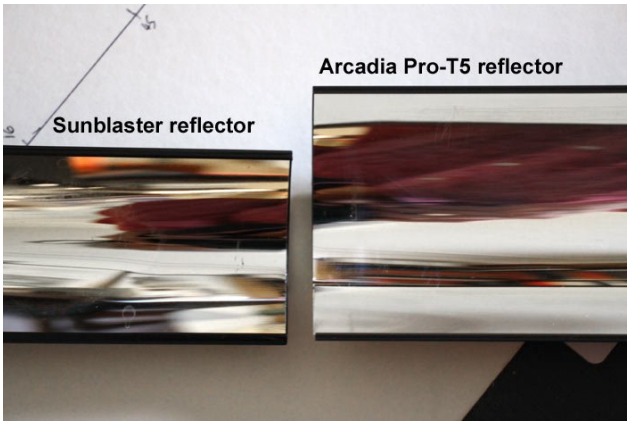
A PROBLEM WITH SOME T5-HO REFLECTORS – January 2020 onwards
Compiled from reports on the Facebook Reptile Lighting Group

Around the beginning of this year, reports were coming in that some of the new-style T5-HO reflector fixtures were not reflecting UVB like earlier models. Some appeared to be reflecting NO UVB at all, others reflecting far less than earlier models had done, but all had no obvious change in appearance.
This article is a collection and distillation of the information gathered by members of this Reptile Lighting Facebook Group, and of the BeardedDragon.org online forum. Where members' posts are quoted directly, they are credited.

The affected reflectors are the type that are sold primarily for horticulture, typically supplied with a non-UVB T5-HO "daylight" or 6400K white-light tube pre-installed. The only brand that has been proven to be affected (with UVB measurements as proof) are Sunblaster T5-HO with NanoTech T5 reflectors, from Sunblaster Horticultural Products. The company spokesperson has said that to their knowledge there has been no change at all in either supplier or product specifications.
NOT ALL Sunblaster reflectors appear to be affected, but we have so few reports I think it is not possible to decide whether this is a single "problem batch" or a change in production specifications.
The Sunblaster reflectors are all made in China. The exact factory where they are made has not been identified with certainty (as these are always "trade secrets") but similar products appear to be widely available from Chinese factories, advertised on sites like AliBaba. These factories will add product branding and may supply a large number of companies with virtually identical products; they do however frequently offer customisation such as better electronics or improved quality control for premium prices.
The Sunblaster reflectors are narrower than many other reflectors, such as some sold primarily for horticulture such as the Hydrofarm JumpStart, and others sold specifically for reptiles or birds such as the Arcadia ProT5. (Photo: **Frances Baines**)



The width and shape (curvature) of a reflector determines the shape of the beam from the reflected light and UVB, so there will always be a difference between brands in the percentage increase measured below a T5-HO tube, compared with no reflector. What we are talking about here, though, is a drastic reduction in the reflecting power of an affected Sunblaster reflector compared to a Sunblaster reflector without the problem.

On this Reptile Lighting Facebook Group, and in the BeardedDragon.org online forum, several reptile keepers have been researching the problem in earnest. We have followed a number of false leads and mistaken assumptions (that the Sunblasters had been given a new varnish coating that blocked UVB; that they were a different product from a different company) and there have been several "scares" that other reflectors that look similar were affected. None of these things have been shown to be true. However, we have learned a lot about this type of reflector, and have found some answers, and even a simple way to fix affected reflectors.

WHAT IS THE REFLECTOR MADE OF?
These reflectors consist of a black, curved holder into which a thin, flexible, shiny, metallic-coated plastic strip has been slipped. (If you remove the fluorescent tube and gently detach the whole reflector from the fixture base, then examine the reflector you will find that you can slide the shiny thin plastic strip out of the end.) This is an Aluminized Mylar reflector strip.
Aluminized Mylar is a transparent plastic film called BoPET (Biaxially oriented PolyEthylene Terephthalate film) "metallized by vapor deposition of a thin film of evaporated aluminium, gold, or other metal" (Wikipedia) - in this case, aluminium.

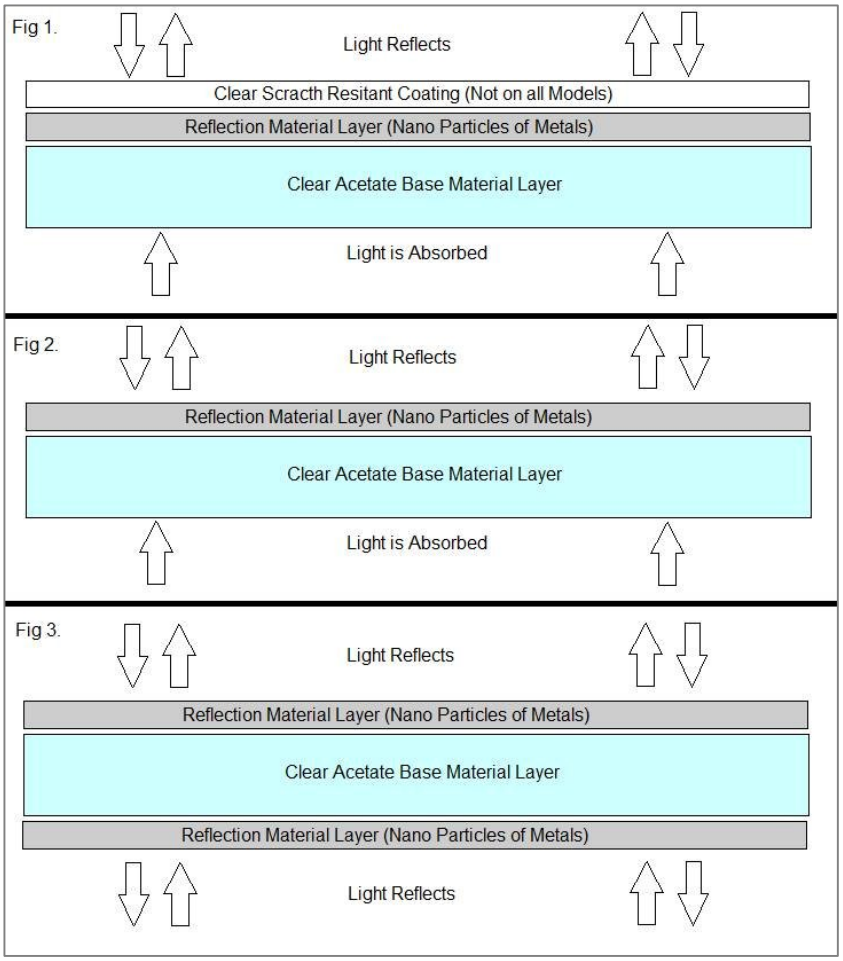
The different ways in which a Mylar reflector might be constructed has been described by **Francis Skibicki. He writes:**

Here is how the Mylar reflector works.

Fig 1. Is that of a Sunblaster, with a Scratch resistant Coating, that coating is not new, and it is not a problem. It prevents the reflection material from rubbing off, as someone said happened with another version.

Fig 2. Is an example of the fixtures that do not possess a scratch resistant coating, works just as well as the sunblaster, is likely cheaper to make, and the reflective coating wipes or scratches off easier.

Fig 3. Is an example of what would have to happen to make a fixture immune to the issue. Which will not happen, as the price to add the second layer, is unjustified with the reflector facing correctly its unneeded, so a wasted cost.



So as Francis has shown, which way round the Mylar reflector strip is placed in the black plastic reflector holder is vital: the aluminum reflective layer must be closest to the lamp. If the reflector strip is put in back-to-front, with the transparent plastic base layer facing the lamp and the aluminum against the black plastic holder, the UVB never gets through the clear plastic, so never gets reflected off the aluminum and so the reflector DOES NOT REFLECT UVB.
(The plastic *does* let visible light get through, so this does get reflected, and to the visible eye there's no problem.)

DO THE AFFECTED SUNBLASTERS HAVE BACK-TO-FRONT REFLECTORS?

The answer is a resounding YES. A whole batch of Sunblaster reflectors have simply had their Aluminized Mylar reflectors slipped into the black holder BACK TO FRONT!!
I'll copy and paste the evidence from all our members, lower down. But first: let's jump to the important part: how to find out if your reflector is affected….

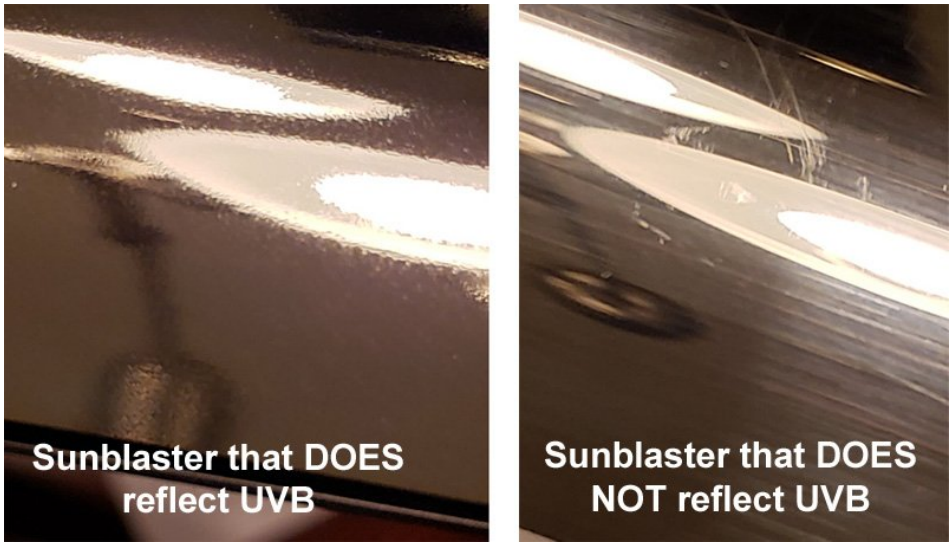
IS MY REFLECTOR AFFECTED?

Sunblaster reflectors should boost the UVB to almost double that of a tube with no reflector at all. Sunblaster boast a 48% increase in visible light due to the reflection, and aluminum reflects more than 90% of UVB too so we should get a similar increase in UVB.

If you have a UV meter this simple test will identify a back-to-front reflector really easily.
1. Take a reading at 6 inches distance (so we have a standard distance for everyone) from the middle of the lamp, with your reflector in place as normal.
2. Turn off your lamp, let it cool down. Take out the tube. Take off the reflector from the fixture. Put the tube back into the bare fixture. Turn on the lamp. Wait 10 minutes for it to warm up again.

3. Now take a reading, from the same position (again, at 6" from the middle of the lamp). What did you get?
If your second reading was about half that of your first reading, your reflector is absolutely fine. It is almost doubling your readings.
If your two readings were the same or nearly the same, **your reflector strip is not reflecting UVB and is probably back to front**.

If you don't have a UV meter there are two things to look for.
First, the "good" aluminum-coated side of the reflector strip has a faintly matte or "orange peel" effect. This may be due to the aluminum or to the lacquer, but several people have described it. Take out the reflector strip and hold it somewhere bright, eg. near a window. Look in the reflector at a reflection of something with sharp lines. You should see that one side of the reflector has a "matte" or "fuzzy" or "orange peel" look to the reflection, whereas the reflection on the other side is sharp and clear.
This photo is from **Brandon Earnest.** The photo on the left is a reflector with the "good" side facing outwards; the reflection of two basking lamps nearby is fuzzy. The photo on the right has its strip in back-to-front, so the smooth backing plastic is facing you, giving a smooth clear reflection.



Second – and this test is easier to be certain about: Scratch a tiny corner of the reflector strip (don't spoil your strip too much!), first on one side, then on the other.
On the "good" side, you will see the silvery layer scratch right off, leaving just the see-through plastic backing. But if you scratch the other side, there's no aluminum layer that side to rub off, all that you'll see is the scratch you made on the shiny plastic. The aluminum, which was on the other side, stayed intact.
Adam Carver-Smith has made two really excellent You-Tube videos on testing reflectors, both with a meter and with the scratch test. In both cases his reflectors were **the right way round to start with**. He writes: "…these film reflectors are a reflective surface applied to a clear acetate backing material. The reflective coating MUST face the tube for maximum effective UVB reflection."
Here is his video for the Sunblaster: https://youtu.be/-mmE-Ms_h2o
Here is his video for an Arcadia ProT5 reflector: https://youtu.be/RYmKWHHWp_0

HOW TO FIX THIS PROBLEM
The fix is really easy.
After you've taken the reflector strip out of its black holder, make absolutely sure you know which side is the good, aluminized side, either from your meter readings or from its appearance plus scratch test.
Turn it over so the good side faces the front. Slide it back into the holder. Now, the good aluminized coating is facing the lamp.
You have a repaired reflector!

(But if you remove your reflector strip please be very careful when replacing it! They can bend and the aluminum film scratch, crack and break easily!)

OUR EVIDENCE FOR THE PROBLEM

Here, I want to copy and paste the work of those folk who first identified the issue so it can be regarded as clear proof, and we can understand what has happened. We can also see that there are other "problems" that can occur with these Aluminized Mylar reflectors, from any brand, and we can also see that at any time, any reflector using this technology could have its reflector accidentally inserted the wrong way round.

One of the first to identify an issue was **Brandon Earnest** on the BeardedDragon.org forum. He tested his new Sunblasters and found that his UVI readings with the reflector and without the reflector were the same, i.e., the new reflector was useless. His older Sunblaster was a good one. He corresponded with Sunblaster (with no resolution of the problem) and then wrote:
"I've been able to spot a visual difference between the working and nonworking reflector thanks to Alan at Sunblaster. He mentioned something about longitudinal lines on the reflective surface. However I don't remember if he said he remembers they've always looked like that, or if he was making a comment about recently noticing that...I will attach two pictures. One is a picture of a good reflector, and another a bad reflector. (See his photos above)
The bad reflector has those longitudinal lines he was talking about, and has a much clearer reflection (or mirroring effect) when compared to the working one.
The working one doesn't have those longitudinal lines, and instead has what I would call a fine orange peel texture look to it. It also doesn't mirror an image as clear as the non working one.
This is evident in the pictures I took of the two. Working one mirrors slightly distorted (from the apparent orange peel look) as is evident in the ceiling lamp above the reflector being mirrored. The bad reflector mirrors it more clearly."

Even before this, **Adam Carver-Smith** had identified a different problem with an Arcadia ProT5 reflector: the very thin aluminum coating on some reflectors (which may or may not have a lacquer top coat) is quite fragile and can be damaged by snalt (eg. from iguanids) or scraped or rubbed off when cleaning. This led to his videos (links above) illustrating that the aluminum layer is one-sided. **Rebecca Elizabeth** also highlighted the issue with the fragility of the aluminum layer, as cleaning her Arcadia reflector rubbed almost all the aluminum off, leaving her just the clear plastic backing. But both Adam's and Rebecca's Arcadia ProT5 reflectors had their reflector strips the right way round. **Frances Baines** has examined an Arcadia ProT5 reflector and found that her reflector is also correctly inserted, however, both sides appear almost identical; there does not appear to be a "matte" vs. "shiny" side; but the scratch test works to identify the aluminized side.

TEST RESULTS FOR SUNBLASTER FIXTURES

John Binns tested his new Sunblaster reflector purchased 12th February, and his old Sunblaster reflector purchased 1.5 years ago, on the same Sunblaster fixture, with a new Arcadia T5-HO D3 6%UVB tube. These are his test results:

Sunblaster Reflector Tests: John Binns - 21 Feb 2020			
Distance	New Reflector	No Reflector	Old Reflector
6"/15.24cm	2.8	2.7	6.4
8"/20.32cm	2.1	2.0	4.8
12"/30.48cm	1.2	1.2	2.7

The new reflector is not reflecting UVB at all. The old reflector is giving a 2.3x increase.

He determined that the aluminized, “matte” side was facing the back, i.e., his reflector strip had been put in back-to-front. He then tested the new reflector, with the same tube on the same fixture, at 4”, 6”, 8” and 12” distance, with the reflector strip both ways round. Here are his results:

New Reflector Side 1/Shiny	New Reflector Side 2/Matte
4.8	8.3
3.3	5.5
2.2	4
1.3	2.3

This reflector, mounted the right way round, is now increasing the UVB about 1.7x. It’s not as good as the old one, but it IS now working properly.
He wrote:
"I replaced the reflector first testing the shiny side, then reversed the foil to the matte side. Here are the results...So the higher UVI levels can be restored by reversing the reflector foil to the matte side... For those that are unsure if they have a new or old reflector, they can compare the sides of the foil. If the backside of the foil is more matte than the front, reverse the foil so the matte side is out."

Sylvain Steyr confirmed John Binns’ results. He tested five new Sunblasters. He wrote:
“Here are my readings. They will be in order: no reflector, shiny side and dull side. All readings at 6" in center. Arcadia 24w +6%

	No reflector	Shiny side	Dull side
Light 1	3.8	3.7	6.4
Light 2	4.2	3.9	5.3
Light 3	3.2	3.9	5.4
Light 4	3.1	4.1	5.7
Light 5	4.1	3.7	5.9

No reflector and shiny side are the same for all lamps, i.e. the shiny side does not reflect any UVB. And the dull side is a fairly good reflector, about 1.7x the no-reflector reading.”
Fran Baines: “Were your Sunblaster reflectors correctly installed when you bought them, or did you have to reverse the mylar film?”
Sylvain Steyr: “had to reverse them. Shiny side was exposed.”

Leah Jackson wrote: I have Sunblaster and VE fixtures, as well as an Arcadia shade dweller. I take readings regularly, and have only had one Sunblaster fixture that had a faulty reflector. My other readings have been within where they should be based on the species I keep. I have not taken readings without the reflector except on one.

Brian O'Hare could not see a difference in the shine between the two sides of his Sunblaster reflector strip. His Sunblaster had the reflector the right way round, though, because he saw a big drop when he tried it the other way round. He wrote:
I just took a measurement with my Solarmeter 6.5 on my reflector (Sunblaster) and then took it off and flipped the reflective insert and took another reading. Before I flipped I got a 5 and after the flip I got reading of 2. Also took reading with no reflector and got the same reading as when I flipped. Both sides of the reflective insert looked the same, a shiny mirror like finish.

Lori Preusse Finn wrote: I got a Sunblaster in November, the reflector is like Len Costa’s pic. With Arcadia 12% (also new 11/8) I’ve barely been getting a 3.0 reading at 16”.
She conducted tests showing her Sunblaster had its reflector the correct way round, doubling the reading when the reflector was put on. Here are her photos:

No reflector

With reflector

Finally, **Brandon Earnest** tried repairing his "Bad" Sunblaster reflector by turning its reflector strip front-to-back, and comparing it with the "Good" reflector from his older model. He writes:
Here are the results using the same fixture and the same Reptisun 10.0 T5, allowed to warm up and stabilize each time:

Good Reflector
(slightly matte, "orange peel" side facing outwards)
11.9 UVI @ 5 inches
4 UVI @ 12 inches
(reflector insert flipped – shiny surface facing outwards)
7.1 UVI @ 5 inches
2.1 UVI @ 12 inches

Bad Reflector
(shiny surface facing outwards)
6.9 UVI @ 5 inches
2.3 UVI @ 12 inches
(Flipped -> slightly matte, "orange peel" side facing outwards)
10.8 UVI @ 5 Inches
3.2 UVI @ 12 inches

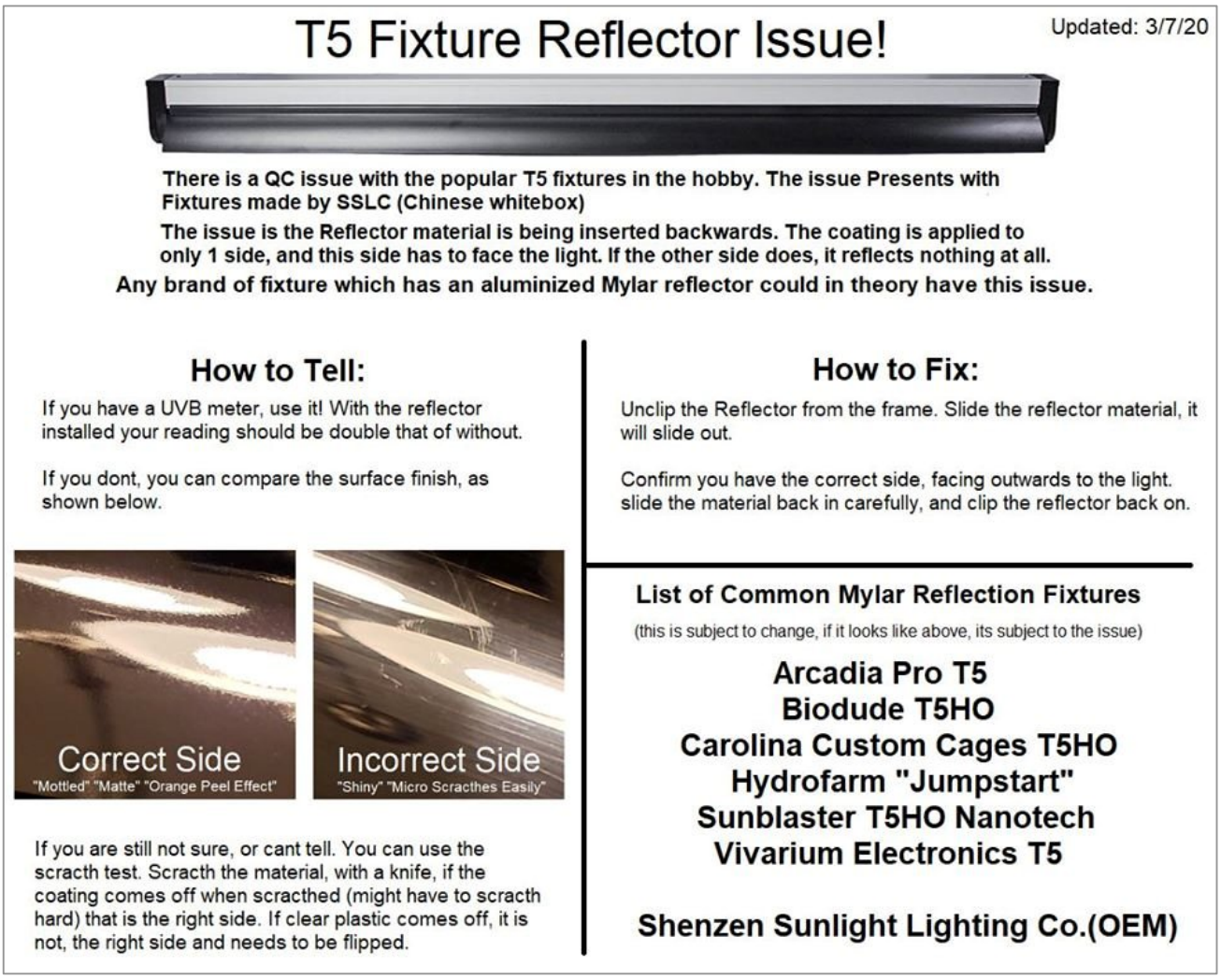
Removing the reflective material and reinstalling the plastic housing of the reflector (i.e., "no reflector") results in a UVI reading of 2.3 at the same 12 inches.
Brandon's old reflector gave approx. 1.7 – 1.9x increase, and once repaired, his new one gave 1.4 – 1.6x increase - although with only two measurements these figures may not be very accurate.

Another person on the BeardedDragon.org forum with username **Mr Spectrum** "repaired" his Sunblaster and improved the readings by 1.9 – 2.0x. However, he warns readers:
"…attempting to flip the mylar reflector in its holder caused the mylar to kink in several places, and shatter. It no longer sits smooth in its cradle, and is in multiple pieces.
I WAS NOT WARNED OF THIS POSSIBILITY BEFORE ATTEMPTING THIS MODIFICATION.
NOW I AM WITHOUT ANY FUNCTIONAL REFLECTOR."

If you remove your reflector strip please be careful when replacing it!

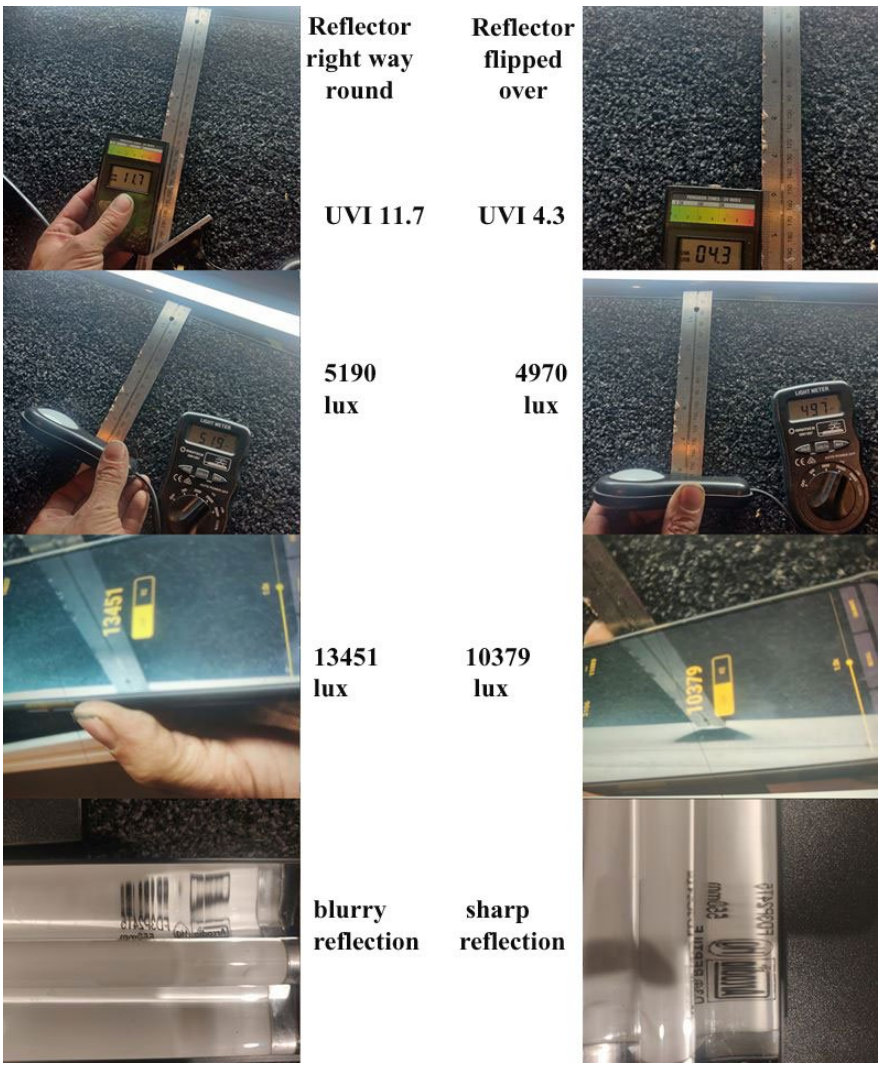
WHAT ABOUT OTHER BRANDS?

Francis Skibicki has pointed out that ANY Aluminized Mylar reflector could be inserted back-to-front during assembly, and urges anyone with any reflector of this type to check it is assembled correctly. Several members have tested other brands. Francis made a poster about this problem:



However, all reports so far are of other brands' reflector strips being installed correctly.

Quinn Harris tested an Arcadia ProT5, to see whether this brand has the potential of being affected, although there are no reports to date of this happening. He wrote:
So I ran some tests with the Arcadia ProT5 and the reflector is definitely different on the back, both on UVI output, looks and light output.
It is very easy to slide in and out to check and the good side is definitely more matte. The good side is on the left (*in the photos below*).
I tried the scratch test but found it hard to distinguish the difference easily.
I tested the lux output with a meter and a free android app and the good side produced higher readings on both.



Frances Baines also tested an Arcadia ProT5 reflector, which likewise had its reflector the right way round. Here are her results:

Arcadia ProT5 6%UVB Kit – brand new lamp (in use 1hr) : UV Index (Solarmeter 6.5)												
inches	2	4	6	8	10	12	14	16	18	20	22	24
no reflector	7.0	3.9	2.7	2.0	1.5	1.2	1.0	0.8	0.7	0.6	0.5	0.4
with reflector	21.4	14.4	9.6	7.0	5.2	4.1	3.2	2.7	2.2	1.8	1.6	1.4
reflector reversed	8.2	4.9	3.3	2.5	1.9	1.4	1.2	1.0	0.8	0.7	0.6	0.5

This gives a 2.5x increase in UV directly under the lamp. These reflectors are wider than Sunblasters and have a greater curvature, bringing the reflected light into a closer focus under the lamp.

John Binns re-tested his Sunblaster fixture with a ZooMed T5-HO Reptisun 10.0 tube, along with a Hydrofarm Jumpstart fixture, to compare these two. The Jumpstart has a wider reflector, very much like the Arcadia one. Its reflector strip was the right way round.
His results are below. He has plotted the Ferguson Zones for which the distances would be appropriate, for each reflector with its strip the right way round.

Fixture: Hydrofarm JumpStart Model JSFC2T w/timer
Bulb: Zoo Med T5HO 24W 22" 10.0 High Output
Reflector as shipped

Distance	UVI	
4 inches	24.5	
5 inches	18.8	
6 inches	15	DANGER
7 inches	12.6	
8 inches	10.1	
9 inches	9.4	
10 inches	8.3	
11 inches	7.2	ZONE 4
12 inches	6.4	
13 inches	5.8	
14 inches	5.2	
15 inches	4.7	
16 inches	4.3	
17 inches	3.8	ZONE 3
18 inches	3.4	
19 inches	3.3	
20 inches	3	
21 inches	2.8	
22 inches	2.6	
23 inches	2.3	
24 inches	2.2	
25 inches	2	
26 inches	1.9	
27 inches	1.8	
28 inches	1.6	ZONE 2
29 inches	1.5	
30 inches	1.5	
31 inches	1.4	
32 inches	1.3	
33 inches	1.2	
34 inches	1.1	
35 inches	1.1	
36 inches	1	
37 inches	1	
38 inches	0.9	ZONE 1
39 inches	0.7	

John Binns 2020

Distance equals UVI levels used for Ferguson Zoning

ZONE 1	Crepuscular or shade dweller LIKE "SHADE"	UVI up to max 0.7 - 1
ZONE 2	Partial sun or occasional basker	UVI up to max 1 - 3
ZONE 3	Open or partial sun; thermophilic LIKE "SUNLIGHT"	UVI up to max 3 - 7
ZONE 4	Mid-day baskers; thermophilic	UVI up to max 4.5 - 8

>> RED = DANGER AVOID UVI LEVELS ABOVE 8.0 <<

Fixture: SunBlaster 22" 24W Nano Tech
Bulb: Zoo Med T5HO 24W 22" 10.0 High Output

	Reflector Matte		Reflector High Gloss	Reflector None
Distance	UVI		UVI	UVI
4 inches	16.4		9.1	8.8
5 inches	13.2		7.3	7.1
6 inches	11.3		5.9	5.9
7 inches	9.5		5	5
8 inches	8.3		4.3	4.1
9 inches	7.3	ZONE 4	3.8	3.6
10 inches	6.4		3.2	3.1
11 inches	5.6		2.9	2.7
12 inches	4.9		2.6	2.4
13 inches	4.4			
14 inches	3.9			
15 inches	3.6	ZONE 3		
16 inches	3.2			
17 inches	3			
18 inches	2.7		1.4	1.2
19 inches	2.4			
20 inches	2.3			
21 inches	2.1			
22 inches	1.9			
23 inches	1.7			
24 inches	1.6		0.8	0.8
25 inches	1.5	ZONE 2		
26 inches	1.4			
27 inches	1.3			
28 inches	1.2			
29 inches	1.2			
30 inches	1.1		0.6	0.5
31 inches	1.1			
32 inches	1			
33 inches	0.9			
34 inches	0.9			
35 inches	0.8			
36 inches	0.7	ZONE 1	0.4	0.4
37 inches	0.7			
38 inches	0.7			
39 inches	0.6			

JOHN BINNS 2020

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ZONE 3	Open or partial sun; thermophilic LIKE "SUNLIGHT"	UVI up to max 3 - 7
ZONE 4	Mid-day baskers; thermophilic	UVI up to max 4.5 - 8

>> RED = DANGER AVOID UVI LEVELS ABOVE 8.0 <<

CONCLUSION

We have determined that recent samples of Sunblaster T5-HO reflectors have had their Aluminized Mylar reflector strips installed back-to-front in their black plastic holders. This has rendered them unable to reflect UVB, since the backing strip of Mylar allows only the visible light through it to the reflective surface.

We have not identified any “back-to-front” reflector strips in products of any other brand, but the nature of these strips means that it is theoretically possible for this to occur with any of them.

We have discovered that it is easiest to determine that a reflector strip has been installed back-to-front using a UV meter, but if one is not available, the correct front surface, with the very fine aluminum coating, can be identified as (a) having a slightly “matte” or “orange-peel” look to it, whereas the reverse side is shiny smooth; and/or (b) if a corner is scratched, the aluminum coating peels off on this side.

We have demonstrated that carefully sliding out the strip from its black plastic holder, turning it over and replacing it with the aluminum side facing outwards towards the lamp, restores normal reflectivity. For the Sunblaster this appears to boost the readings in front of the tube by about 1.7x.

Report compiled by Frances Baines (Facebook Group Owner)
Special thanks to all those who tested their reflectors and submitted evidence, making this possible.
The Sunblaster company representative will be sent a copy of this article.
9th March 2020.