Technoform Glass Insulation North America Exclusion Request Supporting Document

Summary

Technoform Glass Insulation (TGI) North America requires high precision thin slit steel meeting specific material specifications in order to manufacture and sell its proprietary plastic hybrid insulating glass spacer into North American markets. This type of specialty steel is represented by a very small niche market with few potential suppliers. TGI has made many attempts to procure high precision thin slit steel in master coil, oscillate and pancake form from US sources but has been unable to create a fully domestic supply chain because of US suppliers' inability to meet critical material specifications as well as their lack of volume capability. An exceptionally long steel supply qualification process associated with the market requirements for TGI's end product also precludes rapid switching in raw material supply.

Based on the inability to source master coil and oscillate high precision steel product from the US, TGI requests approval for an exclusion to allow Samsung C&T to fulfill its contract to supply TGI with the material requested in master coil and oscillate forms.

Company and Product

Technoform Glass Insulation (TGI) North America (www.glassinsulation.us) manufactures and sells a proprietary plastic hybrid stainless steel (PHSS) edge spacer for use in insulating glass. Insulating glass is an essential component of windows, storefront, skylights, curtainwall and glazed doors in both residential and commercial buildings in the United States. The TGI spacer product is sold under the brand name *TGI Spacer M* and is supplied to the market in a wide range of dimensions to meet the needs of the local market (figure 1).

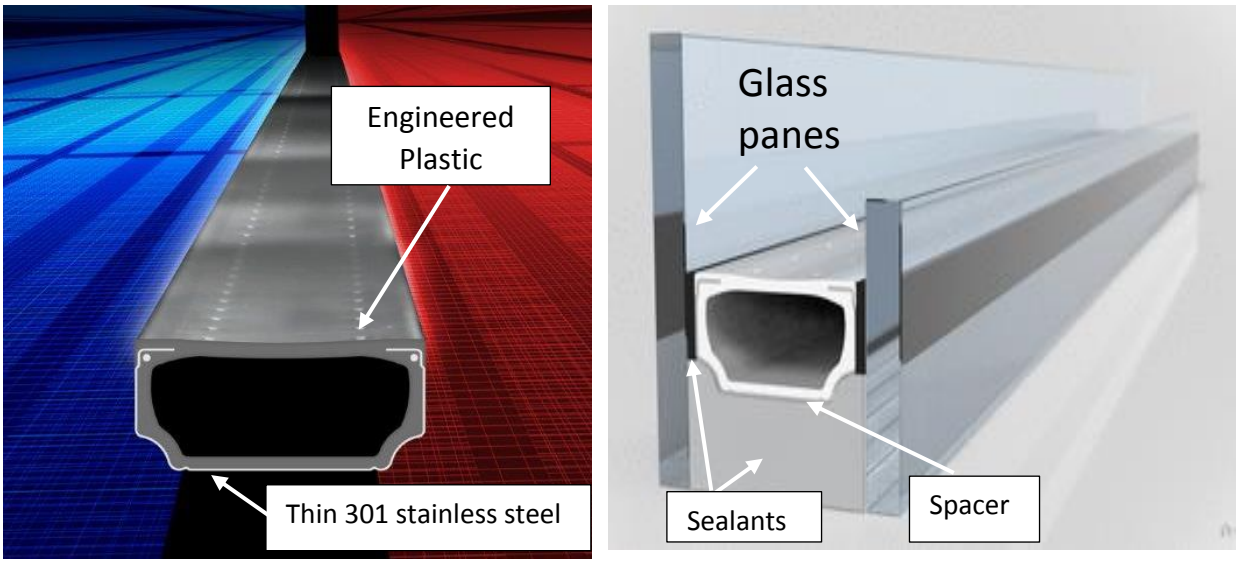

Figure 1: TGI Spacer M and integrated into the of the edge of an insulating glass unit

The combination of engineered plastic and stainless steel provides low thermal conductivity to increase the energy performance of a window by reducing the flow of heat from inside to outside at the glass edge. The use of stainless steel maintains a high level of durability and structural performance in the final insulating glass product. TGI believes strongly in local manufacturing and is committed to manufacturing spacer in the US rather than importing finished goods from abroad. Currently TGI North America employs 35 professional, engineering and manufacturing personnel and has manufacturing in Twinsburg Ohio. TGI North America has plans for adding additional manufacturing capacity in North America to meet additional growth requirements.

Market dynamics

US building energy codes are becoming more stringent. The energy efficiency requirements of our model building codes (ASHRAE Standard 90.1 and the International Energy Conservation Code (IECC)) have increased by almost 30% over the last decade, driven by the Energy Independence and Security Act of 2007. Thermally efficient edge spacer, such as Technoform's TGI Spacer M, are increasingly required as a component of insulating glass in order to meet more stringent window thermal performance requirements set by these codes. Because of more stringent building energy codes in both the US and also Canada, TGI has seen demand for their spacer product increase 60% over the past 4 years. Accelerated market growth is expected in the coming years as the most recent, more stringent, versions of ASHRAE 90.1 and IECC are adopted more widely across the US, and as TGI commercializes new, higher performing products for the US window market. TGI projects their spacer sales volume to increase twofold between 2017 and 2021.

New product commercialization

In 2015, TGI redesigned their original plastic hybrid stainless steel (PHSS) spacer, known to the market as TGI I-Spacer or TGI Wave Spacer, to reach even higher thermal performance targets and increased rigidity in order to better meet the needs of the North American market. The redesigned product (called TGI Spacer M) included a change in the shape of the spacer and a change from 430 stainless steel to 301 stainless steel. The latter grade of stainless steel has lower thermal conductivity than 430 steel, an improvement which is critical to reducing the thermal conductivity of the spacer itself and bringing the product in line with market needs. In addition, 301 grade stainless steel was also a requirement over other grades because its surface provides enhanced adhesion to the sealants used in insulating glass. A high level of sealant adhesion is essential for providing the required durability and lifetime performance when installed in the building. Over the period of 2016 to 2018, TGI has been ramping up production of the higher performance TGI Spacer M to replace the original "TGI Wave spacer". As a result, their purchase of 430 grade steel has decreased, whilst the purchase of 301 grade steel has increased during this time. The changeover from 430 to 301 steel in all but 2 Wave products (11.5mmR and 15.5mmR) and TGI's smallest "box" sizes (1/4, 5/16, 21/64, 3/8) will be complete this year (see figure 2 as an example of the changeover from 430 to 301 for one product size, 1/2").

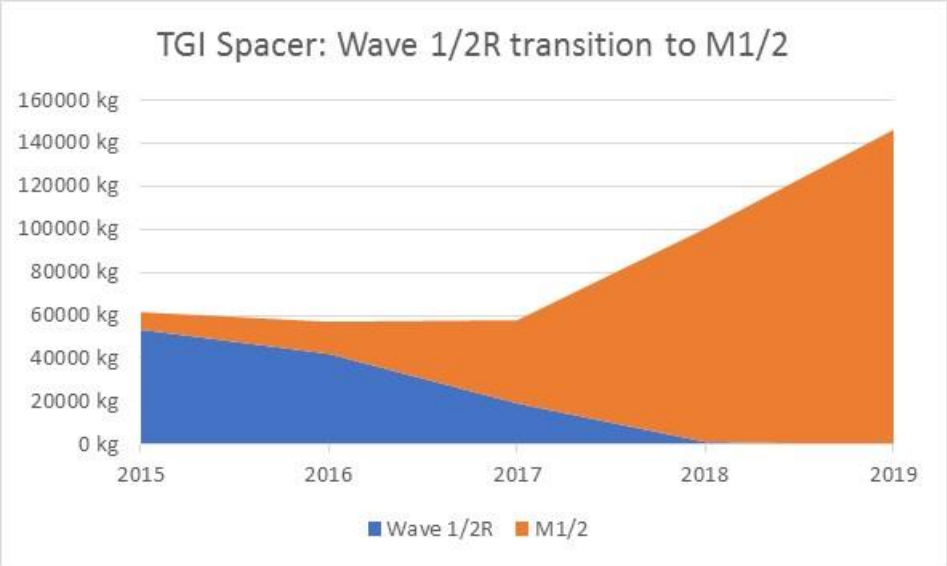

Figure 2: The volume changes in 430 and 301 steel during the transition from TGI Wave spacer in ½" size (Wave 1/2R) to TGI Spacer M in ½" size (M 1/2). Wave 1/2R is made with 430 steel and 1/2M is made with 301 steel.

Material Qualification and Testing Process

Changing the materials used in an insulating glass spacer cannot be done without significant testing and re-qualification because of the significant implications to the durability of the resultant insulating glass unit into which it is integrated. The US market requires that the final insulating glass product be tested according to ASTM E2188 and E2189, meet the specification of ASTM E2190 and to be qualified by an insulating glass certification program. ASTM E2188 alone takes at least four months to complete from the time units are first placed into the test chamber, but often the duration for testing to be completed is much longer, up to 8 months or more due to shipping and backlogs. In addition, because TGI exports to Europe and Asia, testing to International standards is required when new materials are qualified. This requires shipping insulating glass units by sea (4 weeks duration) to Europe for testing. A full qualification of a new steel material (type or source) also involves evaluation in manufacturing process, making sample spacer and component level testing. As a result, the time requirement for evaluating and qualifying new materials is at least one year, especially if test labs are backlogged or multiple iterations have to be explored and tested.

Technoform Glass Insulation's Steel Specifications

The most critical specifications, and those which are hard to meet in combination, for TGI steel raw material are identified below. TGI's full raw material specifications are proprietary and are available upon request. The type of steel that TGI needs to produce their spacer product falls in the category of thin precision steel. This is a small, niche, market with few manufacturers willing or able to make the steel at high precision at the thickness required.

Free of Grease and Oil: The steel used to make TGI spacer must be clean and free of any oil or lubricants. This is a critical specification because oil, grease and other lubricants can impact the adhesion of sealants in the insulating glass unit and cause premature failure in buildings.

Thickness specification: The steel required for TGI Spacer is very thin with a required thickness of 0.09mm with a tolerance of +/- 0.004mm. The thinness of the material is critical to providing the low thermal conduction required for the product performance in the insulating glass unit, and the precision is a requirement of the design to meet the process requirements as well as product performance.

Oscillate format: To make TGI Spacer M, TGI requires thin gauge steel in an "oscillate" form, where in the steel is slit to a pre-specified width (that is required to extrude into, for example, the ½" Spacer M profile by TGI) and wound in an oscillating fashion onto a "reel". Running oscillated material optimizes the throughput of the manufacturing process by reducing change over times compared with using ribbon slit steel (pancakes), see figure 3. The TGI specification for oscillate steel requires 600-1000 kg coils with an outside dimension of 970mm and core diameter of 400mm, with a maximum number of eight welds per coil. Technoform would lose more than 8% of its overall production capacity if it did not use oscillate coils which would result in a loss of customers and orders due to lead time increases.

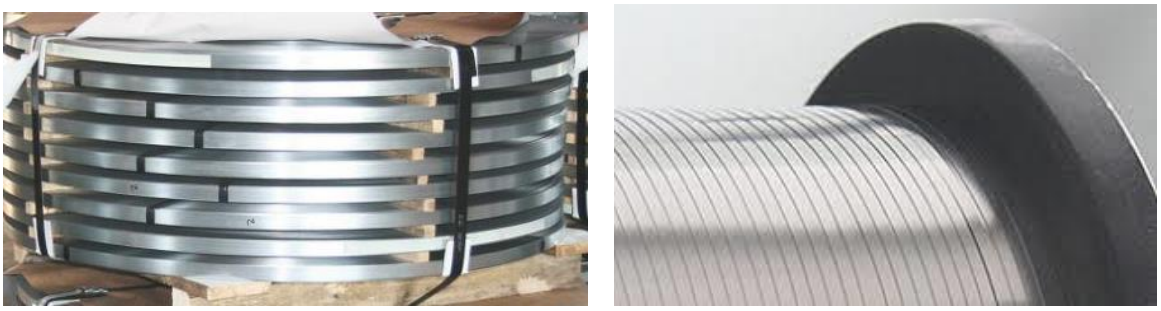

Figure 3: Ribbon coil or "pancakes" (left) and slit oscillated steel wound on a large reel (right).

Question 1.d - Required Volumes

The actual annual steel usage from 2015 to 2017 and the forecasted steel usage for 2018 and 2019 for TGI-Spacer M and TGI Wave spacer products, for which TGI is requesting exclusion from the section 232 tariff, are shown in Table 1. As discussed above, the TGI Wave product (requiring 430 steel) is currently being phased out and replaced by TGI Spacer M (requiring 301 steel) in most spacer sizes (with the exception of Wave 11.5R and 15.5R, and TGI's small "box" sizes – see rows 1-6 in table 1). The growth of steel usage year on year demonstrates the growth of TGI's sales over this time. Also shown in the last column is the requested exclusion amount for every product size and type. The exclusion request amount has been calculated using the forecasted usage for calendar year 2019. The use of the 2019 usage forecast to determine the exclusion request is based on the fact that TGI is forecasting significant sales growth through 2018 and 2019 and, because the steel supply chain is longer than 4 months, a significant amount of the steel imported during the second half of 2018 will be used in 2019. It is already almost half way through Q2 2018 at the time of this exclusion request. In addition, since the North American insulating glass business (TGI's customer base) is driven by custom designed commercial architectural projects, the actual product size mix that is estimated is subject to significant variation.

TGI North America is currently under a purchase contract with Samsung C&T for approximately 400 Metric Tons of steel in total for 2017-2018, with contracts currently being signed for extension through 2019.

Row	Steel Grade	TGI Product Size & type	Actual annual volumes, kg			Forecasted Annual Volumes, kg		Exclusion Request, kg
			2015	2016	2017	2018	2019	
1	430	1/4	2000 kg	5000 kg	3500 kg	7000 kg	7000 kg	7000 kg
2	430	5/16	2500 kg	2500 kg	3000 kg	2500 kg	2500 kg	2500 kg
3	430	21/64	13000 kg	7500 kg	10000 kg	19000 kg	24000 kg	24000 kg
4	430	3/8	6000 kg	7500 kg	6500 kg	7000 kg	7500 kg	7500 kg
5	430	Wave 11.5mmR	110000 kg	129000 kg	41500 kg	31000 kg	31000 kg	31000 kg
6	430	Wave 15.5mmR	28500 kg	13000 kg	23000 kg	3500 kg	5000 kg	5000 kg
7	301	M1/2	8500 kg	14500 kg	38000 kg	99000 kg	146000 kg	146000 kg
8	301	M11.5mm	0 kg	0 kg	31500 kg	100000 kg	100000 kg	100000 kg
9	301	M15.5mm	0 kg	1000 kg	8500 kg	18000 kg	18000 kg	18000 kg
10	301	M15/32	0 kg	1000 kg	6000 kg	14000 kg	15500 kg	15500 kg
11	301	M13/32	0 kg	0 kg	2500 kg	8500 kg	9000 kg	9000 kg
12	301	M17/25	0 kg	0 kg	1000 kg	3500 kg	3500 kg	3500 kg
13	301	M17/32	4000 kg	6000 kg	20000 kg	35000 kg	39500 kg	39500 kg
14	301	M19/32	2000 kg	3000 kg	10000 kg	20500 kg	25000 kg	25000 kg
15	301	M21/32	500 kg	1500 kg	1100 kg	1500 kg	1500 kg	1500 kg
16	301	M23/32	0 kg	0 kg	500 kg	3500 kg	3500 kg	3500 kg
17	301	M3/4	0 kg	0 kg	2500 kg	6500 kg	7000 kg	7000 kg
18	301	M5/8	0 kg	1000 kg	15000 kg	49000 kg	49000 kg	49000 kg
19	301	M7/16	0 kg	0 kg	3500 kg	8500 kg	9500 kg	9500 kg
20	301	M9/16	0 kg	0 kg	3000 kg	11000 kg	11000 kg	11000 kg
21	301	M23.5mm	0 kg	0 kg	1000 kg	8500 kg	15000 kg	15000 kg
22	301	301 Master	0 kg	2500 kg	54500 kg	74000 kg	74000 kg	74000 kg
23	430	430 Master	33000 kg	25000 kg	91000 kg	11000 kg	11000 kg	11000 kg
24	n/a	Wire	0	0	5000 kg	7500 kg	13500 kg	13500 kg

Table 1: Annual actual and forecasted usage for the manufacture of TGI Wave and M Spacer by year and requested exclusion amount. Numbers are rounded to the nearest 500kg (each oscillate weighs 600-1000kg).

Questions 4.e-4.h and 5.a-5e – Lack of Domestic Product Availability

Supplier sourcing

TGI has made many attempts to procure high precision thin slit steel in both oscillate and pancake form from US sources but has been unable to create a fully domestic based supply chain due to US Suppliers' inability to meet critical material specifications as well as a lack of volume capability.

Below is a list of US domestic precision steel suppliers that TGI has evaluated followed by more detail on each. Because of confidentiality agreements with these suppliers, the names of the suppliers are not disclosed herein and are referred to as Supplier A, Supplier B etc. Upon request, company names as well as additional confidential supporting evidence as identified below can be disclosed.

Currently Samsung C&T imports oscillates and master coils for TGI. Samsung C&T delivers the oscillates directly to TGI and delivers the master coils to a local US slitter (service center, Slitter A), which is then slit to size into pancake form for TGI.

The suppliers listed in red (**Suppliers A-E**) cannot meet TGI's specification and/or volume requirements. The supplier listed in black (**Supplier F**) would have to source stainless steel raw material from Europe to meet specification requirements. The supplier listed in green**, Samsung C&T**, imports slit to size oscillate and master coils for TGI, and is the supplier listed in TGI's exclusion request.

- Supplier A has insufficient capacity, quality issues and is unable to meet steel format specifications (supply in oscillate form)
- Supplier B cannot meet thickness requirements
- Supplier C is unable to meet steel format specifications (supply in oscillate form)
- Supplier D is unable to meet quality requirements
- Supplier E is unable to meet quality and format specifications (steel is not grease free, no oscillates)
- Supplier F would need to import steel to meet TGI requirements
- Samsung C&T imports slit to size oscillate for TGI and master coils which are then slit to size into pancake form by Slitter A for TGI

Lack of Domestic Qualified Vendor Capacity

Before 2014, Technoform Glass Insulation was purchasing steel from a local US supplier, ***Supplier A***, which procured its master coils from local mill sources. As TGI's business grew, it became clear in 2014 that ***Supplier A*** was going to be unable to support their volume requirements. Technoform Glass Insulation's orders to ***Supplier A*** had increased and ***Supplier A*** had difficulty in managing this increased capacity and in meeting required lead times.

In addition, ***Supplier A*** does not have the internal ability to oscillate material for TGI which, together with both the capacity constraints and issues meeting TGI's quality specifications (see below), meant that TGI had to look elsewhere to purchase both pancake and oscillated steel.

TGI continued purchasing pancake material from ***Supplier A*** throughout 2014 into 2015. During this time TGI began to qualify a local service center in Ohio, ***Slitter A***. ***Slitter A*** is a member of ***Supplier A***'s business structure. ***Slitter A*** was initially qualified by TGI as a ribbon coil (pancake) supplier. However, the supply chain still required importation of master coils of steel from Europe in order to meet the

volume and quality requirements. To meet TGI's needs, ***Slitter A*** purchased master coils of steel meeting their thickness and grease-free specifications, originally from Aperam in France, and subsequently from Samsung C&T (which also imported master coils from a production facility in Europe). ***Slitter A*** then then slit these master coils into pancake form locally for TGI. Note that the pancake form of steel is much less efficient in TGI's manufacturing process than the oscillate form, and so this was not an effective solution for TGI's business.

In order to create the needed supply of oscillated steel material (oscillates), ***Slitter A*** procured oscillate coils in bulk from Samsung C&T (again, imported from Europe to meet volume and specification requirements) and supplied them on an as needed basis to TGI. This international supply chain was intended to be temporary while ***Slitter A*** worked with their sister company in Chicago to create a domestic supply of oscillate format thin high precision steel. To date, their sister company has never been able to provide such oscillates. Therefore, TGI's only option for such oscillates is to purchase slit to size oscillates directly from Samsung C&T.

TGI also contacted ***Supplier F*** for local supply of steel. During the quotation phase with ***Supplier F***, ***Supplier F*** communicated that they would also need to import material to meet the requested volume for TGI North America.

Furthermore, TGI also reached out to a research group, Specialty Metals Research, lead by Markus Moll, to provide a breakdown of available suppliers of thin precision slit stainless steel from a capability and capacity perspective. This report indicated a significant capacity risk presenting itself in the North American market for precision slit steel. They indicated capacity and capacity utilization becoming critical in the US, all of which supported TGI's experience in trying to set up a solely US steel supply chain for their specialty material. The capacity data from this research is available on request.

Inability of domestic suppliers to meet TGI Specifications

As noted above, TGI North America has contacted a number of domestic suppliers in attempts to establish a local procurement supply chains for stainless steel. Although these actions have identified some vendors that can supply stainless steel meeting some areas of the quality specification, no single vendor can meet all aspects of the specification, and in some cases the raw steel still must be imported. Below is a summary of potential US vendors evaluated and their ability to perform relative to the key specification requirements.

Lack of capability to provide grease free steel:

Supplier A and Supplier D: TGI was formerly purchasing from two domestic suppliers: ***Supplier A*** and ***Supplier D***. During this period of purchasing, TGI experienced critical quality issues because of material contaminated with oil from both suppliers.

Supplier E: TGI attempted to work with ***Supplier E*** to qualify them as a local oscillate supplier. Due to struggles with welding, and the material being covered in oil, TGI was unable to qualify ***Supplier E***.

Lack of capability to produce to required thickness:

Supplier B: TGI attempted to procure precision slit steel from ***Supplier B***. The feedback from ***Supplier B*** is that they would not be able to meet TGI's request to slit material at 0.09mm thickness.

Lack of Capability to Oscillate:

Supplier F: As mentioned above service center, ***Slitter A*** attempted to get their sister company in Chicago set up to run oscillate material. Unfortunately, they struggled to weld and were not able to successfully oscillate all sizes. Technoform began its partnership with ***Slitter A*** in 2015 as a local pancake coil service center with the intention of ***Slitter A*** becoming an oscillate service center. To date TGI has not seen any product produced out of their sister company facility and as a result ***Slitter A*** continues to have to source from both master coils and oscillates from Europe.

Supplier C: Technoform has also tried in the past to procure material in oscillate form from ***Supplier C***. ***Supplier C*** was unable to meet TGI requirements for oscillate coils and was therefore not able to be qualified as a supplier.

Conclusion

TGI has made many attempts to procure high precision thin slit steel in master coil, oscillate and pancake form from US sources but has been unable to create a fully domestic supply chain because of the inability of potential US suppliers to meet critical material specifications as well as their lack of volume capability. This type of specialty steel represents a very small, niche market.

Based on the inability to source product from the US, TGI requests approval for an exclusion be granted for the material requested in master coil and oscillate forms. Furthermore, based on the inability of US suppliers to meet TGI's specification requirements and the exceptionally long (over a year) qualification process for new steel supply, TGI is requesting an exclusion be granted based on the fact there is no US supply.

The inability to find US steel suppliers for this specialty steel product, and the application of a tariff on TGI's current supply chain, will create significant hardship for this US manufacturing company, and negatively impact TGI's ability to compete with foreign importers of competitive spacer products.