BRIGGS STEEL

Leading Manufacturer of High Performance
Metal Roofing, Wall & Soffit Systems

Oil Canning in Metal Roofing & Wall Systems

“Oil Canning” a Natural Phenomenon

Introduction

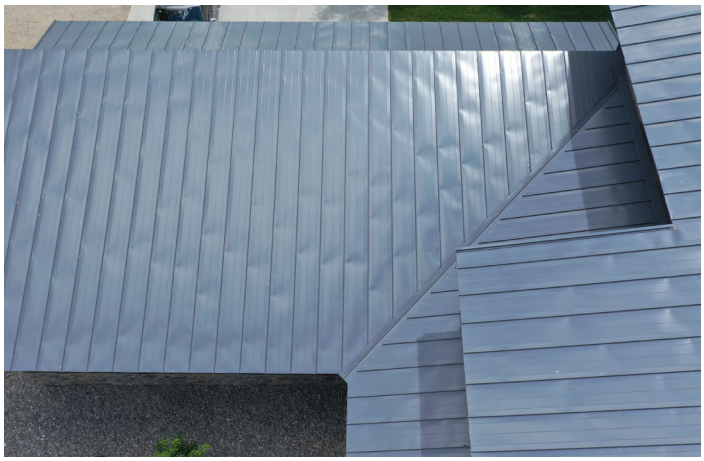
All metal panel standing seam panels, flush panel, wall systems, and all metal panels in generall that you have purchased, or are considering purchasing may show signs of “Oil Canning”, which is a term used for the perceived waviness of the broad flat portion of light metal products.

“Oil Canning”? What is it? “Oil Canning” is an aesthetic issue and does not affect the performance of your material. “Oil Canning” is desired by some due to the metals inherit natural characteristics, while others do not. Throughout this pamphlet you will learn about the natural occurrence of “Oil Canning” and methods that may reduce the appearance of “Oil Canning”.

“Oil canning” is a natural characteristic that will occur in flat, manufactured and/or roll formed light metal products for various reasons; including but not limited to; panel type, width of panels, length of panels, gauge of metal, tensile/yield strength, color of coating, gloss coating, slitting of coil, stresses of roll forming substrate misalignment, non-planer, camber, movement of structure, thermal expansion and contraction, improperly aligned panels from installation, improperly installed fasteners, improperly installed clips, temperature, time of year, the viewing angle, the angle of the sun and overall improper installations of metal products.

Metal products have been growing substantially over the last decade, which in turn has allowed for many innovations and research for the methods of reducing “Oil Canning” in light metal products and is continuing to this day.

Photos taken with proper install, with the varient of only a few hours in the day.



Proper install with natural “Oil Canning” of light metal products.

“Oil Canning” Basics

“Oil Canning” in metal roofing and/or siding is a common, yet natural occurrence that happens in light sheet metal products, which include but are not limited to, steel, copper, zinc & aluminum. “Oil Canning” creates a unique perceived waviness, elastic buckling or stress wrinkling in the flat portion of the metal roofing and/or siding panels.

There are a variety of ways that oil canning is noticeable from panel width, gauge, however oil canning can occur in basically all light sheet metal products, regardless of these special steps listed below.

Following all of these guidelines is a helpful tool, but does not eliminate “Oil Canning” or the appearance thereof, as it is an inherit natural characteristic of metal. “Oil Canning” is not a cause for rejection.

Thermal Expansion and Contraction

Understating thermal expansion and contraction of your metal product can help reduce improper installation and to help with reducing “Oil Canning”. The surface of the metal fluctuates daily, following the conditions it’s subject to. As metal expands and contracts, it needs to release the stress that is naturally created, this will lead to “Oil Canning.”

Storage and Handling

Store product on a flat, even protected surface to avoid panels from unnecessary stress and twisting.

Always transfer/carry the panels or flat sheets perpendicular to the to the ground to avoid damaging the panels or causing buckling, which can leave permanent imperfections in the metal. Do not lift panels from one corner, consistent lifting along the entire panels is recommended. Avoid the constant twisting and moving of the panels as this creates opportunities for damage. For panels over 10’ lengths there should be an additional person for every 10’ length of the panel to properly support it and to avoid damage. When transferring the panels to the roofing and/or siding always avoid kinking or manipulating the panels, for example when transferring panels to the roof, a common mistake is to drag the panel vertically over the eave which creates unnecessary strain and can lead to damage of the panel in highly increase the chance of extreme “Oil Canning”.

Production of raw steel.

“Oil Canning begins at the mill during the flattening and coil process of the raw steel. These are three common reasons, but are not limited to; the coil is longer in the middle and in turn creates a rippled and/or buckling appearance, the edge of the coil may be longer than the edge of the metal strip, and the camber is where the flat coil diverges itself from a straight line.

Another common by-product of the production of light metal is the thickness. The most common method of measuring metal thickness is based on a minimum/maximum thickness such as gauge and/or other thickness measuring methods; for example, 24ga metal is also referred to as 0.0236 min but can be up to 0.376 max which is also considered 24ga, in turn, your metal may vary in thickness throughout the coil. This is not a cause for rejection and may affect the appearance of “Oil Canning” throughout the coil.

Coil Processing

Coil processing such as slitting is common in the light metals industry. For many cost reasons and benefits, the coil is produced and coated in a wider material and then slit down to narrower size, this sometimes leads to the “Oil Canning” appearance but is not a cause for rejection. All appropriate quality measures are followed during the process of slitting coil, but may lead to the natural occurrence of the metals, for example, elastic unloading.

Manufacturing

Briggs Steel uses state-of-the-art equipment, along with quality fabricating methods, along some of the highest quality tension-leveled metal products available and this in turn helps reduce the appearance of “Oil Canning”. Briggs Steel takes all the necessary steps to help reduce “Oil Canning” during the manufacturing process, this includes but are not limited to the use of, high-quality metal products, proper machine tolerances, proper material handling, constant evaluation as materials are manufactured and any noticeable issues that are visible at the time of the manufacturing process in which they will be corrected.

All metal products we purchase go through a very detailed quality control process to ensure the quality of the product before received by Briggs Steel. In the very rare case material is defective, we immediately stop the manufacturing of the material to address the issue, and if necessary, the material will be rejected and replaced.

The following are common, and are not a cause for rejection as many materials have different tolerances, and they are often changing from batch to batch. The stress during the production of the metal coil may contribute to the appearance of “Oil Canning” which is not a cause for rejection. A common misconception of metal products is the linear elasticity also known as spring back of metal. This is noticeable toward the edges of the panels that are roll formed and folded. As the metal is being roll formed and/or folded, the stress created therein releases towards the ends of the panel and creates the initial appearance that the panels are not roll formed properly or may not be square. This is a common misconception. The spring back varies from panel to panel and other factors may include, but are not limited to the gauge, type of material, tensile/yield strength, and/or type of panel profile being used. If panels are properly installed the rib of the panel will align itself with the male side of the panel. This is very common in all lighter metal products roll formed and/or folded and is not a cause for rejection.

Structure

All metal products are designed to be installed onto a solid, leveled in-plane substrate, and/or proper plane open purlin systems. A non-planar or concave or convex contoured structure is one of the most common issues enhancing the effect of “Oil Canning” in light sheet metal products. If metal products are installed on a non-planar or concave or convex contoured structure, the metal product is forced to follow the structures support system and doesn’t always allow for the panel to perform properly.

Some measures may be followed to help reduce “Oil Canning” issues during the install of the metal product, all conditions are unique and may require more attention. Some structures are not suitable for all metal products and special considerations should be made to avoid issues with your installation. Consult with a quality metal roofing and/or siding contractor to see available options for such a structure.

A structure over time may show the following sign that put tension on the panels including, but not limited to, structure movements, settling, etc. within the structure. The metal product has no choice but to follow and conform with the structure therefore may create “Oil Canning” that may not have been present during the installation process. This is not a cause for rejection. In some cases, over time the structure will settle and possibly reduce the apperance of “Oil Canning” and can also increase the apperance of “Oil Canning”.

Additionally, some structures are designed to have an intentional camber to adjust for the deflection of the load, this in turn will increase the appearance of “Oil Canning” with or without a load.

Fastening of Metal

The most common mistake on metal roofing and/or siding is over driven fasteners and the use of improper tools. Over driven fasteners do not allow the for the proper thermal expansion and contraction that are designed in a lot of metal products for stress relief of the metal. Over driven fasteners with a washer can cause damage to the seal and lead to failure. For roofing and/or siding applications where clips are used, don’t over drive the fastener as it will weaken the connection to the substrate. In some cases where the fasteners have been overdriven and/or not properly aligned may lead to failure or cause the appearance of “Oil Canning” lines where fasteners were over driven and/or not properly aligned.

To reduce the over driven fastener, use a quality electric or cordless screw gun with working clutch system. Electric/cordless impact drivers are not recommended to be used on any metal products for a variety of reasons including but not limited to, over driving of fasteners, weakening of fastener head and/or damaging paint coatings on fastener which can lead to red rusting of the fastener head.

Installation of Metal

There are many variables that need to be considered before, during and after installation. Proper planning and preparation is recommended.

Metal roofing and siding panels are designed to have a certain coverage to accommodate proper thermal expansion and contraction.

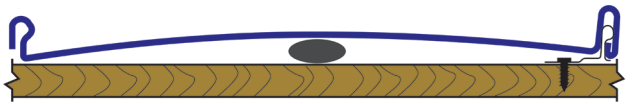
Avoid misaligned panels during installation, you must ensure the panels stay true to the intended coverage widths and to not over-engage the metal which can lead to it bowing outward. Proper Installation methods must allow for the intended panel stress relief systems to work properly. When using a clip system, allow the panel system to stay true and don't force the clip toward or away from the male side of the panel. Overall, eliminate the unnecessary movement, stress and/or tension during install, any deviation from these proper installation methods will inheritably cause "Oil Canning" and in rare circumstances extreme cases of "Oil Canning" that may lead to the denting of the metal and possibly lead to roofing and/or siding failure.

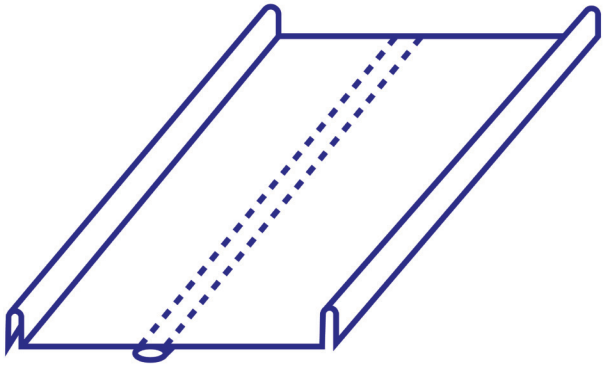
All accessories should be intended for the roofing and/or wall system, and installed properly, this will help avoid "Oil Canning" where the accessories were installed. Do not force metal panels over penetration as it may damage the panel and increase the appearance of "Oil Canning".

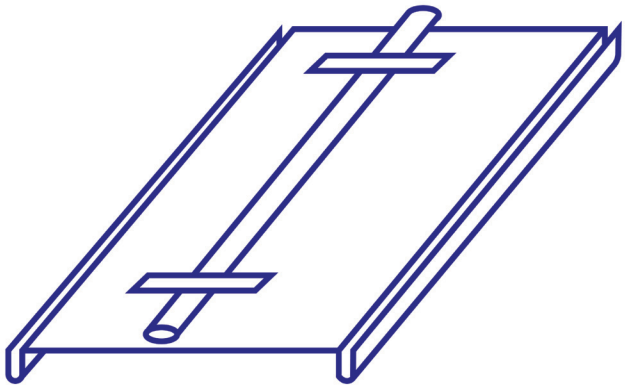
On a concealed fastened roof, avoid fastening in the flats of the panels at the eaves, this does not allow for proper thermal expansion and contraction of the panel. However, some roofing systems or structures specifications may require fastening at the eave for a variety of factors. For mechanically seamed metal roofing and/or siding, follow all seamer manufacturer's instructions to properly seam the rib, this may help reduce the appearance of" Oil Canning". Read all technical data for proper install of any concealed metal roofing panel. Always check federal and local laws/building codes. Improper installation in not a cause for rejection.
For an exposed metal roofing and/or siding system, it is also recommended not to under or over drive fasteners, this can lead to the failure of the washer and lead to roof failure. Over driven fasteners can cause a dimple in the panel that may collect water and cause "Oil Canning". For Exposed fasteners panels it is recommended to pre-drill panels, be sure to use a cover sheet to prevent shaving from damaging the coating, this will help reduce the appearance of "Oil Canning"

Snow retention is used often for concealed fastening and exposed fasting metal roofing systems. Properly engineered snow retention systems will help avoid roof failure and reduce the appearance of "Oil Canning" when properly installed.

How a Backing Rod is Installed







For metal wall systems, ensure you install the fasteners in sequence, for example, install from the bottom to top etc. Improper installation is not a cause for rejection.

Additional options to consider to reduce “Oil Canning”

The type of finish plays a large role in the reduction of the appearance of “Oil Canning”. Metallics and darker colors often increase the appearance of “Oil Canning” due to how the human eye perceives the reflection of light. Lighter colors help reduce the visual perception of how the metal looks to the human eye. Consider, panel finish and/or color can help reduce the appearance “Oil Canning”

Panel selection along with narrower panel widths can help reduce “Oil Canning”, as some panels have better thermal expansion and contraction designs than others. Adding ribbing in valley of the panel helps reduce the appearance of “Oil Canning” by reflecting light in different directions.

In addition to the install and structure portions, there are some more options that may help to reduce the appearance of “Oil Canning”. The use of thicker metal will increase the chances of less “Oil Canning”.

The use of backer rod on standing seam panels to be installed on a solid substrate creates a separation from the roof deck in the center of the panel. Backer rod in turn helps the reflection of light, this helps what the human eye perceives and may help with reducing the stress created during the natural thermal expansion and contraction of the metal.

Standing seam panels manufactured with smooth, box ribbing and/or with pencil ribs have a higher chance of “Oil Canning” rather than the use of striations, however you may still show signs of “Oil Canning” with the use of striations due to the natural characteristic of sheet metal. “Oil Canning is generally noticeable during installation, however, does not eliminate the possibility of “Oil Canning in the future as the structure ages and/or settles.

Exposed fasting metal roofing and/or siding doesn’t have a lot of the features built into the system to reduce “Oil Canning” like concealed fastener systems do, however, the proper installation and care will help reduce “Oil Canning”.

Resources

For resources not affiliated with Briggs Steel, visit our website at briggssteel.com/oil-canning with links to multiple, industry leading, technical data sources related to “Oil Canning” the natural phenomenon!

Bad Installation Examples

Oil Canning Disclaimer & Fabrication Agreement

The standing seam and/or flush panel material that you have ordered may show signs of “oil canning.” “Oil canning” is an aesthetic issue and does not affect the performance of your material. Standing seam panels manufactured with smooth, box ribbing and/or with pencil ribs have a higher chance of “oil canning” than the striations, however you may still show signs of oil canning with the use of striations due to the natural characteristic of sheet metal. Briggs Steel takes all the necessary steps to help reduce “oil canning” during the manufacturing process, including but not limited to the use of high-quality metal products. However, “oil canning” is a natural characteristic that can and will occur in flat, manufactured and/or roll formed steel for various reasons, including but not limited to; panel type, width of panels, length of panels, gauge of steel, color of coating, slitting of coil, stress of roll forming substrate misalignment, non-planer, camber, movement of structure, thermal expansion & contraction, improperly aligned panels, improperly installed fasteners, improperly installed clips, and overall improper installations of panels.

Briggs Steel recommends striations to help reduce “oil canning”. Other options to help reduce the appearance of “oil canning” are use of a heavier gauge of steel, narrower panel profile, lighter colors or backer rod. However, these methods are not guaranteed to eliminate “oil canning”.

We recommend that you read pages 2 through 6 of the Metal Construction Association Technical Bulletin 4/2018 V2: “Oil Canning in Metal Roof and Metal Wall Systems” of this disclaimer packet for more information about the natural phenomenon of “oil canning” or visit our website at, www.briggssteel.com/oil-canning.

Denotes required field in order to process your order*

*Please initial ribbing choice to be used on the panel profile from the approved order:

Smooth:_____ Box Ribbing:_____ Pencil Ribbing:_____ Striations:_____

BY SIGNING BELOW YOU HEREBY AUTHORIZE BRIGGS STEEL TO FABRICATE YOUR STANDING SEAM PANELS AND/OR FLUSH PANELS WHILE UNDERSTANDING THAT ”OIL CANNING” IS NOT A CAUSE FOR REJECTION. IF END USER IS NOT REQUIRED PER PURCHASER REQUEST, PURCHASER ACCEPTS ALL LIABILITY FROM END USER FOR ALL AND ANY “OIL CANNING” ISSUES THAT MAY ARISE.

*I, the purchaser, understand the natural phenomenon of “oil canning”; oil canning is not a cause for rejection and reviewed all 5 pages of the Metal Construction Association Technical Bulletin 4/2018 V2: “Oil Canning in Metal Roof and Metal Wall Systems” and authorize this order to be produced.

*Job Name:_____*Invoice # (s):_____

*End user physical address where material will be installed.

*Address_____

*City:_____*State:_____*Zip:_____*Phone:_____

*Purchaser full name:_____*Company:_____*Title:_____

*Purchaser signature:_____*Date:_____

End user and/or installer release of liability disclaimer

I, the purchaser; assume all responsibility of the end user and/or have the end user sign “oil canning” disclaimer below.
By signing you are assuming all liability with issues resulting in the end user’s satisfaction or lack thereof, due to “oil canning” issues that may arise, now or in the future.

*Purchaser signature:_____*Date:_____

*I, the end user, understand the natural phenomenon of “oil canning” and authorize Briggs Steel to produce the order.

*End user full name:_____*Title:_____

*End user signature:_____*Date:_____