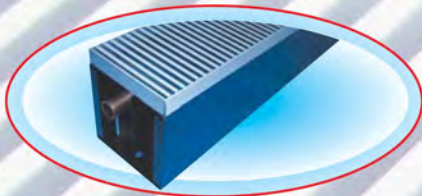




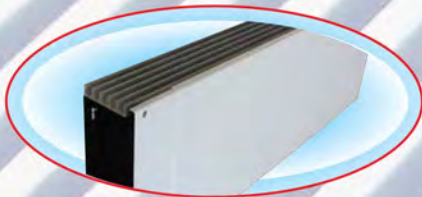
FRASER ENGINEERING (UK) LIMITED

Specialists in trench, perimeter & radiant panels

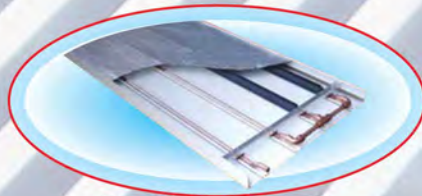
New supply,
refurbishments
& repairs



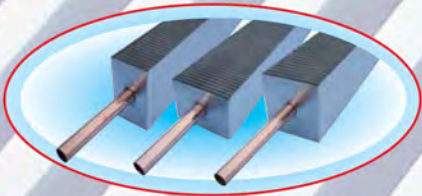
Trench



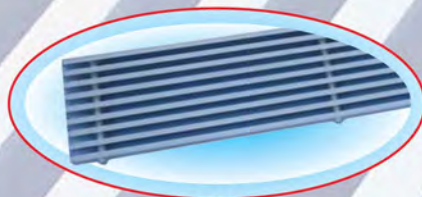
Perimeter



Radiant Panels



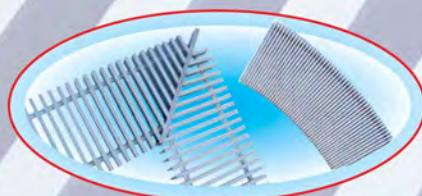
Heating Elements



Grilles



Stainless Grilles



Specials



Telephone
01233 733308

Facsimile
01233 733883

Website
www.feukltd.com

Sample Calculations for Heat Output

L.T.H.W floor system required to provide a heat output of 3000W. Maximum run length 6m. Entering water temperature (e.w.t.) = 82°C. Leaving water temperature (l.w.t.) = 71°C. Entering air temperature (e.a.t.) = 20°C.

1.) CALCULATE CORRECTION FACTORS

Outputs are based on testing performed at an average water temperature of 80°C, e.a.t. 20°C. To adjust these outputs for different conditions correction factors must be applied.

ΔT correction:

$$\Delta T = \frac{(e.w.t. + l.w.t.)}{2} - e.a.t. = \frac{82+71}{2} - 20 = 56.5^\circ$$

Now look up 56.5°C on graph 1 and note correction factor ...0.9

Mass flow correction:

$$\text{Mass flow rate (kg/s)} = \frac{\text{heat output}}{(e.w.t.-l.w.t.) \times \text{specific heat cap of water}} = \frac{3000}{11 \times 4187} = 0.065 \text{ kg/s}$$

Now look up 0.065 on graph 2 and note correction factor ...0.94

Total correction factor to be applied = ΔT correction x mass flow rate correction = $0.9 \times 0.94 = 0.846$

2.) CALCULATE UNCORRECTED OUTPUT REQUIRED

Active (i.e. finned) element length is 90% of actual casing length. In this example the maximum active length = $0.9 \times 6\text{m} = 5.4\text{metres}$. This means the required output per metre of active element = $\frac{3000}{5.4} = 556 \text{ W/m}$

This is an actual output and needs to be transformed to an uncorrected output so a selection can be made from the output table.

$$\text{Uncorrected output} = \frac{\text{Actual output}}{\text{Total correction factor}} = \frac{556}{0.846} = 657 \text{ W/m}$$

3.) UNIT SELECTION

From output data table select an output equal to or higher than required. In this case an NN unit should be selected.

Maximum uncorrected output = active element length x uncorrected output/metre x total correction factor = $5.4 \times 657 \times 0.846 = 3,001 \text{ W}$

A decision can now be made as to whether to have a shorter run or to use a T.R.V. to control output. Although the amount of active element could be reduced, this is not recommended as it is desirable to have even heating over the whole run.

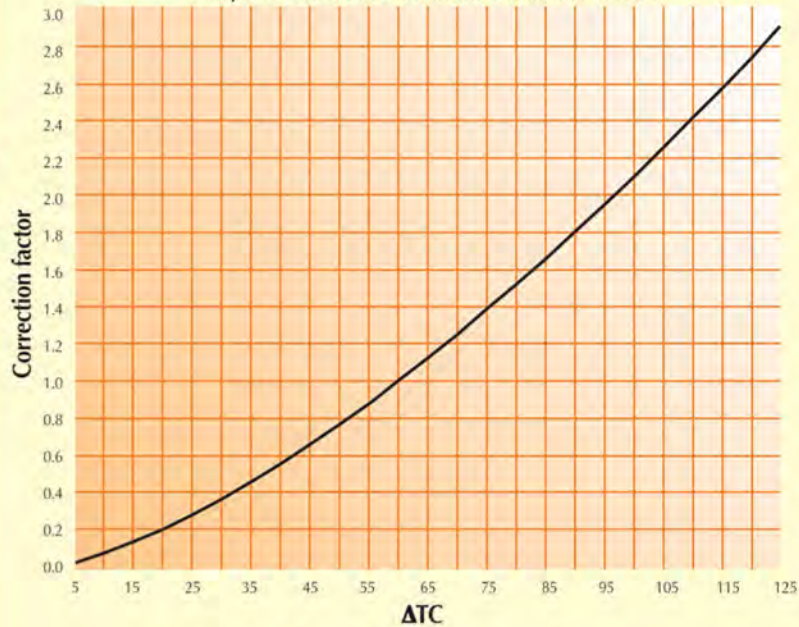
TO CONVERT MASS FLOW TO VELOCITY

$$\text{Water velocity (m/s)} = \frac{\text{mass flow (kg/s)}}{\text{Tube factor T}}$$

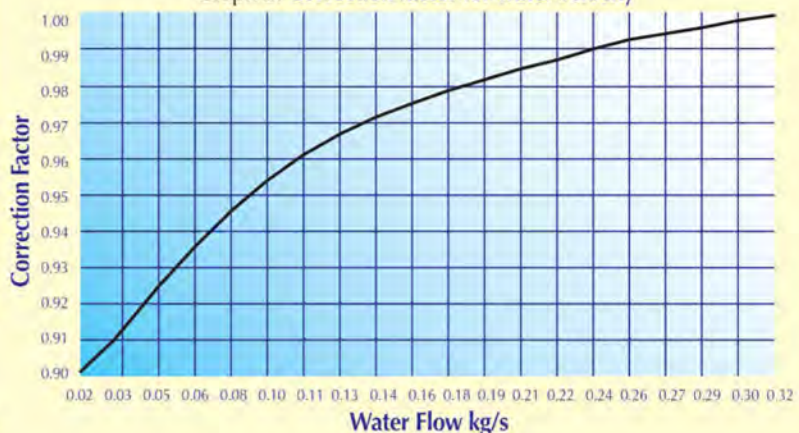
Tube Dia (mm)	Factor T
15	0.14
22	0.31
28	0.52

Correction Graphs

Graph 1: Correction factor for variations in $\Delta T C$

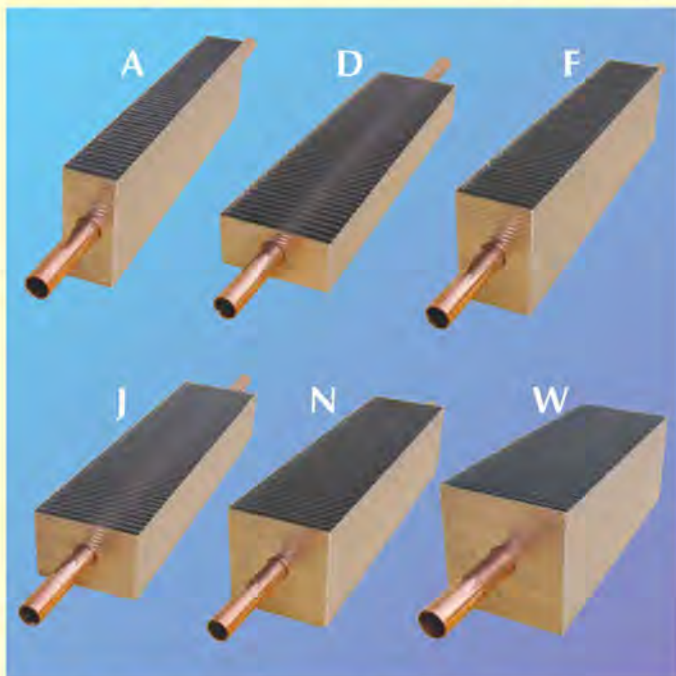


Graph 2: Correction factor for water velocity



Finned Elements

L.P.H.W. elements manufactured from 1050 'O' aluminium, mechanically bonded to copper tubing.



Type A 76mm x 35mm
Type D 35mm x 76mm
Type F 76mm x 50mm

Type J 50mm x 76mm
Type N 76mm x 76mm
Type W 108mm x 108mm

Trench Output Data

ELEMENT TYPE	OUTPUT* BASED ON TESTING TO BS 3528 (W)	OUTPUT* BASED ON TESTING TO BS EN442 (W)	AVAILABLE TUBE DIAMETERS
A	250	175	15/22
D	250	175	15
F	322	252	15/22
J	322	252	15/22
JJ/Low	380	358	15/22
N	480	385	15/22/28
AF	570	540	15/22
W	645	530	22/28
FF	645	580	15/22
JJ	645	600	15/22
AN	730	625	15/22
FN	820	720	15/22
NN	960	800	15/22/28
WW	1290	1060	22/28

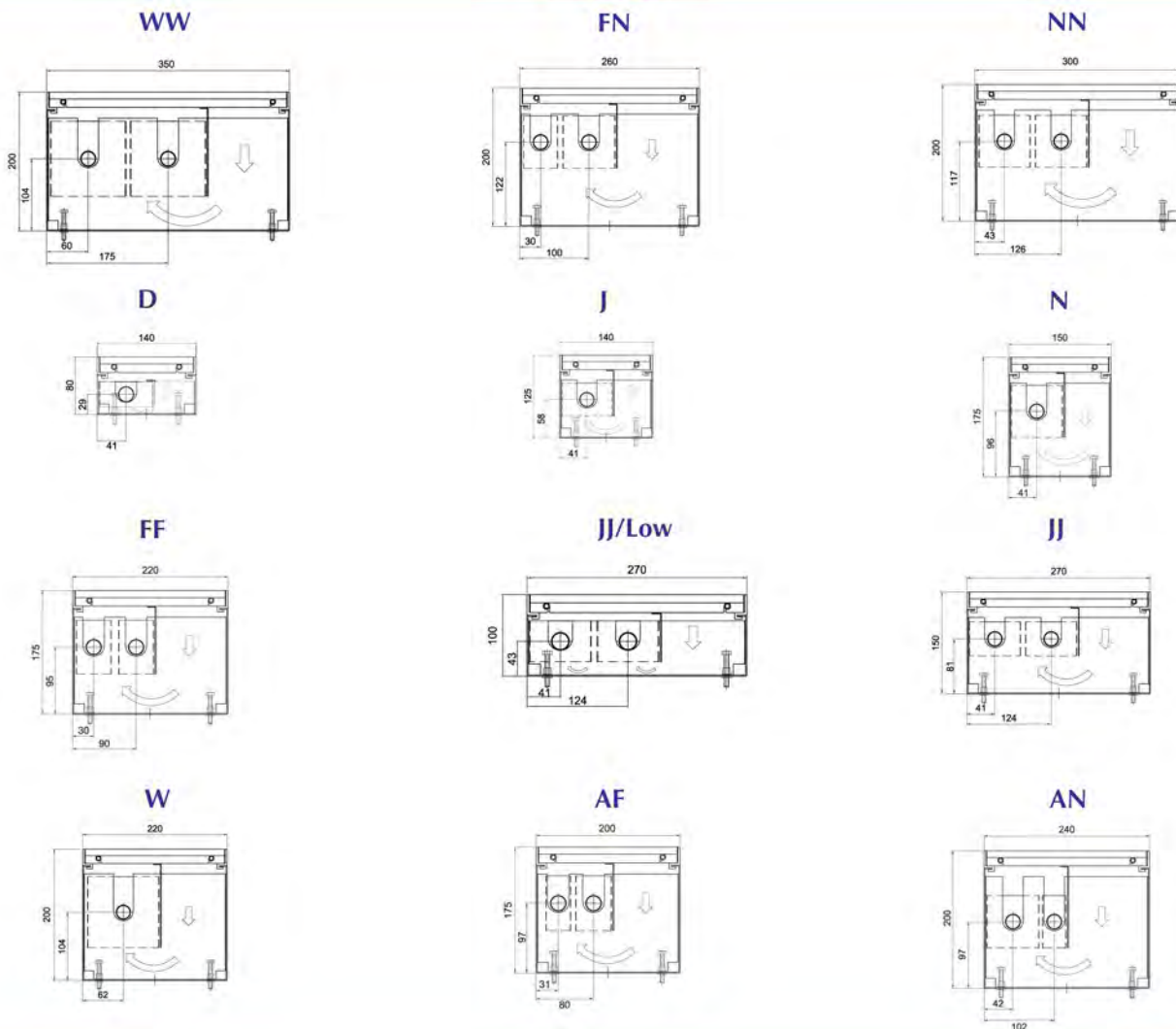
Exploded Trench Heating



Fan assisted and electric trench and perimeter also available. Please contact us for details.

* Outputs in Watts per metre of active element at 60 ΔT, 20°C ambient and 0.31 kg/s mass flow

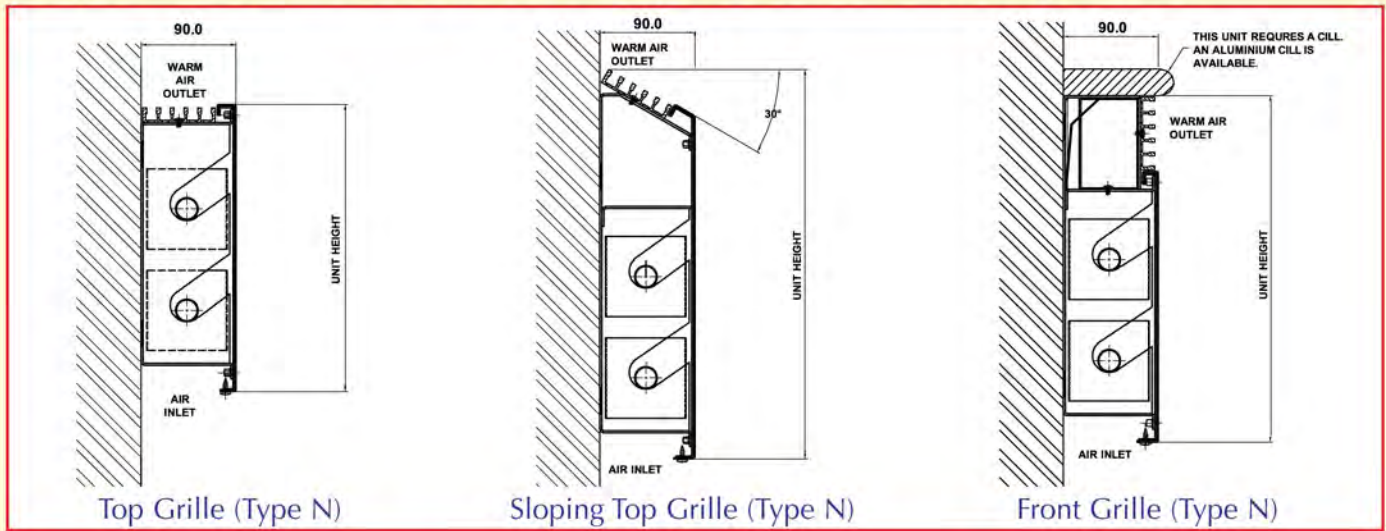
Casings



PERIMETER OUTPUT DATA* BASED ON TESTING TO BS 3528					
UNIT HEIGHT	SINGLE OR DOUBLE ELEMENT	ELEMENT TYPE			
		A	F	N	W
150	S	300	428	684	-
200	S	300	523	739	898
250	S	320	554	784	954
250	D	355	616	872	-
300	S	335	582	825	1002
300	D	425	733	1037	1165
350	S	350	607	860	1044
350	D	425	733	1037	1261
400	S	365	630	892	1082
400	D	450	784	1112	1350
450	S	375	650	920	1119
450	D	480	833	1180	1434
500	S	385	668	947	1151
500	D	505	880	1245	1513
550	S	395	686	972	1180
550	D	535	923	1307	1589
600	S	405	703	994	1208
600	D	560	966	1367	1661
650	S	415	718	1016	1235
650	D	580	1006	1425	1731
700	S	425	733	1036	1260
700	D	605	1045	1479	1798

PERIMETER OUTPUT DATA* BASED ON TESTING TO BS EN442					
UNIT HEIGHT	SINGLE OR DOUBLE ELEMENT	ELEMENT TYPE			
		A	F	N	W
150	S	224	386	547	-
200	S	240	418	591	718
250	S	256	443	627	763
250	D	284	493	698	-
300	S	268	466	660	802
300	D	312	541	764	932
350	S	280	486	688	835
350	D	340	586	830	1009
400	S	292	504	714	866
400	D	360	627	890	1080
450	S	300	520	736	895
450	D	384	666	944	1147
500	S	308	534	758	921
500	D	404	704	996	1210
550	S	316	549	778	944
550	D	428	738	1046	1271
600	S	324	562	795	966
600	D	448	773	1094	1329
650	S	332	574	813	988
650	D	464	805	1140	1385
700	S	340	586	829	1008
700	D	484	836	1183	1438

* Outputs in Watts per metre of active element at 60ΔT, 20°C ambient and 0.31 kg/s mass flow



Exploded Perimeter Heating

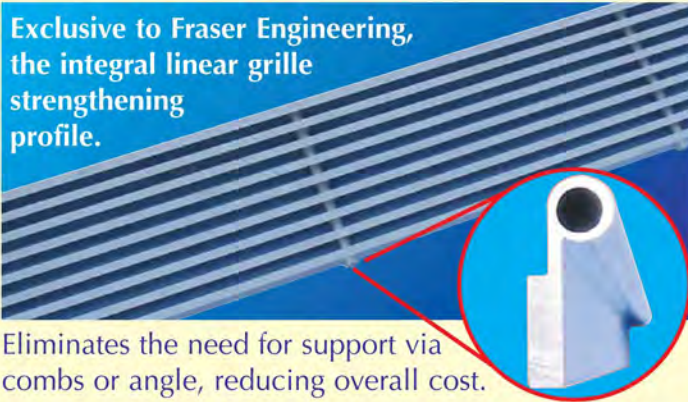


Ref	DIMENSIONS (MM)		
	Depth	Height	Tube Dia.
A	60	150-750	15,22
F	60	150-750	15,22
N	90	150-750	15,22,28
W	120	200-750	22,28

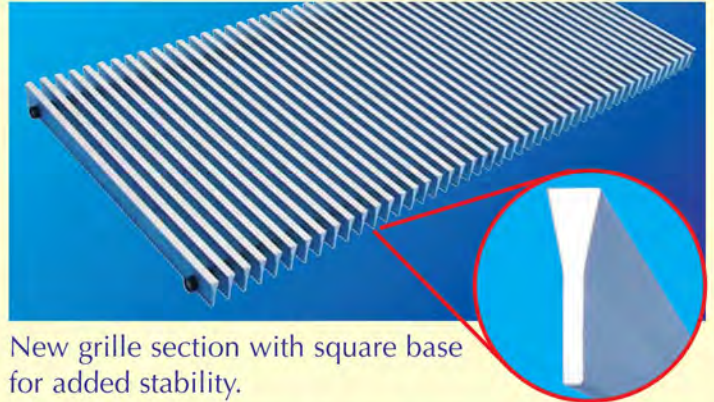
Note: Dimensions used to select outputs.
 For Sloping Top Grille: Use unit height - 50mm
 For Front Grille: Use panel height NOT unit height
 If integral cable duct is required, deduct height of duct.

New Products and Improvements

Exclusive to Fraser Engineering, the integral linear grille strengthening profile.

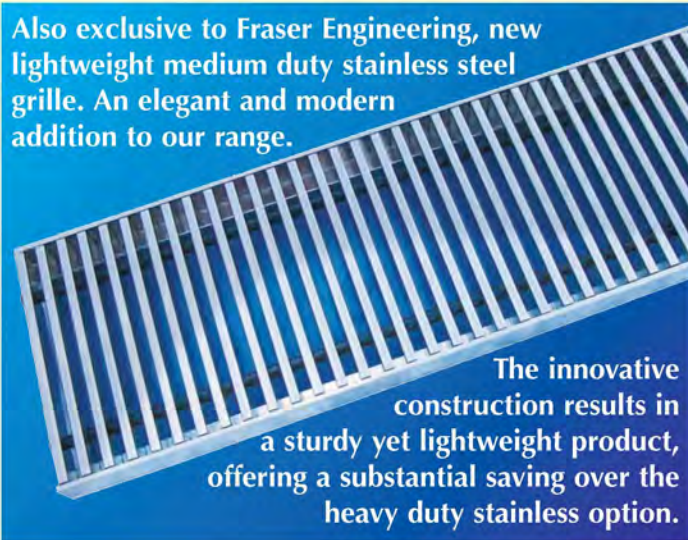


Eliminates the need for support via combs or angle, reducing overall cost.



New grille section with square base for added stability.

Also exclusive to Fraser Engineering, new lightweight medium duty stainless steel grille. An elegant and modern addition to our range.



The innovative construction results in a sturdy yet lightweight product, offering a substantial saving over the heavy duty stainless option.

Contract Examples

A few examples of larger contracts Fraser Engineering have supplied

- WELSH ASSEMBLY
- BP HQ
- VODAPHONE HQ
- CANARY WHARF DS4
- MERRILL LYNCH HQ
- PFIZER HQ
- M.O.D. WHITEHALL
- D.V.L.A.

Typical Applications



External stainless grille.



Radiant panel



Internal aluminium 3 core rigid grille.

Heavy duty stainless grille.



Front inlet/outlet perimeter

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Manufacturer reserves the right to change any product specification without prior notice.