are three of the chemicals mainly used:

1. Tannin
2. Sodium Sulphite
3. Hydrazine

Corrosion of Condensate Return Lines

When steam condenses oxygen and carbon dioxide dissolve and produce a dilute carbonic acid solution containing oxygen; this solution being very aggressive will attack steel return pipes. If oxygen predominates the metal will be pitted and if carbon dioxide predominates, it will be channelled out as gas voiding. Both types of attack are frequently encountered together. The measures recommended to prevent return line corrosion may include removal of the damaging gases from the feedwater and the use of corrosion inhibitors. De-aeration and dealkalisation will for the most part remove oxygen and carbon dioxide respectively. But there will always be a certain amount of these gases getting into condensed lines. Direct chemical treatment is therefore necessary. In general, volatile amines are used of which there are two broad classes.

1. Neutralising Amines
2. Filming Amines

Conclusion

Effective scale and corrosion prevention will only be achieved if the correct treatment is prescribed and continuously applied. For any boiler system, an appraisal of the plant problems and water quality is essential. This is best done by water treatment specialists who supply the equipment and the chemicals but also should supply a good back-up service, as treatment may have to be adjusted from time to time because of water quality change. The maintenance staff should be trained to carry out periodic tests to ensure effective operation.
Part of a multiple Lincoln packaged boiler installation recently supplied to a large hospital in North West England.

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NEW PRODUCTS

RADIALAX FANS — NEW FROM THE BRENnan GROUP

The Brennan Group have recently introduced a range of fans, the Radialax fan which is a new development in fan engineering incorporating the high performance characteristic of backward curved impellers housed in an in-line duct. Ease of mounting, low noise generation, high performance and one hundred per cent speed regulation are built advantages of this fan. By using the unique "inside-out" motor, fan dimensions are reduced to a minimum making the units ideal for all ceiling mounting, air handling units or conventional duct or tube mounting. Inlet and outlet dimensions are identical.

The unique "inside-out" motor enables direct mounting of the impeller. Motors are built to IP22 Class B insulation in accordance with European specification VDE0530. The motors run on ball bearings and are designed for operation in air stream temperatures of 65°C. Motors are one hundred per cent controllable by transformer or step controllers. Fan motors are sized to give margins over maximum load conditions ensuring long and maintenance free operation.

The impellers are high efficiency backward curved type giving stable characteristics over the range and non-overloading power characteristics. Good air entry and exit conditions ensure excellent airflow and extremely quiet operation. Impellers are both statically and dynamically balanced to fine limits thus giving smooth running operation. The fans are available for air volumes up to 3,500 cfm and pressures up to 80 mm w.g.

Full details of this new development are available from Brennan Airconditioning Limited, 60 Cookstown Industrial Estate, Tallaght, Co. Dublin. Tel. (01) 514711/514008.

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Please telephone the Nursery Manager W. Dray at Sligo 071-5597.

One of the Radialax fans, manufactured by Radial and Axial (Fans) Ltd., which are distributed by the Brennan Group.
NEW PRODUCTS

MICHELANGELO BATH

The distinctive raised wrap-round back-rest is a feature of Ideal-Standard's new Michelangelo bath.

The Michelangelo, the first new design of acrylic bath to be produced in their new manufacturing facility at Hull, has been introduced by Ideal-Standard. The bath, bearing the same name as Ideal-Standard's Michelangelo suite of Italian-designed vitreous china bathroom furniture, was designed by John Beauchamp, who also created the best-selling Brasilia bath for Ideal-Standard. The new bath, featuring a raised wrap-round back-rest, has been designed, however, to complement not only the Michelangelo bathroom furniture, but all co-ordinated vitreous china bathroom suites from Ideal-Standard. The Michelangelo bath is 1700mm x 800mm luxury width combined with a standard length which makes it suitable for installation in the vast majority of bathrooms.

The new bath can be supplied with centre tapholes or without tapholes, and has a pair of cast brass handgrips which are fitted on shelves along the sides of the bath, a feature which Beauchamp also designed so successfully into the Brasilia bath. Attractive design-coordinated front and end panels are available in matching colours in high impact polystyrene.

Particular attention has been paid to matching the Michelangelo bath and panels to Ideal-Standard's ceramic bathroom furniture colours in which it is available — Sorrento Blue, Bali Brown, Harvest, Avocado, Pampas, White, Penthouse Blue and Penthouse Red.

Ideal Standard products are available from K.M. Reynolds Ltd., 13 Bath Avenue, Dublin 4, Tel: 685079.

Toilet/bath ventilator fan

An attractively styled ventilation fan specially designed to provide quiet, effective ventilation for toilets and bathrooms. The unit is manufactured to high standards with a smoothly styled plastic cover in ivory, with a beige-coloured grille, giving an attractive two-tone effect.

The Tiba multi-fuelled cooker from Grantaid.

Published by ARROW@DIT, 1979
NEW PRODUCTS

New VAV System from Walker

Walker Air Conditioning Limited, authorised distributor of Carlyle air conditioning and refrigeration equipment throughout Ireland, has introduced a new variable air volume system designed to handle large cooling zones with fewer pieces of equipment. A highly flexible and efficient box/system, Carlyle's new-Modubox is an ideal companion to the company's Moduline air terminal diffuser system.

The Modubox system consists of factory assembled airflow control box, optional re-heat coil, an optional octopus connector arrangement to remote diffuser boots, and patented, remote diffuser boot outlets. It is a completely factory-assembled plenum section that houses an aerodynamically-designed modulator — a gravity load swing damper to control airflow. The diffuser boot is an acoustically and thermally insulated plenum mounted on a Moduline air diffuser. The boot can be installed in either a T-bar or custom ceiling.

As each Modubox can handle zones up to 5098 m³/h, more area can be covered with fewer pieces of equipment. Each optional octopus connector has its own balancing damper and locks the diffuser boots. Internally insulated, have inlet collars and an optional pressure probe for quick, accurate zone balancing. Standard diffusers are available in two-way or one-way blow down to -29°C: the Chillermate water-to-refrigerant model nos. 036, 048 and 060; the 'Hot Shot' heat reclaim device which transfers heat from a hot discharge gas to a hot water system: a low voltage control transformer and, a range of thermostats with sub-bases.

Further information from Walker Air Conditioning Limited, Dublin Industrial Estate, Finglas Road, Dublin 11. Tel: Dublin 300844.

Carlyle's cylindrical 'dustbin' shaped 38VE available from Walker Air Conditioning Limited.

Luwa's New 'FS' Fine Dust Filter

A new bag type filter has been introduced by Luwa's Filter Division, featuring 10 continuous seamless media self supporting pockets which are lightweight, compact for transport and can be easily installed in ordinary pocket filter frames. The construction of this bag filter to a depth of 680 mm, using fleece covered glass fibre composition, provides a large surface area of active media which is humidity resistant and strong enough to give protection from overloading or blowouts. This filter requires no maintenance during its long service life and carries an AHSRAE efficiency rating of 45% or 85%, according to size. 'FS' fine dust filters are ideal for use where heavy concentrations of dust, smoke, soot, pollen, bacteria, etc. are prevalent. They are suitable for nearly all air conditioning and air handling installations as end filters and especially as pre-filters for Luwa HEPA filters.

Glowtherm Ltd are Irish agents for Luwa.

Luwa's New 'FS' fine dust bag filter.

The new VAV system from Walker.

SUVIC TRV RANGE EXTENDED

A new horizontal thermostatic radiator valve (TRV 3301) has been added to the Satchwell Sunvic range of TRVs. The new TRV can be fitted to either the top or bottom of a radiator and as with all other Satchwell TRVs they can be used on microbore systems. This is the first horizontal TRV from Satchwell Sunvic and it compliments their existing, well-established range of angled and straight-through TRVs. The new TRV is available in ½" (15mm) BSP, has compression fittings supplied as standard and can be easily recalibrated on site. It can be used on both double or single pipe systems and the thermostatic head and the upper gland packing can be changed without draining the system. The Satchwell range of TRVs can be easily installed, directly replacing the ordinary radiator hand valves and with the inclusion of adjustable stops for pre-selected day and night temperatures gives quick positive selection.

Satchwell's new Dublin office is at 15-19 Hendrick Street, Dublin 7, Tel: 775413.
After 21 years of making professional equipment for air and gas movement, our three divisions have become leaders in their field. Whether it's fans, instruments or ventilation units, you'll find Airflow Developments a tower of strength.

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Our Instruments Division offers a comprehensive range of precision manometers, anemometers and specialist test equipment. They bring laboratory accuracy to on-site testing by combining simplicity, portability and durability. Technical assistance on special measurement problems is readily given.

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Aidelle Division

Our Aidelle division specialises in ventilation for domestic, commercial and industrial premises. Aidelle is well known for its leading range of Loovent extractor units and has recently introduced an attractive range of recessed wall fans. These use the extra power of centrifugal impellers for more effective ventilation.

The division also manufactures a range of flue boosting and dilution equipment for gas-fired boiler installations.

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NEW PRODUCTS

EURO FUEL MASTER

Guaranteed Irish, designed and manufactured in Ireland to BS 693 and 2640 and also tested by the Institute of Industrial Research and Standards, these are the lengths to which Euro Engineering Co Ltd, have gone to before they launched their new product on the market. Euro Engineering have been making boilers for a number of years but this new model, the Fuel Master, is entirely their own design and creation. A number of prototypes were at first tried out when it became obvious that the market for multi fired boilers would expand rapidly due to the present oil shortage, the final result is the present model which has been tested on all types of solid fuel and oil.

The combustion chamber is constructed from 6 mm steel plate of highest quality metal and the water chamber is covered with 50mm high density insulation. The rated output for the unit on solid fuel is 60,000 BTU/hr and 77,000 BTU/hr on oil.

The finish on the exterior is an attractive hammer green but apart from the fact that insulation is needed for efficiency it is a shame to cover the very high quality welding. A very good effort from Euro Engineering's directors and design team Paddy Sarsfield, Chairman, John Byrne, Managing Director, Eddie Taylor, Director and Production Engineer and Barry Quinn, Director and he also takes charge of matter technical/welding.

The following is an extract from the IDHE journal which we received after the postal dispute which was the obvious cause the nightmare of every journalist, the story that didn't happen, as we all know the dance was cancelled at the last minute due largely to the same postal dispute.

Due to the strike by the Irish post office employees (I would have said workers, but that rather rubs salt into the wound) we are a long way behind with news from the branch. The only method of getting a letter delivered to England is to find someone who is catching the jerry and entrusting it to them. Problem is that the last letter to arrive at the office by this method came after your man had already telephoned three weeks previous to say a letter was on its way. (Seems the messenger went to see his aunt in Liverpool and forgot to post it!) It is understood, however, that a splendid time was had by all at the annual dinner-dance held on March 30th. Can't be too sure of the precise details, but if it was up to the usual standard it will have been a whale of a do. For those who haven't had the pleasure of a dinner-dance in Ireland it must be mentioned they start when we are ready to stop, i.e. kick off at about 9.00 to 9.30 p.m. and official

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SURREY KT6 4JT. ENGLAND.
finish is around 3 or 4 o'clock
(unofficial finish is usually
just in time for early breakfast
—if you can stand it). Great!
By the way Christy what
about the night out in place of
the non event? Promised for
about the night out in place of
October I believe.
Conservation in a campaign to
doing their bit for Energy
October I believe.
conservation is as follows. Instead of
giving our Sales Representatives
motor cars, we are giving them small specially
designed oil tankers so that as they
do their sales calls from
do to door they will actually be
driving a small oil tanker
well able to collect any waste
oil they may happen across
and of course to instruct
clients in how to save it and
have it collected. This
approach gives new meaning
to the job of the
representative.

Speaking of representatives
I heard that JRT's long
serving representative, Jim
"Fingers" Kelly (ask him to
tell his finger joke), had a request
played for him on our new
Radio 2 reps spot, the request
was from the office staff of
JRT's, nice thought, let's hear
a few more for the trade's
King of the road.
I also heard that a namesake
of Jim's, but no relation,
Paddy Kelly is back with
Hevac covering the areas
north of Dublin, best of luck
and may all your orders be big
ones.

On a recent trip to Carlow I
called into the showrooms of
the local heating merchant,
Gillespies in Kennedy Avenue
and was surprised at the range
of back boilers and closed
stoves on display. I was
further surprised by what I can
only describe as a giant display
board depicting the modern
Chinese puzzle, or how to
interconnect. Top marks for
this effort even though it looks
familiar, based on CIS liter-
ature possibly.
I would now like to hear
from any heating contractors
wife who has seen her husband
in the last six months, judging
by reports most contractors
have been so busy with conver-
sions and new solid fuel
installations that there is now
a waiting list of customers of
three months at least. The
latest story is that some con-
tractors are charging a survey
fee for estimates and then tell
the customer that they will be
available in three months for
the operation, sorry I mean
the installation. It all reminds
me of a conversation I had
with a friend who had return-
ed from the USA and as he
had been involved in the heat-
ing trade here the conversation
got around to the trade in the
States, and he said that calling
a heating contractor was like
calling a surgeon, you need
such a large bank account to
pay him.
As long as solid fuel fever
continues the heating trade
will do well but how long will
it last? Forever we hope but
then what ever extra we earn
our wives will spend for us,
new washing machines, holi-
days in Greece etc . . . . easy
come, easy go.
Our best wishes for a speedy
recovery to Peter Morrow of
Hevac who is recovering from
a recent motor bike accident.
Peter is well known in the sales
office of Hevac and is also a
student on the IDHE diploma
course in Bolton Street.

Over 500 central heating
installers from all parts of
Britain flew to Bermuda (on
Tuesday 3 April) to sample the
heat of the sun for five days,
having qualified in an incent-
itive scheme. The trip, from 3-8
April, was organised by Glow
Worm Ltd., of Belper, Derby-
shire, the biggest manufac-
turers of gas-fired central heat-
ing boilers in the world. The
programme in Bermuda incl-
uded a conference and pres-
tations as well as enter-
tainment. Among the passeng-
ers were cabaret stars. How
about some trips like that in
Ireland we could all do with
the break.

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BIOMASS — ECONOMIC IMPLICATIONS

T. Cahill-O’Brien’s paper on The Commercial, Economic and Employment Opportunities Arising from a National Programme in Ireland was presented at a one day conference held at the IMI Conference Centre, Dublin, earlier this year. Organised jointly by the Agricultural Institute and the Solar Energy Society of Ireland, the conference examined biomass development in Ireland and the above paper in edited form appears this month.

The employment and commercial opportunities in any sector of the economy are closely related to the availability and cost of raw materials, and to the market for finished products. To establish the quantity of biomass which could become available in a reasonable time scale, I will first have to outline a realistic programme. The achievement of this programme is based on the following assumptions:

That it will become Government policy to actively encourage a national biomass programme of short rotation forestry, on marginal land which is unsuitable for other purposes.

That this policy will be fully implemented by State and Semi-State bodies who already have considerable control and expertise in the utilisation of wood, peat, electric energy, and chemical products.

That it will be fully supported by the agricultural, industrial, and commercial sectors, and by the public at large.

Short Rotation

Some of you may consider that these assumptions are far too optimistic. It is a national aim, however, to achieve full employment and to reduce our energy imports. If a programme for biomass will help us to achieve these aims, we must be optimistic and assume that it will get both government and community support. Up to one millions hectares exist in Leitrim, west Limerick, north Kerry, and Clare which are not suitable for conventional agriculture, but which are capable of producing very high timber yields. This area does not include cut away bogs. It would be unrealistic to assume that all of this land could be used for short rotation forestry, since there are competing uses such as traditional forestry which must expand, so that the value of our timber and pulp imports can be reduced. I have therefore based my proposed national biomass programme on five hundred thousand hectares of short rotation forestry. To be optimistic and at the same time realistic I have selected an establishment rate of twenty five thousand hectares per year, over a twenty year planting programme, and a conservative yield of 12.5 dry tons equivalent, per hectare, per year. I have allowed a lead time of three years for research and development, organisation of administration, and land negotiation. Figure (1) shows the projected annual yield in dry tons equivalent, and in tons of oil equivalent. It also shows the savings in our balance of payments which could occur if the yield was used to replace oil imports. These figures are based on constant 1978 prices and exchange rates. Since it is likely that oil prices will rise in real terms, these savings should be regarded as minimum values.

The employment content, in preparation of the ground, planting, harvesting, and primary processing is difficult to assess accurately. There are, however, very close parallels between the harvesting of peat and short rotation forestry. The employment content in each system will probably be very similar. Harvesting of peat is more labour intensive, but this is offset by the larger areas of land which are required for short rotation forestry. Using Bard na Mona production figures, in dry tons equivalent, and employment figures as a rough guide, and making allowances for secondary processes such as briquette manufacture, we can estimate that the total employment in primary growing and harvesting biomass could exceed five thousand in 1992 and double that figure in 1997. All of these figures could be brought forward in time if the establishments rate was increased, the lead time reduced, or the yields improved. You will appreciate that this method of estimating employment is very crude, but it is interesting to note that Bard na Mona is currently employing between five and six thousand people, and maintaining profitability, despite the fact that it is selling a large proportion of its products to the E.S.B. at comparatively low prices.

For the longer term, however, the employment potential of short rotation forestry, in comparison with alternative land uses.

Bord na Mona

Concern has been expressed for some time about the long term job security of those employed by Bord na Mona, when the bogs have been cut away. It is interesting to compare the 1977/78 Bord na Mona figures with those in figure (1). In that year Bord na Mona had established twenty two production centres, and fifty-two thousand six hundred and thirty hectares of bog. Production of milled and sod peat totalled 2.5 million dry tons equivalent. Using milling and cutting rates of 12.75 hectares and 7.65 hectares per annum we can calculate the production area at approximately 32 thousand hectares. This compares with a production area of 40 hectares, and a total area of 200 thousand hectares, which would be needed to produce the same yield in dry tons equivalent from short rotation forestry. We can conclude from this, that Bord na Mona could ensure its long term viability by growing short rotation forestry, but that it will have to substantially increase the land area it utilises.
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The creation of secondary employment in the proposed biomass programme will depend on the existence of viable markets for biomass products. These markets can be broadly divided as follows:-

A large scale market for the conversion of biomass into electricity.

An industrial and domestic market for process or building heating, or for conversion into chemicals.

A national and international machinery market for planting, harvesting, processing, and utilising biomass.

An international market for biomass technology.

You will note that the first three are all replacement markets. Many of the technologies now being developed are well established before they were replaced by oil products. The reason for this was that oil products were cheaper and more convenient to use. As oil prices rise and the supply become unreliable, the market for biomass products will once again open up. The market has now become more sophisticated, and products will have to be both competitive in price, and convenient to use if they are to replace oil or coal in the short term.

**LARGE SCALE ELECTRICAL MARKET**

The whole yield from the proposed biomass programme could be utilised for generating electrical power. It may not be in the national interest to do this however, due to the high cost and low thermal efficiency of power stations. It may be more beneficial to encourage the conservation of electric power, and to use biomass fuel for building and water heating. This picture would change however, if the waste heat from power stations could be used for horticultural or fish farming purposes, because the total thermal efficiency of the power stations would rise dramatically and a large number of jobs would result in these industries. If power stations were used in conjunction with industries or district heating it might be more economical to gasify the biomass and use turbines to generate power. Waste heat from the turbines and the gasification plant could power the industries, and the start up time for the power station would be reduced, so that it could be used for peak shaving.

**INDUSTRIAL AND DOMESTIC MARKET**

The possibilities here are extremely broad, ranging from primary production processes of wood gases, alcohols, and high density wood fuels to a whole range of chemicals which are derived from them. Modern wood processing industries are highly automated and capital intensive. They are not job intensive, and cannot be, if they are to compete on world markets. Industries based on the proposed biomass programme would be located where the biomass is grown. They could therefore over a twenty year period make a contribution towards regional employment. Figure 2 will give you some idea of the capital cost and employment of typical plants. I propose to concentrate on those processes which seem more viable in the medium term in Ireland, and which have already been commercially developed elsewhere.

**DENSIFIED BIOMASS**

Wood is an attractive fuel with a low sulphur content compared to coal, but has the disadvantage of a high moisture content and is bulky in relation to its calorific value. A number of processes have been developed to overcome these problems. These generally involve million, drying, and compressing into pellets or briquettes. In its densified form, wood biomass can be burned in standard equipment with reduced sulphur emissions, and higher thermal efficiency. In industrial applications in the U.S.A. densified biomass is more economical than coal since it does not require expensive flue gas scrubbers. It has a 1% ash content which can be sold as soil conditioner, whereas the 5-10% ash content in coal creates a disposal problem. The number of U.S. companies manufacturing densification equipment has grown to 14 within the last three years. Seven U.S. companies are no producing densified wood products, and four more have new processors under development.

**WOOD GASIFICATION AND CHEMICAL PRODUCTION**

Wood pellets can be used as a feed stock for gasification plants at a thermal efficiency of 85/90%. This could be used directly by industry, or used as a feed stock for methanol production. With current technology the production of methanol from wood is still uneconomic. This is rapidly changing however, due to real increases in the price of oil and improved technology. Current trends indicate that wood/methanol plants will be competitive by 1987 when the first yield of the proposed biomass programme...
would be available.

Chemici Teo are currently making industrial alcohol from sugar beet and potatoes. This is uneconomic at present due to the high price of the feed stock. They should however consider developing wood/alcohol technology so that part of the biomass yields could be converted into methanol, either for dilution in petrol, or as a feedstock for other chemicals.

WOOD GAS TO MOTIVE POWER

Some of you will remember the producer gas systems which powered our cars during the last war. They were very crude devices run on charcoal. A German company developed a very advanced form of gasifier at that time, which was subsequently used by the German army to power all kinds of military and supply vehicles. In the 1950's when the company closed down it had made over 300,000 gasifiers. This company Imbert G.M.B.H. of Arnsberg has now improved the original design and has developed a range of gas/electric generators ranging from 10 Kva to 10,000 Kva, and gasification units for use on road vehicles and tractors. The gasifiers is highly efficient and eliminates tar and dust problems. The only waste remaining is a small quantity of wood ash of approximately 1% of the original wood fuel. One kilogram of air dried wood, with a moisture content of 15 - 20%, will yield 2.3 cubic meters of generator gas. This means that 1 litre of petrol can be replaced by 2.5 to 3 kilograms of wood, and 1 litre of diesel oil can be replaced by 3 to 3.5 kilograms of wood.

The gas is suitable to operate almost all combustion engines. It is also suitable for heating purposes. Diesel engines may be converted by building in an external auto ignition. Alternatively they can be operated using a mixture of 5 to 12% diesel oil. Due to the lower calorific value of generator gas the output of standard engines is reduced by 15 - 25% when operated on pure generator gas. This drop in efficiency can be avoided by using a mixture of 5 - 12% liquid fuel, or by oversizing the engine.

It takes two to three minutes from lighting the gasification plant to starting the motor. The wood fuel will remain alight as charcoal, for three hours, giving an instant start within that time. This may seem unattractive to some of the eager beavers in the city. In my view it beats queuing for petrol and I look forward to the day when I can get a fill of wood pellets in my local garage.

Many developing countries do not have the luxury of a choice, and Imbert generator sets may be the only way of supplying rural electrification. A 20 Kva generator set powered by a standard V.W. engine, costs approximately 7,000 DM. The development of this technology in Ireland means that we will have another alternative to oil, but only if a proposed biomass programme becomes a plan of action. Figures 8 and 9 illustrate typical wood/gas electric generation plants.

Fiscal policy could have a major effect on markets for these products. A recent Canadian government report suggests that energy tax structures should be based on energy values. Methanol has 52% of the rate levied on petrol. This is an interesting idea, which could promote the use of native fuel if it was applied to all forms of energy, and could discourage the wasteful use of high energy power sources.

The author who is with the Research and Planning Division of the IDA wishes to state that the conclusions expressed in this paper are his own and not necessarily those of the IDA.
We’ve more going for us than Molly Mollone

Nobody doubts the popularity of one of Dublin’s most famous daughters and it’s true that if asked, more Irish would have heard of her than would have heard of Baltimore Aircoil/Heath vanSpall. But we’re catching up. In fact in the area of mechanical engineering services, we might even be slightly ahead.

More important than equipment supply, however, is after-sales service. This we offer on a truly world-wide basis and we can always be called on to advise or assist. We believe one of our principal functions is to solve problems and then to provide the technology and hardware that matches the solutions we propose.

Here’s just one example — the Lakos separator. Some of our clients wanted solids-free water. We can remove up to 99%. Some of our clients use liquids from which they want to reclaim something. We can manage that too. Some of our clients want the best of both worlds — solids-free liquids and reclamation. They get it — and at no extra cost (the luck of the Irish). They have no worries about reliability or maintenance because what we provide has nothing that can go wrong. The customer provides the engineering; so if that’s you and you can come up with a feed of 5 p.s.i. then you’re in business.

Solids removal from the water used in all types of plant and equipment is already proving itself in many of our leading industries. Our Lakos separators are currently protecting the nozzles and control valves of sprinkler systems; cartridge, sub-micron, chemical and sediment process filters; pump water seals and bearings; surface or submersible pump and turbine bowls; condenser tubes and heat exchangers; water treatment plant and softeners — and all with one signal result: maintenance costs that are down — but down.

So if it’s a comprehensive service in any area of mechanical engineering services that you need, then call us — with confidence. If it’s cockles and mussels you’re after, perhaps Molly’s in the book.

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HORTON PARADE, HORTON ROAD, WEST DRAYTON, MIDDLESEX, UB7 7NS
Telephone WEST DRAYTON 40697/8
Telex 934934
### COMPANIES SUPPLYING REFRIGERATION EQUIPMENT – INDUSTRIAL & COMMERCIAL

<table>
<thead>
<tr>
<th>Co. Name:</th>
<th>Address:</th>
<th>Tel. No:</th>
<th>Telex No:</th>
<th>Manufacturer:</th>
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<tr>
<td>Airacs Ltd</td>
<td>20 Upper Jane Place, Dublin 1</td>
<td>747146</td>
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<tr>
<td>Anglo Irish Refrigeration Ltd</td>
<td>Balinstown Industrial Estate, Ballyboughal, Co Dublin</td>
<td>433312</td>
<td>31382</td>
<td>Costan, Verco Hill, Caddie Bonnetneuhaus, Swedish Royal</td>
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<tr>
<td>Arctic Refrigeration Ltd</td>
<td>167 Upper Rathmines Road, Dublin 6</td>
<td>971277</td>
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<td>Frigopol</td>
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<tr>
<td>Brennan Group of Companies</td>
<td>Unit 60 Cookstown Industrial Estate, Tallaght, Co Dublin</td>
<td>514008</td>
<td>514711</td>
<td>McQuay, Friedrich</td>
</tr>
<tr>
<td>Burke &amp; Son Ltd</td>
<td>7 The Parade, Donaghadee, Co Down</td>
<td>882202</td>
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<td>Howden</td>
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<tr>
<td>Commercial Refrigeration Ltd</td>
<td>13 Bridge Street, Waterford</td>
<td>75441</td>
<td>8560</td>
<td>Arneg, Pegesus Castle, Mac Franger Frigor, Mario Dorin</td>
</tr>
<tr>
<td>Coolair Ltd</td>
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<td>511244</td>
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<tr>
<td>Cool Heat Ltd</td>
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<td>661837</td>
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<td>Hall Thermotank Products</td>
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<tr>
<td>Cool Products Ltd</td>
<td>Balmoral Road, Balmoral Industrial Estate, Belfast BT12 6QD</td>
<td>084 664935</td>
<td>747559</td>
<td>RSL, Fridigadare</td>
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<tr>
<td>Company Name</td>
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<td>Cross Refrigeration Ltd</td>
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<td>Crossflow Airconditioning Ltd</td>
<td>The Colour Shop, Stillorgan Road, Blackrock, Co Dublin</td>
<td>881607</td>
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<td>J Norman Fulton</td>
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<td>Fridge Spares Wholesale Ltd</td>
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<td>Glowtherm Ltd</td>
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<td>Hall Thermotank Ireland Ltd</td>
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<td>580311</td>
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<td>Hammond Ltd</td>
<td>111 Pearse Street, Dublin 2</td>
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<td>Hevac Ltd</td>
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<tr>
<td>H.R.P. (Ireland) Ltd</td>
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<tr>
<td>ICI (Ireland) Ltd</td>
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<tr>
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<td>19 Rutland Place, Dublin 1</td>
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<tr>
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<tr>
<td>P &amp; D Macfarlane Ltd</td>
<td>51/53 Ridgeway Street, Belfast BT43 JJ</td>
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<td>Westinghouse</td>
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Available from:

RSL Ireland Ltd
48F Robin Hood Industrial Estate,
Long Mile Road,
Clondalkin,
Co. Dublin.
Telephone: 508011 Telex: 4818.

Haynes Coils (Kettering) Ltd

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fan arrangements and motors rated for free discharge or
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Compact design and strongly built.

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tallaght co dublin
tel: (01) – 514711
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<thead>
<tr>
<th>Co. Name</th>
<th>Address</th>
<th>Tel. No:</th>
<th>Telex No:</th>
<th>Manufacturer</th>
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<tr>
<td>Manotherm Ltd</td>
<td>4 Walkinstown Road, Dublin 12</td>
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<td>Masser Irish Food Machines Ltd</td>
<td>Kylemore Road, Dublin 10</td>
<td>364499</td>
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<td>Craig, Nicol, Sadia Westgate</td>
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<tr>
<td>Mycold Ltd</td>
<td>Davitt Road, Dublin 12</td>
<td>508310</td>
<td>30272</td>
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<td>Nicold Ltd</td>
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<td>O’Gorman (Ireland) Ltd</td>
<td>Unit 13, Dublin Industrial Estate, Dublin 11</td>
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<td>Cole, Derby Norcool, Foster, Coldbrook, Revco</td>
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<td>Castelcontardo, Arcton, Ranco Bitzer, Alco</td>
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<td>Refrigeration Engineering Ltd</td>
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<td>Esta-Van Swaay Vest frost</td>
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<tr>
<td>J J Sampson &amp; Son Ltd</td>
<td>12a Wexford Street, Dublin 2</td>
<td>752317</td>
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<td>Sermet (NI) Ltd</td>
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<td>Hillsborough, Co Down</td>
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<td>Southern Refrigeration Ltd</td>
<td>149 North Strand, Dublin 3</td>
<td>749251</td>
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<td>Stal, York, Acrokoool Torry, Revco</td>
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<td>Trane Ltd</td>
<td>46 Ardeevan Avenue, Lucan, Co Dublin</td>
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<td>Twomey O’Shea Refrigeration Ltd</td>
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<td>Unimack Ltd</td>
<td>James Place East, Dublin 2</td>
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<td>Walker Air Conditioning Ltd</td>
<td>Dublin Industrial Estate, Dublin 11</td>
<td>300844</td>
<td>4862</td>
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<tr>
<td>Zero (Ireland) Ltd</td>
<td>Burrin Arcade, Carlow</td>
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Index compiled from information received from companies and additional information from Suppliers would be welcome for the next issue of the Index on Refrigeration. Companies who supply refrigeration equipment and are not on this list are especially welcome to contact us.
Penn Single and multi-stage thermostats
Penn Single and multi-stage pressure switches
Penn Water and air-flow switches
Penn Pressure activated water valves
Penn Frost protection controls for heating batteries

The International Standard of Quality for Air Conditioning and Refrigeration Systems.
REFRIGERATION

Refrigeration and Energy Conservation

The requirement for industrial and commercial refrigeration is from two main sources, a. Air conditioning, b. The food industry. Both use similar technology but the food industry requires lower temperatures. At the recent IhVex exhibition almost 25% of the stands were involved in refrigeration and this is an indication of growth as two years ago at IhVex there were only two or three stands catering for refrigeration.

Looking at each business separately, starting with air conditioning, the growth in the air conditioning market was slowed down when in 1973/4 office block development almost ceased and this caused many firms in the trade to seek new outlets for their expertise. At this time two things happened, firstly due to the efforts of the Industrial Development Authority, new industries like chemicals, textiles and electronics were established and these all required air conditioning as an essential part of their business and secondly due to various grants and incentives from both the EEC and the government the food industry particularly the meat business expanded very rapidly.

The meat industry continued to expand until 1976/7 when it reached a peak and again other outlets were sought like fish and agricultural produce but it would appear that the boom time is over for the time being at least.

A typical meat factory requires refrigeration firstly in the boning hall with temperatures kept to 10°C, then the meat is chilled to 6°C over a period of about two days, the holding room or the main store area is kept at even lower temperatures usually 0°C to minus 10°C and finally a blast freezer may be used bringing temperatures down to minus 18°C.

With electricity charges rising rapidly all cold store owners are concerned about running costs and so many old fridge plants are being replaced by smaller systems with proper insulation and controls. This concern for cost is keeping many people in the trade very busy at the moment and it may even bring about a mini boom.

The following is a table of the most common refrigeration media:

AMONIA: highly efficient and relatively cheap but not used in air conditioning due to harmful effects on people if leaked in an air system.

CARBON DIOXIDE (CO2): requires much higher pressures for operation and therefore requires skilled staff, again not used in air conditioning.

REFRIGERANTS 11, 12 and 22, also known as Freon or Arcton (ICI) these are used for most refrigeration applications from air conditioning to cold stores. Refrigerants in this group are organic gases with combinations of fluorine and chlorine in combination with carbon. The main advantages are that the gas is non toxic, colourless, non corroding to most metals and non inflammable.

WATER AND BRINE: these are used in evaporative coolers.

Heath Vanspall

Baltimore Aircoil, through their representative, Heath Vanspall Associates Limited, have, over the past six years, established themselves as one of the major suppliers of Evaporative water cooling equipment in Ireland. In that time the range of Baltimore Aircoil equipment has been improved and extended to afford specifying authorities the most comprehensive choice available in today’s market.

In terms of hardware, Heath Vanspall’s offering through cooling towers, evaporative condensers, closed circuit coolers, refrigeration plant and a mass of matched optional and auxiliary equipment, provides for operations on the smallest industrial scale to the largest and most demanding. There are, for example, in excess of sixty standard sizes available of evaporative condensers with centrifugal fan arrangements and now - after an extensive R & D effort aimed at providing required condensing capacity with as low as 50% of the fan horsepower of centrifugal units — a range of over fifty standard sizes of unit with the introduction of centrifuge multistage axial fan geometry that still meets acceptable sound levels for most installations. The addition of multi-stage axial fan units also extend to the closed circuit range of evaporative coolers. Within each of the hardware ranges there is ample opportunity for ‘tailoring’ particular items to very fine tolerances, in order to match strict customer specifications and all equipment is offered in a proven corrosion-resistant and finish for critical environments.

Examples of some of the most interesting B.A.C./Heath Vanspall installations in this country in industrial and commerce.
Westinghouse

Westinghouse P.D. Packaged
Water Chiller
Air Cooled

Westinghouse P.E. Packaged
Water Chiller
Water Cooler

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TOTAL ENVIRONMENTAL EQUIPMENT SUPPLIERS
Industrial and commercial application design facilities

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Tel: 47611/470209/470113. Telex: 33356.

Also Mr. B. Scully,
Castlemahon, Co. Limerick. Tel: Castlemahon 59

Or Mr. T. Walsh,
2 Parkview Drive, Bishop Street, Tuam, Co. Galway.
Tel: (093) 24896.

Guaranteed 24 hour 7 day Service
of the following advantages occur:

1. The impellor which is the "Piston" is greatly reduced in size and weight.
2. As the impellor has been reduced the mass which must be handled by the machines on a long term basis. The most significant difference in Refrigerant 12 and 11 Centrifugal Machines is the size of the compressor and associated pipework, the "12" machines being far smaller as a result of the reduced C.F.M. gas per ton of refrigeration, almost six times as much must be handled by "11" machines to produce the same amount of refrigeration.

As a result of the reduced quantity all of the following advantages occur:

1. The impellor which is the "Piston" is greatly reduced in size and weight.
2. As the impellor has been reduced the mass which must be handled by the machine's gears has been lightened it is therefore unnecessary to become involved in highly complex gear trains which are almost impossible to assemble on site.
3. Inertia to be overcome on startup has also been significantly reduced allowing for smooth starts which in no way tax either the bearing surfaces, gears or the electrical starting equipment.
4. It is possible on a stripdown for a single engineer to dismantle the "12" machine due to weight and size reductions the same stripdown of an "11" machine requires several engineers and heavy lifting tackle mounted in an "over" situation.

The above items are those occuring from size reduction only a brief description of other advantages.

1. By now the most infamous section of "11" machines must be the purge pump. This unit is necessary as the "11" machine to supply water at 40°F must operate the refrigeration section at pressures below atmospheric thereby drawing in air and moisture to contaminate the system and cause shutdown due to high pressure problems. The purge pump through delicate pressure switches must remove this air and water. Unfortunately it is impossible to avoid removing refrigerant at the same time thereby necessitating recharging with refrigerant at intervals, this does not occur on the "12" machine as the refrigeration section operates at above atmospheric pressures.
2. Westinghouse have developed a superb capacity control device which is operated by the machine lubricant oil controlled by two solenoids. It is totally sealed thereby precluding refrigerant leaks. On the "11" machine this duty is performed by a shaft-motor arrangement which in itself by requiring external driven and bearings is cumbersome, however its greatest disadvantage is that to interconnect the capacity control device to the control motor a shaft passes from the machine internals to a motor outside this would be a disadvantage even on the "12" machine but on the "11" machine it compounds the problem of operating below atmospheric as well as a leak occurs and air and moisture are drawn into the system.

For further information please contact:

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Reconair — Westinghouse

The advantages of the Westinghouse centrifugal Packaged water chiller operating on Refrigerant 12. over many of its contemporaries in the market which operate on Refrigerant 11. are abundantly obvious to the experienced service engineer who will have to deal with the machines on a long term basis. The most significant difference in Refrigerant 12 and 11 Centrifugal Machines is the size of the compressor and associated pipework, the "12" machine being far smaller as a result of the reduced C.F.M. gas per ton of refrigeration, almost six times as much must be handled by "11" machines to produce the same amount of refrigeration.

As a result of the reduced quantity all of the following advantages occur:

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Cross Refrigeration

Cross Refrigeration Limited, of Dublin, Cork and Limerick, through the provision of a comprehensive range of products and services, has become one of the leading operators in the field of commercial and industrial refrigeration.

Specialising in the supply, installation and servicing of high quality refrigeration equipment, Cross currently holds agency for a number of leading ranges. These include Craig-Nicol frozen foods and provisions display cabinets, Husqvarna ice-cream and frozen foods display cabinets, Taylor soft ice-cream machines, Foster refrigerated catering equipment, Colbrook display equipment and Revco...
Should he be in search of air conditioning and refrigeration equipment, he'd be taken straight to Walker Air Conditioning. Because Walker Air Conditioning — your local Carlyle distributor — is the leading air conditioning equipment supplier in Ireland, in Scotland and in northernmost England; and because Carlyle, with over 4000 different products, is itself the world's biggest and best-selling range of air conditioning and refrigeration equipment. For top quality products backed by top quality pre- and after-sales service throughout Ireland, in Scotland and in northernmost England, make straight for the leader: Walker Air Conditioning.

Walker Air Conditioning Limited

Dublin: Finglas Road, Dublin 11 Phone: Dublin 300844 Telex: 4862
Belfast: 9a Cherryhill Road, Dundonald, Belfast BT16 OJH
Phone: Dundonald 5235 Telex: 747681
Glasgow: Washington Road, Unit 10B, Abbotsinch Industrial Estate
Paisley PA3 4ET Phone: Glasgow 887 0551 Telex: 779406
Leaders in Industrial Refrigeration

* LARGE COLD STORE
* FISH PROCESSING
* FOOD PROCESSING
* MEAT PROCESSING

*CROSS REFRIGERATION Ltd*

25 COOKSTOWN ESTATE, TALLAGHT, CO. DUBLIN. TEL. 01-511915
MALLOW RD., CORK 021-502321
17 ROXBORO SHOPPING CENTRE, LIMERICK 061-47415

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G. B. Services Ltd. THE SQUARE, BALLINCOLLIG, CORK
ultra low temperature refrigeration equipment.

Employing its own planning and design staff, Cross has the capacity to carry through projects from the initial drawing stage to final commissioning. The company's own manufacturing and assembly facilities ensure control over the quality of work and materials employed in projects requiring these services. Refrigeration applications in which Cross is currently involved include commercial warehousing, meat and fish processing, hotel and catering industry, bakery industry, supermarkets and shops and industrial process chilling.

Cross has completed installations in some of Ireland's major developments including the 3 Guys complex at Tallaght, Blooms Hotel, Musgrave Cash and Carry, Mitchelstown Creameries, Pfizer and Lydon House.

For further information please contact Cross Refrigeration (Ireland) Ltd., 25 Cookstown Estate, Tallaght, Co. Dublin. Tel: 511915.

ICI Ireland

ICI manufacture 'Arcton' refrigerants and these are stocked in Ireland. RSL (Ireland) Ltd are an authorised 'Arcton' distributor, backed by ICI technical service, expertise and literature. They offer a nationwide delivery service.

Information on 'Arcton' refrigerants and details concerning supplies are available from ICI Ireland Ltd., 5-9 South Frederick Street, Dublin 2, (Telephone 765807/Telex 5140) or RSL (Ireland) Ltd, 48 Robinhood Industrial Estate, Clondalkin, Co Dublin (Telephone 508011).

Southern Refrigeration

The Southern Refrigeration Group comprising Southern Refrigeration Ltd., SR Thermoclod Ltd., and SR Air Conditioning Ltd., handle an extensive range of equipment for refrigeration, insulation and air conditioning.

From York Division of Borg Warner Ltd., with whom we have an association going back over 30 years — liquid chilling, air and water cooled, reciprocating and turbo, packaged, blast freezing and storage equipment, heat pumps, air to air, air to water, as recently supplied for swimming bath heating and air conditioning.


Insulation of the traditional panel, pre-fabricated and modular systems in all materials.

Air conditioning for comfort cooling, industrial process controlled environment, heat pumps, air to air, air to water.

Further information from Southern Refrigeration Ltd, 149 North Strand, Dublin 3. Tel: 749251.
O’Gorman

Following major re-organisation and the adoption of a planned expansion programme, O’Gorman (I) Ltd, have in recent months, been appointed distributors in Ireland for the following equipment ranges:

Cole liquid chillers for both air conditioning and process applications — the Keep-Rite range of domestic and commercial packaged air conditioners, the Norcool range of bottle coolers as supplied to Guinness Group Sales.

Recognised as one of the major commercial refrigeration contractors in Ireland, O’Gorman have now successfully extended their field of operations into industrial refrigeration with installations planned for 1979 of up to 150 H.P. refrigeration sets.

Further information from O’Gorman (Ireland) Ltd., Unit 13, Dublin Industrial Estate, Dublin 11, Tel: 300977.

Manotherm

Manotherm, the Walkinstown instrument and control specialists, offer a wide choice of products in the refrigeration field, some of which are briefly featured here:

Type P70 low pressure refrigeration control — Rugged, dependable design. Direct reading scale; up-front wiring and space-age power elements. Surprisingly reasonable cost.

Type V46 water regulating valve — The standard of the industry for over 30 years. Exclusive internal design takes the roughest field conditions in stride. Repairs easily accomplished on the job. All sizes immediately available from authorised wholesalers across the country.

Type A72 cooling tower control — The only control designed expressly for this tough job. Heavy duty 2-pole contacts, weather tight enclosures, neoprene coated bulb and power element which will resist chemicals, cleaning solutions, bad water conditions. Models available to maintain proper head pressure on either forced draft or atmosphere type cooling towers.

Type A19 remote bulb temperature control — An extremely compact temperature control to fit any refrigeration or air conditioning application. Small bore cap tubing and mini-diaphragm contribute to precise control with rapid response to temperature changes. Concealed differential adjuster, SPDT contacts, 16 Amp ratings, wide choice of ranges and on-the-job adjustable limit stops.

Type A19 space thermostat — Same compact control as above for space temperature control, walk-in boxes and similar applications. Rugged bulb is rigidly and securely mounted.

Type P28 lube oil protection control — The latest in lube oil protection controls from Penn... the people who designed the first one over 35 years ago. Built with the same space-age power elements as the P70. The P28 will handle crank case heaters, provides an alarm circuit and will directly replace earlier model, the Penn Type 275.

For comprehensive details on all these products contact Manotherm Ltd, 4 Walkinstown Road, Dublin 12, (Tel: 504025).

RSL

RSL are one of the largest suppliers of refrigeration and air conditioning equipment, controls and specialist tools. Some of the products distributed by RSL are Bitzer Compressors, Alco controls, Ranco controls, Yellow Jacket and Robinair test equipment, Consort Roten­
ergers, Eclipse copper fittings and Insul pipe insulation.

Further information from: RSL (Ireland) Ltd., 48f Robinhood Industrial Estate, Clondalkin, Co Dublin. Tel: 508011.

Carlyle

Walker Air Conditioning Limited, Dublin, authorised distributor of Carlyle air conditioning and refrigeration equipment throughout Ireland, Scotland and Northern England, has introduced a new refrigerant-to-water heat exchanger designed for use with an outdoor condensing unit to provide chilled water for air conditioning.

‘Chillermate’ is suitable for light commercial application and may also be applied to process cooling situation where exceptionally close temperature control of chilled water is required.

Available with nominal capacities ranging from 7 to 14 kW and from .25 1/sec to .82 1/sec, the units fit under Carlyle’s ‘Round’ condensing units. They may be installed remotely from the unit, mounted on an inside or outside wall or adjacent to the condensing unit. Factory-

installed refrigerant tubing saves on installation time.

The Chillermate housing measures 23 cm high and contains a tube-in-tube heat exchanger for use with either a water or water/glycol solution.

Further information from: Walker Air Conditioning Limited, Dublin Industrial Estate, Finglas Road, Dublin 11.

Hammond Refrigeration

Hammond distribute Presticold Searle Refrigeration products which include hermetic and semi-hermetic compressors and condensing units, evaporators and condensers.

Fuju Koki, automatic controls for use in heating cooling and air conditioning industries.

Scotsman automatic cube and flake ice machines. The new Scotsman ACM25 automatic cube ice machine does not require plumbing or waste connections.

Halsey Taylor drinking water fountains. UPO Finland, display cabinets for self service and supermarkets. Sadia Aircool, Foster and Westgate high and low temperature service cabinets.

For further information contact Hammond Refrigeration Ltd., 111 Pearse Street, Dublin 2. Tel: 775861.

Hall-Thermotank

Hall-Thermotank who are part of the A.P.V. group of companies manufacture a wide range of refrigeration and air conditioning products such as chillers, water cooling towers, air handling units and air diffusion equipment.

Hall compressors including the new Hall Skrew. Deltaclima range of air handling units (previously known as Paracon range).

Hall-Thermotank Ireland provide a comprehensive range of products in the air conditioning field backed up by an expert service engineering team and spare parts department.

For further information contact Hall Thermotank Ireland Ltd., Hall House, Main Street, Rathcoole, Co Dublin. Tel: 580311/580477.
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