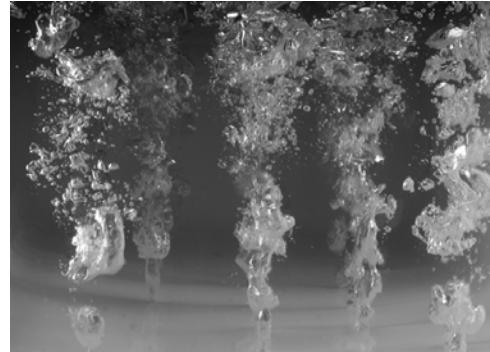


MTI WHITE PAPER

Air Baths: Fact and Fiction

Air baths have greatly increased in popularity within recent years for several reasons.

1. First of all, air baths, or thermo-air massage, is a newer technology than whirlpools.
2. Secondly, because air baths provide an overall gentler type of massage than whirlpools, the elderly can also enjoy and benefit from them, an important factor in light of the increasing elderly population in the US.
3. The third reason for the increased popularity of air baths is that many people believe that air baths are “cleaner” than whirlpools. They think that the two therapies are interchangeable and assume that because air baths do not use a pump and pipes, they cannot harbor elements that can breed bacteria.



Although this **third statement** represents a **fairly common perception**, it is **fundamentally and substantially incorrect** based on:

- A lack of understanding of the purpose and effects of air bath hydrotherapy in contrast to whirlpool hydrotherapy.
- Incorrect knowledge of the construction and operation of air bath systems compared to whirlpool systems.

The focus of this treatment is on air baths. To learn more about whirlpool hydrotherapy, system operation and cleanliness, go to mtiwhirlpools.com/products/whirlpools.html.

So let's separate fact from fiction and set the record straight.

What are air baths?

Air baths are a type of hydrotherapy that provides a light full-body massage. Air baths produce an effect of well-being throughout the whole body by stimulating the production of our natural analgesic hormones known as endorphins. Millions of tiny air bubbles cling to the skin and open the pores, drawing the capillaries to the surface and thereby increasing blood circulation and detoxifying the bather. Because the effect is stimulating but non-aggressive, the elderly can also enjoy and benefit from it.

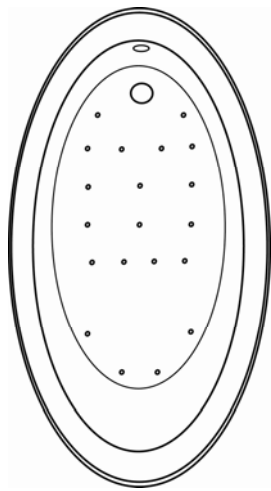
How do air baths work?

Air baths utilize a blower that generates millions of tiny air bubbles released through very small holes in the bottom area of the tub. **These bubbles are supposed to caress the body** as they move toward the surface of the water and revitalize the bather with a **light, full-body massage** to achieve the effects described above.

This means two things:

1. **Air baths can only provide their specific therapy if the air bubbles come in contact with the skin.** If the air bubbles have little or no contact with the body, then you have a lot of bubbles on the surface, which may look good, but they provide little therapeutic value. **The more contact that the air bubbles have with the body, the greater the therapy.**
2. **To achieve maximum contact of the air bubbles with the body, the air jets need to be positioned in the central part of the bottom area of the tub.** Why? **Air bubbles go straight up.** Think of a scuba diver's bubbles. They go straight up. They travel vertically, not horizontally. Put a small balloon filled with air underwater and slowly release the air. The bubbles will travel up, not sideways.

Engineering, construction and operation of an air bath system affect the quality of therapy provided:



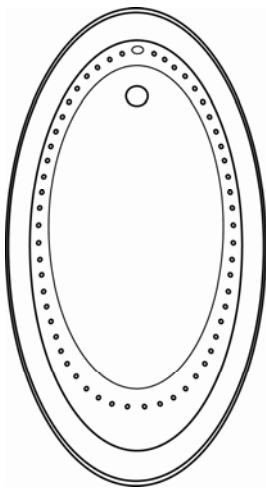
This is the **MTI** way.

The illustration to the left shows the **air holes positioned for maximum therapy**. They are positioned on the floor of the tub so that as the air is forced out and straight upward, there is **optimum** opportunity for the upward-traveling air streams to come in **contact with as much of the body's skin as possible**, thereby fulfilling their purpose, generating their desired effect and yielding the maximum therapeutic benefit.

In this configuration, the air streams are created by using air jets with built-in check valves, which allow the air to be output through the jets, but prevent water from returning through the jets into the air lines. A blower generates the forced air, which is distributed through a manifold with discreet air lines to the jets. This means of distribution permits **optimum uniformity of air force to the various jet locations** at the bottom of the bath tub for maximum therapy.



Air lines from manifold to jet locations.



This is the way of **most others**.

The illustration to the left shows an alternative configuration used by most manufacturers, where the air outlets are positioned around the perimeter of the tub. This more economical manufacturing approach is referred to as the "channel system", so named because the air is delivered to the air holes through an air "channel" that is created around the outside perimeter of the tub. This channel is generally made out of some type of tubing that is cut in half and affixed to the outside perimeter of the tub.

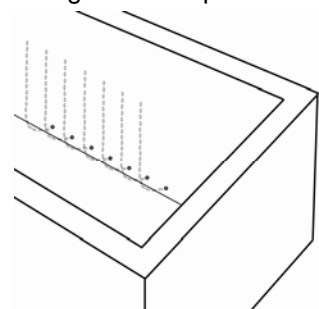
With the channel system a blower is attached to one end of the channel, and holes are drilled through the interior surface of the tub, through the fiberglass backing, into the air channel. As the air circulates around the outside perimeter of the tub, air is released through the holes.

There are **two distinct operating disadvantages of the channel system**, which **have a negative effect on the amount and quality of therapy** delivered:

1. Since the blower is attached to one end of the channel, **the force of the air distributed is not equal around the entire perimeter**. As might be expected, the farther away the holes are from the point of origin of the forced air, the lower the intensity of the air output through the holes. In other words, uneven air distribution resulting in **diminished therapy**. This is especially noticeable when the blower is operating at lower speeds.
2. Since the holes are located around the inside sides of the tub, the air bubbles produced will actually come in contact with only a portion of the body's skin. **The air comes out of the side holes horizontally and then goes vertical**. Even if the air streams are forceful enough to hit the skin before they go vertical, the **air streams** are still only **hitting the outside skin areas of the body, instead of enveloping all surface areas** of the body.



Cutaway showing the air bath channel affixed to the outside of the tub, with air holes drilled through from the inside wall.



Air streams come out horizontally and then bubbles go vertical.

SUMMARY: EFFECTIVE AIR BATH THERAPY

FICTION	FACT
All air baths are the same.	An air bath can only provide its intended therapy if the air bubbles come in contact with the skin. The more contact that the air bubbles have with the body, the greater the therapy.
An air channel is an effective means of delivering the air around the tub.	The force of the air distributed by a channel around the entire perimeter of the tub is not equal. The farther away the holes are from the point of origin of the forced air, the lower the intensity of the air output through the holes. Discreet air lines from source to jets provide optimum uniformity.
Positioning air holes on the sides of the tub is an effective way to implement air bath therapy.	Air bubbles rise vertically. Air streams coming from holes in the sides are horizontal and then the bubbles go vertical. They may contact only outside surfaces of body parts. Therefore, the best position for air bath jet placement is in the floor of the tub.
Positioning the air holes on the floor of the tub is not good because your body parts block the air streams.	Air bubbles coming from the floor are the ideal source location because the bubbles come in contact with and envelop <u>all surfaces</u> of body parts as the bubbles rise toward the surface of the water.

Bonus Benefits

Here are **2 Additional Benefits** of having the **air jets** positioned **in the floor** of the tub. The benefits have more to do with bather comfort than effective therapy, and they may not matter to some people. However, they deserve mentioning because they are characteristics exclusive to air baths engineered in this way.

1. Quieter Air Bath.

- This is about the sound of the bubbling air bath itself; **not** the sound of **the blower**, which can be attenuated in a number of different ways.
- As described above, positioning the air jets in the floor of the tub provides maximum therapy because the bubbles come in contact with and envelop all surfaces of body parts as the bubbles rise toward the surface of the water.
- **The deflection of the bubbles off the body** reduces the concentrated turbulence at the surface of the water, **resulting in** an average **sound level reduction** around the surface of the water of **around 2 db.**
- Translated this means that **the sound of the bubbling air bath of a channel system tub is approximately TWICE as loud** as the bubbling sound generated by an air bath tub with floor-positioned jets. This is not surprising since the air jets of a channel system tub are mounted on the sides, and the air streams come out and go vertical, with minimal contact with the bather.
- This means the **bather can enjoy a quieter**, more tranquil **air bath** experience.
- This has been laboratory-tested with the **same blower** and same **electronic controls**, operating at **maximum speed** for both systems.

2. Less Bath Water Heat Loss.

- Remember **the engineering difference** between floor-positioned air jets with check valves and the side-positioned jets with the channel system:
 - **The floor-positioned air jets** receive the air from the blower via **discreet air lines** for **optimum uniformity** of air distribution.
 - **The channel system** has the blower attached to one end of the channel as one big loop so that **the farther away the holes** are from the blower, **the lower the intensity** of the air output through the holes.
- Because the air force of the channel system gets less and less as it nears the "end" of the channel, **channel system** air baths are **generally run at higher speeds** so that the holes "at the end of the line" are actually putting out air.

- This fact, plus the greater number of holes around the perimeter of the tub (50, 80 or more), means that more air is being blown into the tub, which cools the bath water faster.
- This was laboratory tested with the same ambient room temperature. After 20 minutes:
 - Bath water starting off in a soaking tub at 101°F cooled to 99.34°. Heat Loss: 1.7°.
 - Bath water starting off in a floor air jet system tub at 101°F cooled to 96.63°. Heat Loss: 4.37°.
 - Bath water starting off in a channel air system tub at 101°F cooled to 94.95°. Heat Loss: 6.05°.

So here's the conclusion: the channel system offers:

- More bubbles on the surface of the bath water.
- More noise.
- More heat loss.
- Less therapy.

Now let's discuss air bath cleanliness.

It is a fairly common misconception that air baths are "clean" and whirlpools are "dirty". The thinking is that because air baths do not use a pump and pipes, they cannot harbor elements that can breed bacteria. The truth is that both air baths and whirlpools can be "clean" or problematic. It depends on how they are engineered and maintained. For the purposes of this treatment, we will confine our discussion to air bath cleanliness.

Earlier in this treatment we identified two fundamentally different engineering approaches used in producing air bath systems:

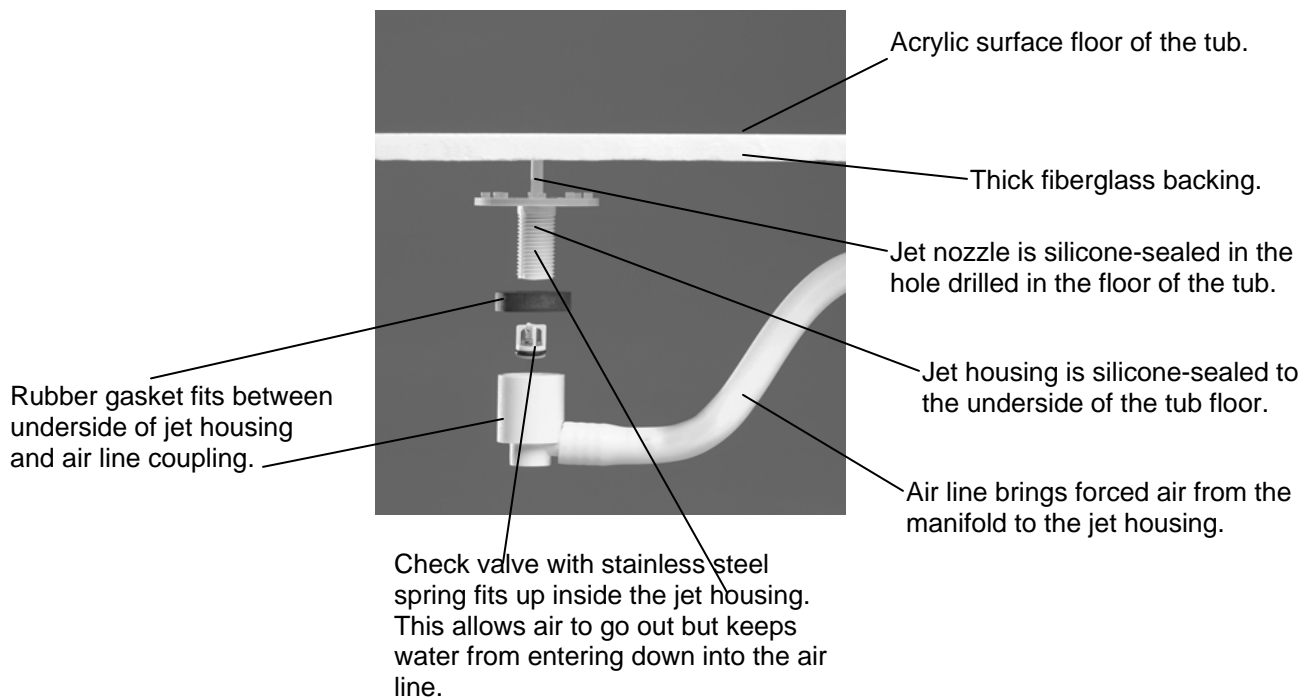
1. The first system utilizes built-in check valves in air jets located in the floor of the tub. A manifold distributes the air from the blower to the air jets via discreet air lines. MTI uses this system.
2. The second system uses a channel around the outside perimeter of the tub. Holes are drilled from the inside of the tub through the fiberglass backing into the channel. A blower is attached to one end of the channel and forces air through the channel around the perimeter of the tub. As the air is forced through the channel, it is released through the holes drilled around the sides of the tub. This is the channel system commonly used by most others.

Here are several facts that apply to any air bath:

1. Whenever you fill an air bath tub with water, the water will enter any holes drilled in the surface of the tub. This is a fact, whether you intend to use the air bath or not.
2. Secondly, when a bather gets into the bath water, he or she introduces elements to the bath water. What elements? Whatever is on the bather's body. No description is necessary.
3. Thirdly, whatever impurities brought into the water by the bathers are now entering any holes drilled in the surface of the tub.

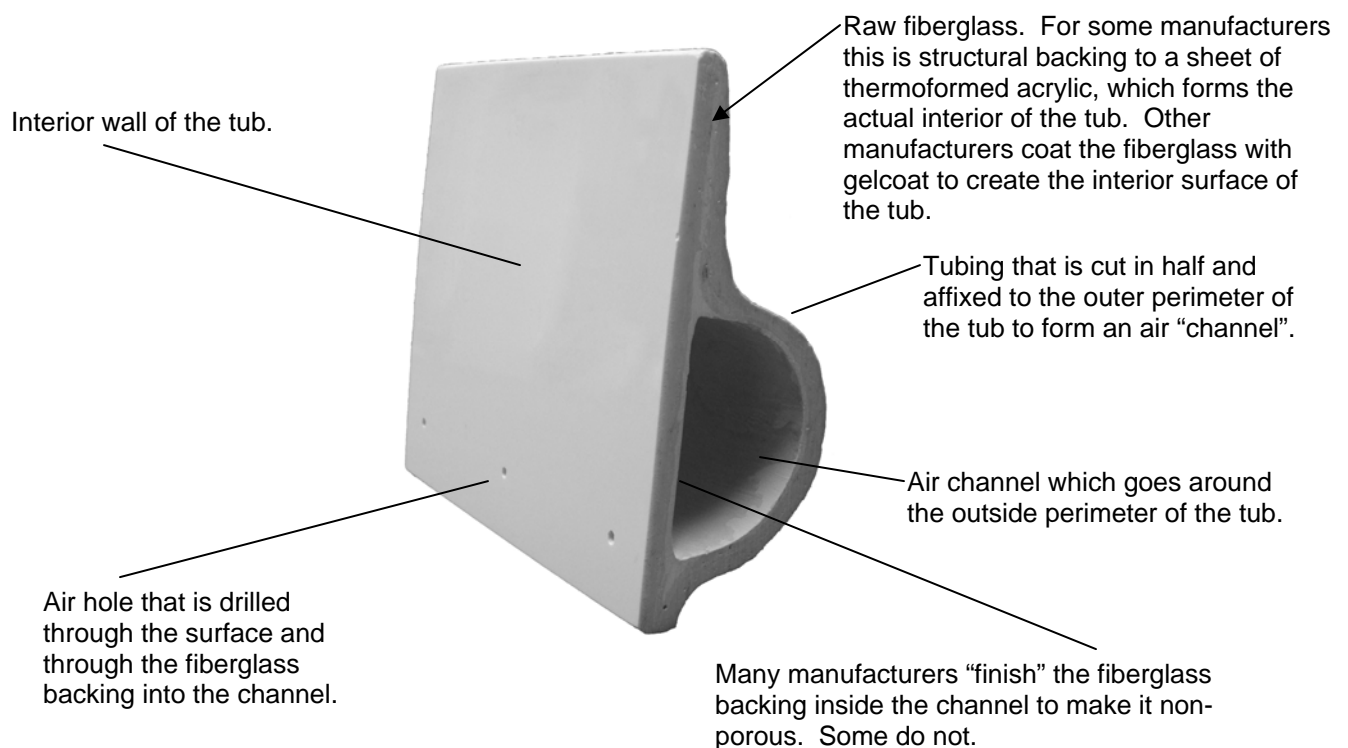
Now let's look at each engineering approach in detail.

- ◆ MTI's air bath systems are inherently hygienic, by design:
 - Unique plastic air jet nozzles and housings prevent water and residue from reaching the fiberglass backing of the bath.
 - Built-in check valves are designed to allow the air produced by the blower out but prevent any water from coming in.
 - The air line tubing is even FDA approved; the same material used by the food production industry.
 - A 1-minute automatic purge cycle activates 7 minutes after the water has drained out of the tub. The blower turns on and blows air through the air lines, removing any water that may be in the top portion of the jet nozzle. The check valve has already prevented any water from entering the air line.
 - This automatically activated purge cycle will engage even if the air bath system itself was not used because, as stated earlier, when the tub is filled with water, the water will enter any air holes. This underscores MTI's thoroughness in producing systems that are hygienically sound.



◆ **Channel systems** are **inherently problematic**:

- As stated earlier, each time the tub is filled with water, the bath water enters the air holes.
- In the case of the channel system, these air holes go right through the tub surface and backing into the air channel.
- This means that the **air channel fills with the bath water**.
- This water **contains** whatever the bather has brought into it on his/her body: **body oils, soap, dried skin particles, dirt and contaminants of various kinds**.
- This happens each time the tub is filled with water, whether the air bath system is used or not.
- Most channel systems have some sort of purge cycle, which activates the blower and blows air through the channel to purge it of any water remaining in the channel.
- **BUT:**
 - If the average bath is 6' x 3', that is roughly 18' of channel going around the outside perimeter of the tub.
 - Will a 90 second purge cycle completely dry out the channel?
 - And even if the channel were completely dried out, would drying it clean it?
 - The answer is "No".
 - To illustrate this point, think about taking a long soak in a simple soaking tub. After your bath, you drain the water, but the "ring around the tub" still remains. That ring contains all kinds of residue, some of which will breed bacteria if ignored. You might even take a hair dryer and dry the remaining water in the tub, but drying the water will not remove the ring.
 - The purge cycle for a channel system is no different. **Blowing out the air channel does not clean it.**
- Additional threats:
 - Since the air holes that are drilled through the tub surface also go through the raw fiberglass backing into the air channel, **the exposed fiberglass in each air hole acts as a "magnet" for residue**. Fiberglass is also porous, which lends itself to breeding bacteria.
 - Even more problematic are those channel systems manufactured without "finishing" the fiberglass backing inside the channel. In these cases there are large areas of exposed, porous fiberglass which will retain residue and breed bacteria over time.



SUMMARY: AIR BATH CLEANLINESS

FICTION	FACT
<p>The purge of a channel system activated after air bath operation will keep the air channel clean and hygienic.</p>	<p>Even if the blown air of the purge cycle completely dries out the channel, blowing out the air channel does not clean it, nor does it remove residue from the exposed fiberglass in each of the air holes.</p>
<p>Check valves fail and are problematic.</p>	<p>This is absolutely not true.</p> <p>Anything made by man is subject to failure. However, the degree of problems with any product is directly related to the quality of design and materials used; manufacturing care; and quality control.</p> <p>The check valves used in MTI air bath jet housings are of the highest quality, incredibly reliable and trouble-free. In fact, MTI's database indicates 0 reported check valve failures in its illusion jet housings since MTI began using them in 2003. This represents 0 failures in approximately 20,000 tubs equipped with air baths with check valves. That's 400,000 check valves with no reported failures!</p> <p>It is significant to note that the check valves used in MTI air baths were 2 years in development. They were tested and validated for 200,000 cycles (open and close). This equates to using the air bath once a day, every day for at least 547 years! To ensure and maintain these standards, each check valve is individually tested before it leaves the manufacturer's factory. With this degree of precision engineering and quality control, to-date over 3 million check valves have been sold globally, with ZERO returns.</p>

Now let's tie it all together.

"Caveat emptor" is Latin for "Let the buyer beware". In 1963 Kurt Vonnegut wrote, "In this world you get what you pay for". In today's market, a prevalent trend is, "Buy once; buy right".

Regardless of origin, emphasis or time period, the message is similar and enduring. Equipped with the facts, a buyer can make the best decisions, purchasing the best product for the money.

SUMMARY: AIR BATH FACTS

- If you want to enjoy the full benefits of air bath therapy, the air jets need to be positioned on the floor of the tub.
- This installation method allows optimum positioning of the air jets for complete body coverage by the air bubbles.
- The forced air provided by the blower is delivered through jets positioned on the floor of the tub, producing bubbles which naturally rise vertically, contacting and enveloping all submerged body parts.
- Discreet air lines from the blower manifold to the air jets provide uniform distribution of air through all the jets.
- Check valves in the air jet housings allow the air to rise out of the jets and upward, but prevent water from returning into the air lines.
- The check valves maintain the hygienic integrity of the system.
- Check valves have proven themselves in real-life use to be reliable and problem-free.
- A system designed, engineered and installed in this fashion provides optimum air bath therapy with optimum hygiene, quieter operation and less bath water heat loss.
- ***This is the MTI way.***