

915 MHz MICROWAVE TEMPERING TUNNEL

TMW 35



Multiple microwave inlets crossed above & below
TEMPERING OF FROZEN BLOCKS
Capacity: 1 t/h to 1.5 t/h from -20 °C to -4 °C / -2 °C
Maximum microwave power 35 kW

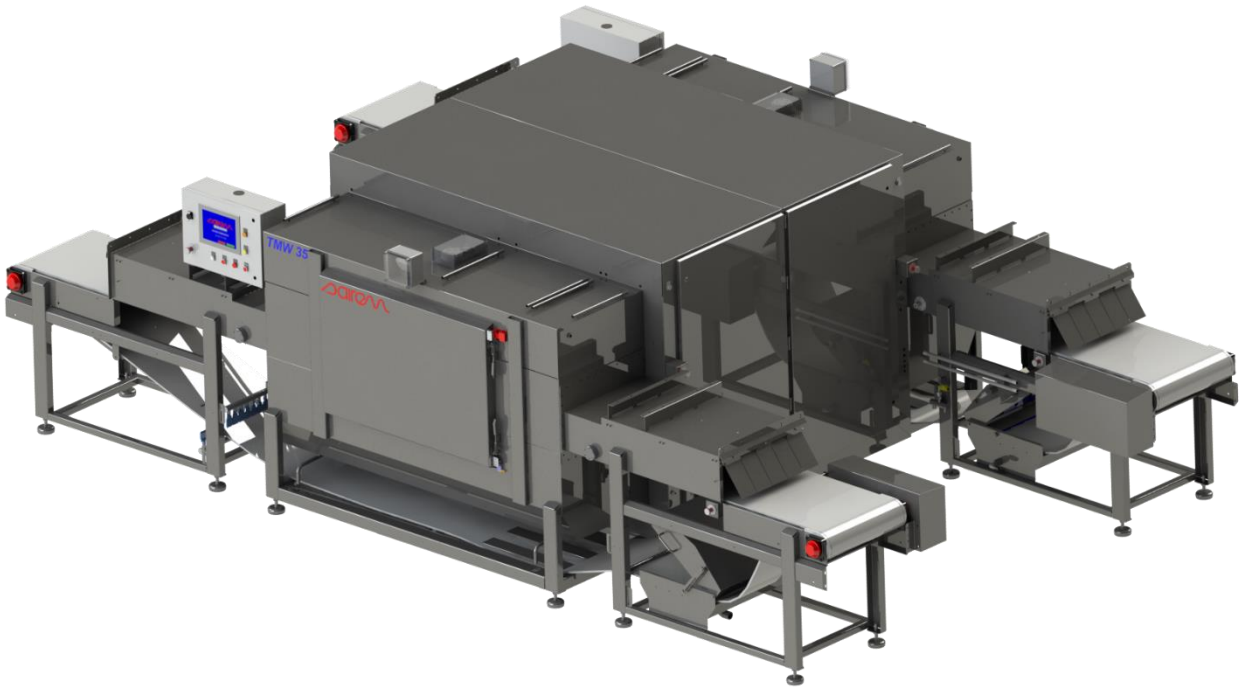
ADVANTAGES

- ✓ **FAST:** very short time of treatment, high production flexibility,
- ✓ **ECONOMIC:** product gain from 5 to 10 %, continuous flow operation, **minimum floor space**, fast return of investment;
- ✓ **HOMOGENEOUS:** large microwave cavity, high residence time under MW, multi microwave power inlets around the product, built-in proprietary structures for the uniform repartition of microwaves;
- ✓ **RELIABLE:** very good control of **final temperature**;
- ✓ **HYGIENIC:** no **bacteriological** growth, complies with all hygiene regulations and standards, keep taste and texture **qualities**;
- ✓ **FLEXIBLE:** can be used for tempering of meat, fish, vegetables, **packed** (carton without metallic staple or plastic film) **or not packed**.
- ✓ **COMPACT** : standalone tunnel with integrated 35 kW microwave generator

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Tunnel TMW 35



Example of two TMW35 side by side (outlet view), with cleaning belt option

The distinctive feature of the TMW 35 tunnel is the use of the microwave technology to achieve the best tempering homogeneity while maintaining a good microwave efficiency.

The very low floor space, the length under microwaves (residence time) and the crossed coupling of microwaves above and below the blocks, are a few examples of the solutions used to conciliate capacity, flexibility, efficiency and homogeneity.

TEMPERING CAPACITIES

The TMW 35 offers a tempering capacity between 1 t/h and 1.5 t/h from - 20 °C to a final temperature between - 4 °C and - 2 °C; the capacity is calculated to temper frozen blocks with standard dimensions 600 mm x 400 mm x 200 mm and a weight of about 20 / 25 kg.

The tempering capacity is variable and depends on the final required temperature and on the product (meat, fish, vegetables, fruits, butter, etc. Figures below show these variations.

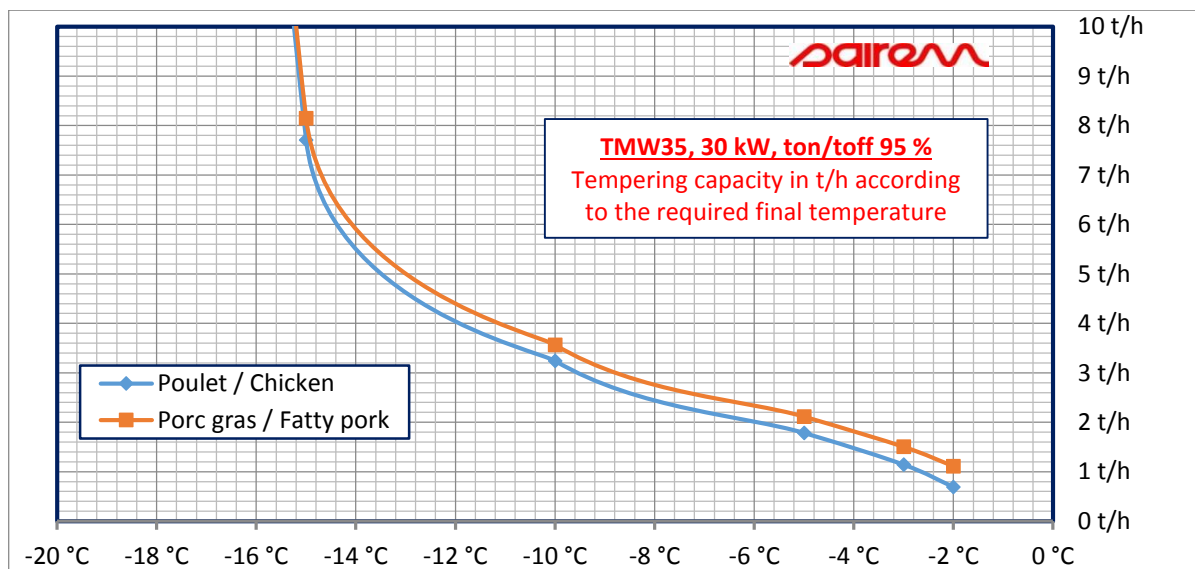
The data in the charts are calculated for the TMW 35 operating at 30 kW power, with t_{on}/t_{off} optimum at 95 %, for blocks with regular size and weight 25 kg (600 mm x 400 mm x 200 mm) and for a starting temperature around -20 °C/-18 °C.

t_{on}/t_{off} is the microwave utilization within 1 hour including loading/unloading; the optimum is 95 %.

OBSERVATIONS

- If fatty products are to be processed, fat ought to be very homogeneously distributed in the block, otherwise the limit temperature for homogeneity is - 4 °C;
- At the final temperature of - 4 / - 2 °C the blocks are cold enough to be processed: dicing, grinding, slicing...
- The maximum microwave power which can be used in processing is limited by the products and not the tunnel. Recipes power vs. time must be chosen according to the compromise between capacity and homogeneity of heating.

Fig.1. Tempering capacity vs. desired final temperature

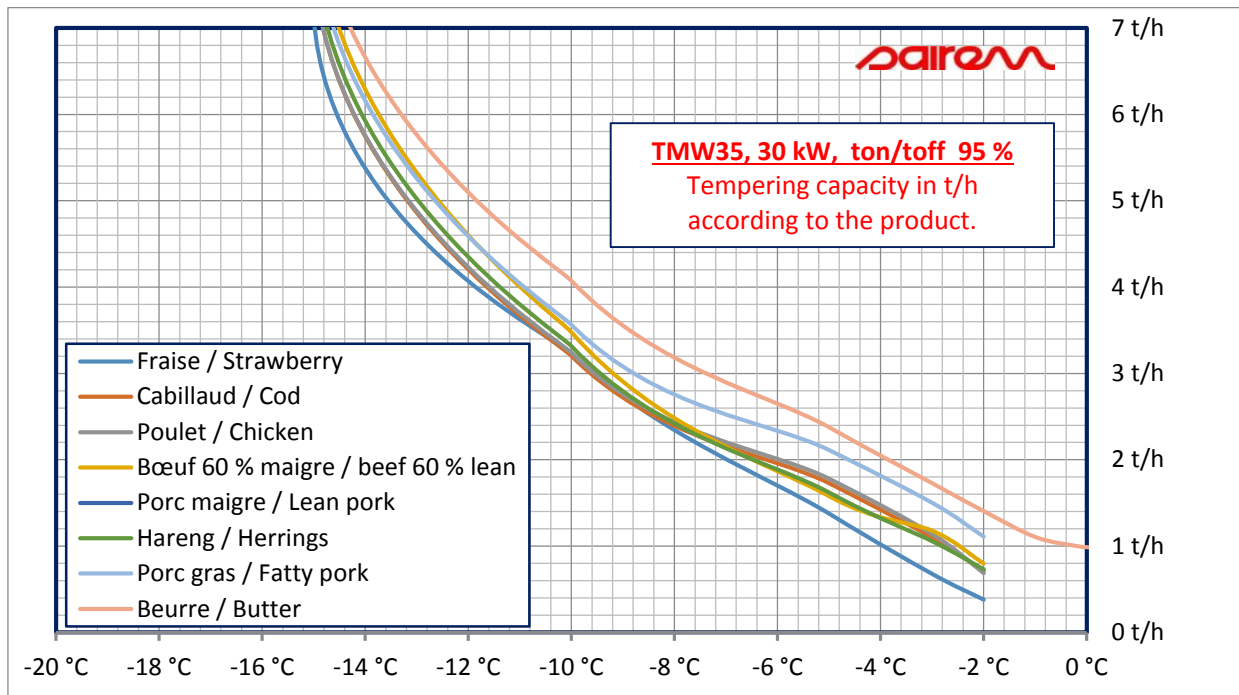


Example: Chicken ~ 1.8 t/h from -18 °C to -5 °C or ~ 1.15 t/h from -18 °C to -3 °C.

Example: Fatty pork ~ 2.1 t/h from -18 °C to -5 °C or ~ 1.5 t/h from -18 °C to -3 °C.

It has to be noted that a starting temperature at -20 °C or -18 °C has almost no effect on the tunnel capacity if temperature is homogeneous in the whole product.

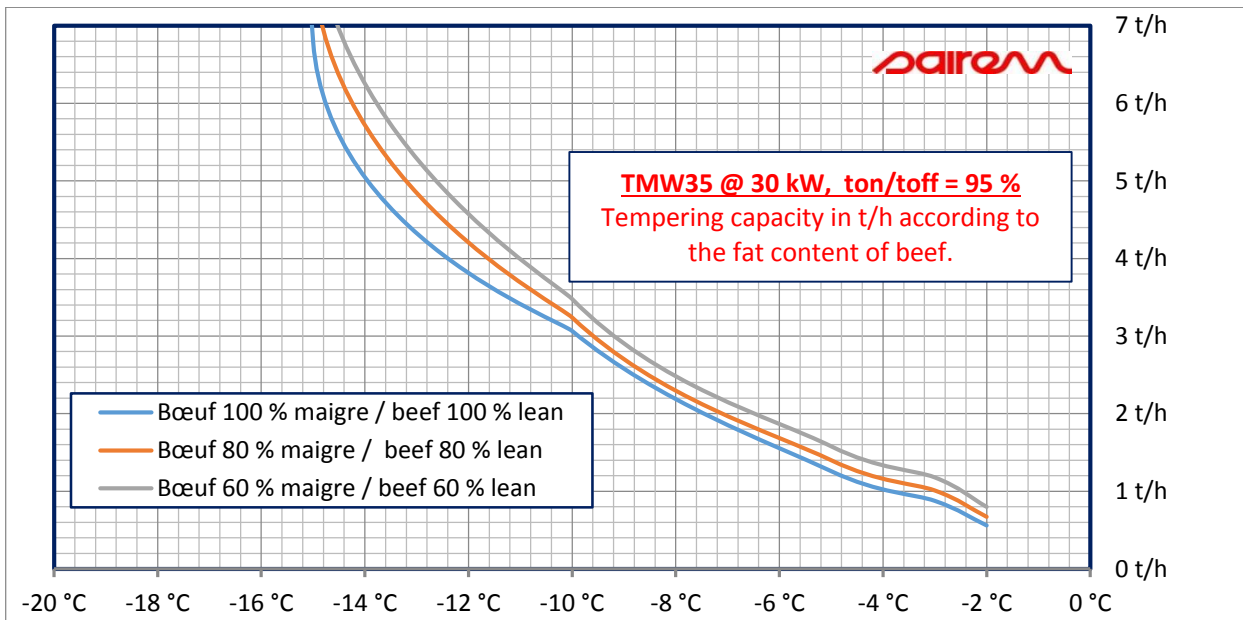
Fig.2. Tempering capacity vs. product type



Thawing capacity is highly variable according to the product.

Examples: butter (1.8 t/h at -3°C) or beef 60 % lean (1.15 t/h at -3°C) for the same final temperature.

Fig.3. Tempering capacity vs. fat content



Example from -18°C to -3°C: capacity ~ 1.2 t/h for beef 60 % lean, or ~ 0.85 t/h for beef 100 % lean

Some examples of blocks processed with the TMW 35



Beef 25 % lean

Capacity: ~ 1500 kg/h from -18 °C to -4 °C



Turkey filets

Capacity: ~ 1200 kg/h from -18 °C to -4 °C / -2 °C
or capacity: ~ 750 kg/h from -18 °C to -3 °C / -1.5 °C



Pork shoulder, 10 to 15 % fat

Capacity: ~ 1000 kg/h from -18 °C to -3 °C / -1 °C



Chicken skin

Capacity: ~ 1200 kg/h from -18 °C
to -3 °C / -1 °C

Conclusions

Capacity is highly variable if final temperature is -7 °C or -3 °C, or if meat is lean beef or fat pork. Such variations are linked to physical laws such as for example, latent heat of fusion.

Capacity varies according to the processed product (lean beef, pork...), its fat content and the final required temperature.

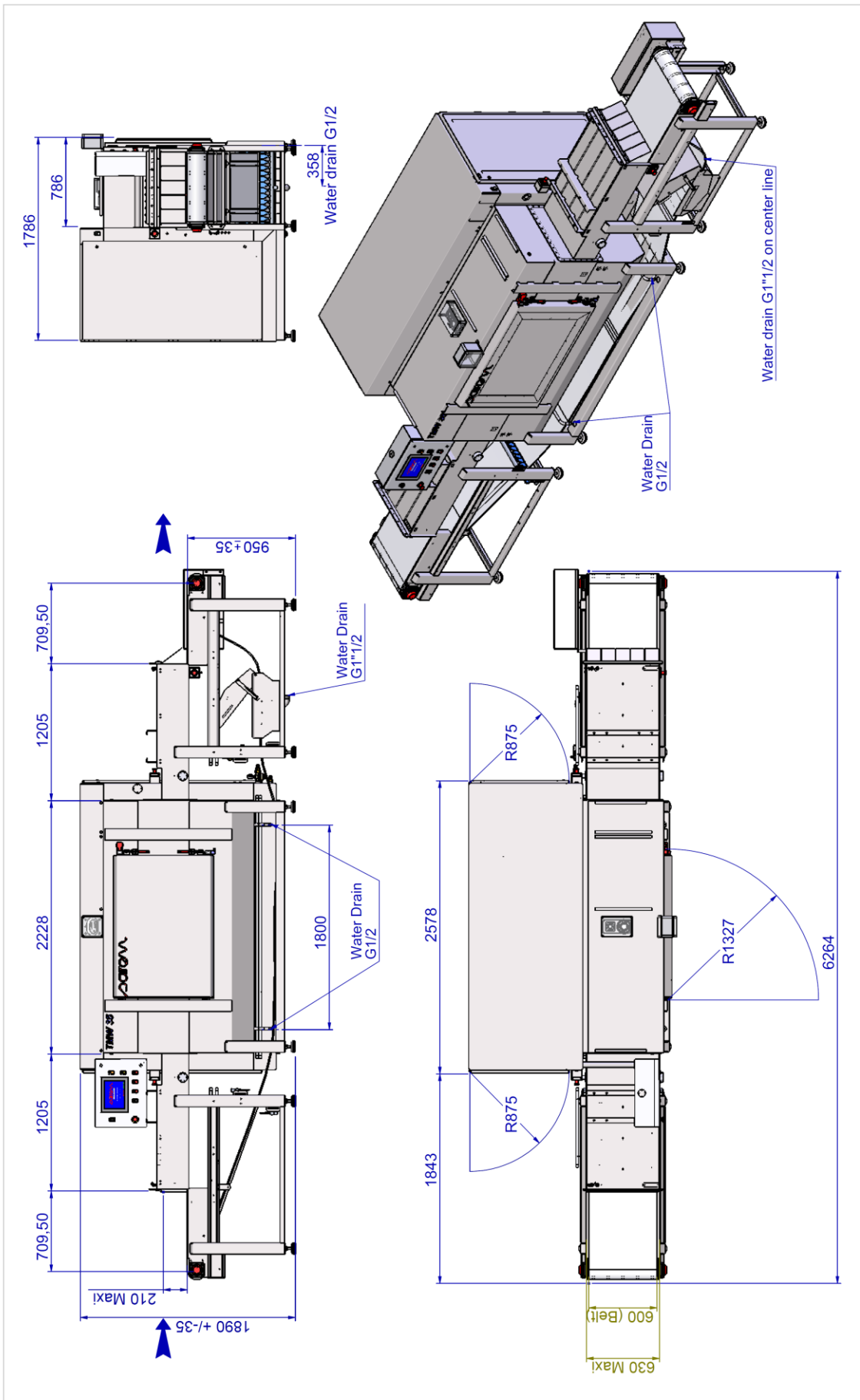
All the above charts are calculated for a TMW 35 operating under following conditions:

- Power of microwave generator at 30 kW
- T_{on}/T_{off} at 95 %
- Blocks or products with regular mass and shape
- Blocks or products regularly placed on the belt
- Starting temperature between -20 °C and -18 °C homogeneous in all the blocks or products

TECHNICAL CHARACTERISTICS

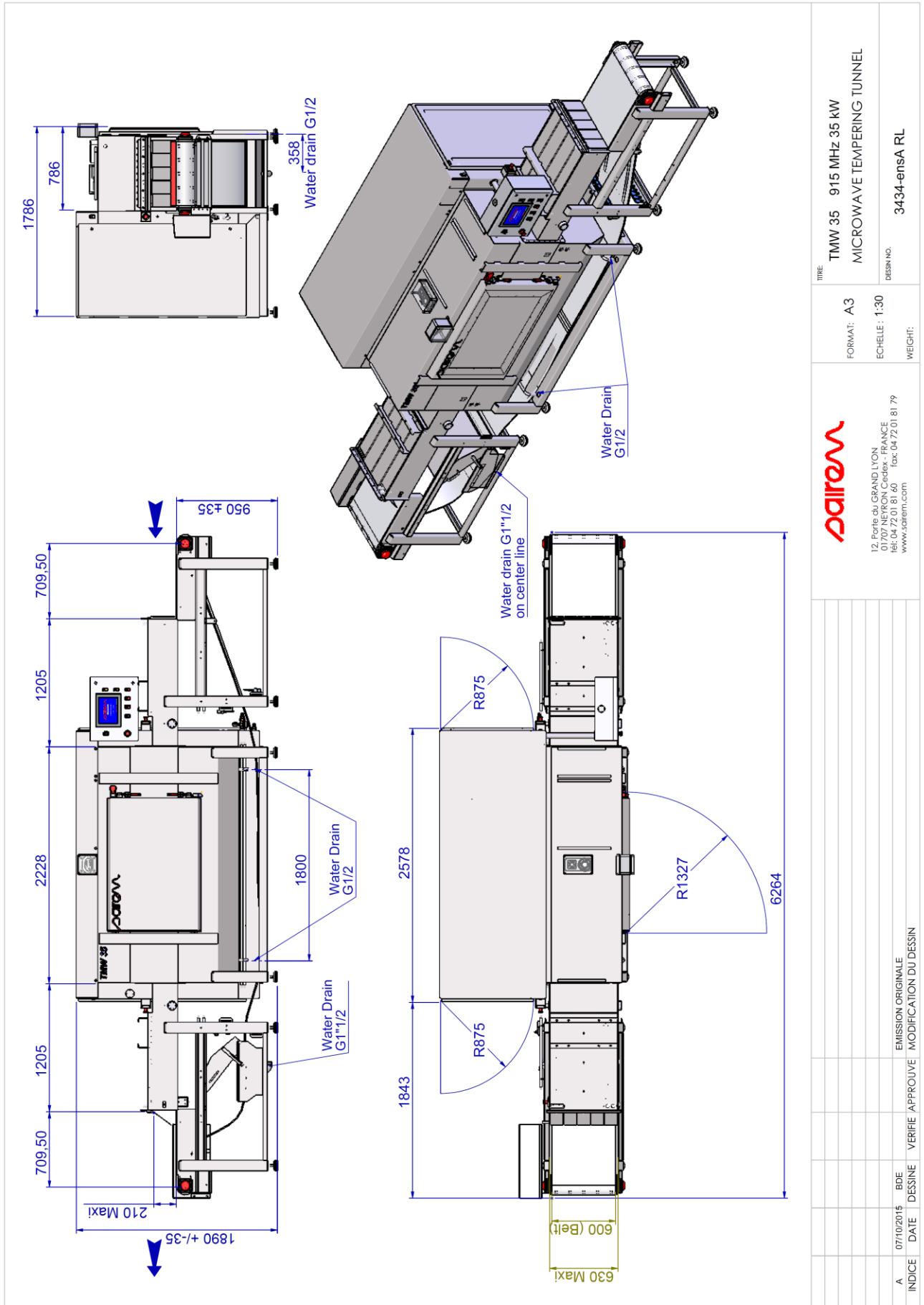
Reference	TMW 35
Construction	<p>Tunnel and microwave generator integrated in the same cabinet: 304 L stainless steel, chain conveyor belt in polyethylene, microwave door with $\frac{1}{4} \lambda$ choke, touch screen, microwave inlet above and below, automatic loading and unloading.</p> <p>Possibility to inverse the operation from right to left (RL) to left to right (LR). Microwave Generator cabinet is IP55 and equipped with a single 75 kW magnetron, electronic system and boards without any adjustment to make maintenance easier, high reliability.</p>
Tempering capacity	Depends on final temperature, product, fat content, see above charts.
Conveyor belt	<p>Flat top Intralox principle, width 600 mm, adjustable belt speed, operating height 950 mm.</p> <p>Belt direction has to be indicated on ordering: from the right to the left (RL) or adversely (LR).</p>
Max. size of blocks	<p>600 x 400 x 200 mm, 30 kg maximum per block.</p> <p>Option: maximum height 250 mm.</p>
Microwave frequency	915 MHz ; other frequencies are available according to specific regulations of each country.
Microwave power	35 kW maximum, adjustable from 10 kW to 35 kW.
HMI (Human Machine interface)	12" touch screen, multi-lingual, control of microwave power and belt speed, 50 programmable recipes, tunnel status, faults status, etc... Microwave start, emergency stop, etc.
Specific safety	<p>Option: a leakage detector ref. DFM signals any accidental leakage. It is a security for the operators.</p> <p>A smoke sensor detects a fire in the tunnel (for example a meat box blocked in the tunnel that could create a fire) and stops microwaves before injecting water via nozzles.</p>
Voltage & consumption	400 V, 3-phase + earth (no neutral), 50/60 Hz, 50 kVA at full power.
Cooling water	<p>Min. 30 L/min with differential pressure min. 3.5 bar, inlet water temperature 18 °C to 22 °C, power to dissipate 12 kW ; ES 1.5" gas female.</p> <p>Option: air/water chiller.</p>
Option belt washing/drying	System for belt washing/drying located near the tunnel output
Cleaning	Water jet inside the tunnel, evacuation under the tunnel
EC standards	<p>CE norms 'machines' (2006/42/CE)</p> <p>CE norms 'low voltage' (BT 2006/95/CE)</p> <p>CE norms 'electromagnetic wave' (CEM 2004/108/CE) and EN 55011.</p> <p>CE norms 'installations safety' (CEI60519-6 :2011).</p>
Size, weight	See drawing below, weight 1900 kg

TMW35 H210 mm Left / Right



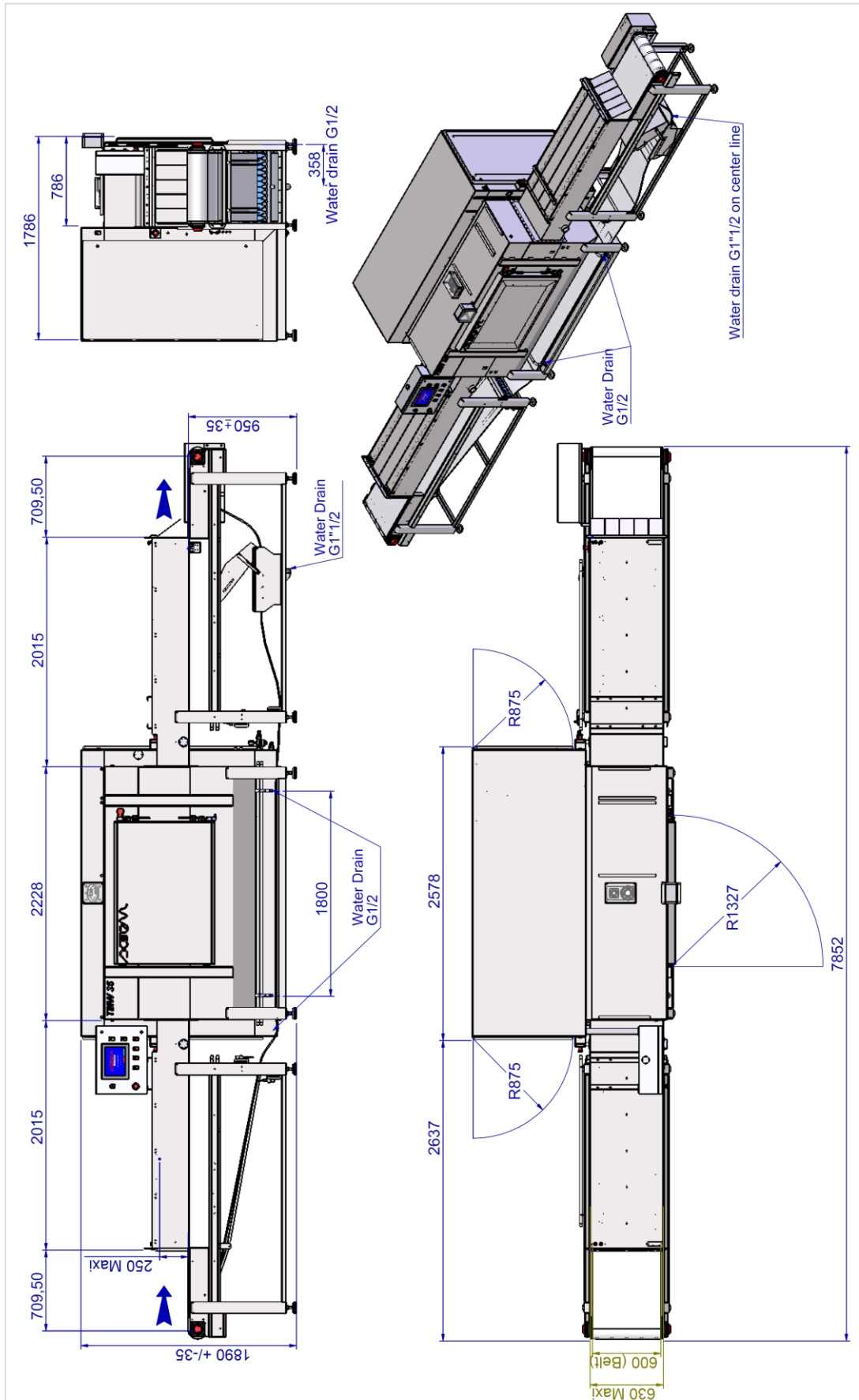
		saiREM		12, Porte du GRAND LYON 01707 NEYRON Cedex - FRANCE tél: 04 72 01 81 60 fax: 04 72 01 81 79 www.saiREM.com	
		TITRE:		TMW 35 915 MHz 35 kW MICROWAVE TEMPERING TUNNEL	
		FORMAT:		A3	
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TMW35 H210 mm Right / Left



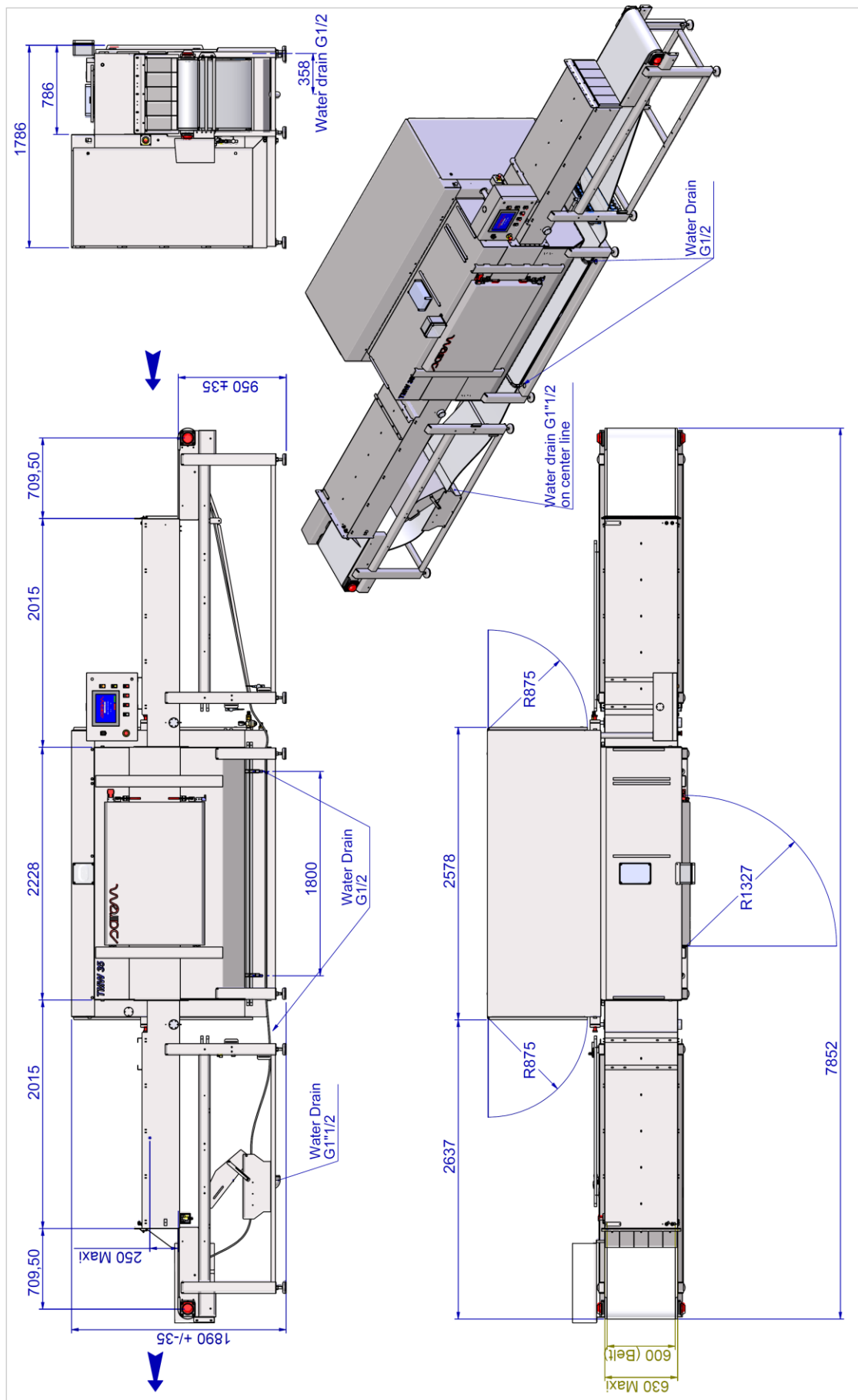
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TMW35 H250 mm Left / Right



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12, Porte du GRAND LYON 01700 NEYRON Cedex - FRANCE Tél: 04 72 01 81 60 Fax: 04 72 01 81 79 www.sairem.com		FORMAT: A3	DESIN NO: 3434-ENSA LR H250
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TMW35 H250 mm Right / Left



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