

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

U63141411355111

FACILITY: Glass and Mirror Craft Industries		SRN / ID: U631414113
LOCATION: 48230 West Road, Wixom		DISTRICT: Warren
CITY: Wixom		COUNTY: OAKLAND
CONTACT:		ACTIVITY DATE: 08/18/2020
STAFF: Iranna Konanahalli	COMPLIANCE STATUS: Compliance	SOURCE CLASS:
SUBJECT: FY 2020 inspection of Glass and Mirror Craft Industries ("GMC Industries")		
RESOLVED COMPLAINTS:		

Glass and Mirror Craft Industries (U-63-14-14113)

48230 West Road

Wixom, Michigan 48393-3675

Rule 336.1287(2)(c) paint spray booths (1. Small: 5 ft. width x 5 ft. depth * 5 ft. height, color matching booth [production outsourced] and 2. Large: 20 ft. width x 5 ft. depth x 10 ft. height, silicone paint booth)

Not Subject to: NESHAP/ MACT T, area source National Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning (40 CFR, Part 63, Subpart T; NESHAP/ MACT T); Correction; 29484 Federal Register / Vol. 60, No. 107 / Monday, June 5, 1995 / Rules and Regulations; amended National Air Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning (40 CFR, Part 63, Subpart T); Final Rule; Page 25138 Federal Register / Vol. 72, No. 85 / Thursday, May 3, 2007 / Rules and Regulations. Solvents containing halogenated compounds (>5%w: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 71-55-6), carbon tetrachloride (CAS No. 56-23-5), and chloroform (CAS No. 67-66-3)) are not used.

On August 18, 2020, I conducted a level 2 self-initiated **FY 2020 inspection** of Glass and Mirror Craft Industries ("GMC Industries"), located at 48230 West Road, Wixom, Michigan 48393-3675. The inspection was conducted to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451; and Michigan Department of Environment, Great Lakes and Energy, Air Quality Division (EGLE-AQD) administrative rules.

During the inspection, Mr. Tony Moore (Phone: 248-624-5050-ext. 218; Fax: 248-624-6988; Cell: 248-303-2631) E-mail: tMoore@GlassAndMirrorCraft.com), Plant Manager, assisted me.

About 2018, Mr. David Bruss (Phone: 248-624-5050 or 800-521-2200-ext. 218; Fax: 248-624-6988; Cell: 517-416-5712) E-mail: dBruss@GlassAndMirrorCraft.com), Maintenance & Facilities Manager, separated.

Glass and Mirror Craft Industries (“GMC Industries”) moved into this building about 2002; GMC Industries is in business for over 50 years. GMC Industries is in the business of glass fabrication involving cutting, polishing, insulating, tempering (heat treatment), laminating, etc. Predominantly, glasses are for architectural and commercial buildings. Glass pieces (large enough [5-20 mm] that the pieces cannot be air-borne and settle to ground quickly via gravity settling) are spilled in some areas of the plant. GMC Industries employs about 150 people (2018).

GMC Industries makes a wide variety of products:

1. Fabricated glass: wide range of fabricated products
2. Architectural systems: custom fabricated glass for entry ways, structure walls, guardrails, canopies, shower enclosures, stairs, etc.
3. Insulated glass: energy efficient solutions to residential and commercial projects
4. Decorative glass: crystal clear glass, bright colored glass, textured glass, etc.

Glass tempering – heating in furnace and air quenching

As one more is added about April 2016, two glass tempering furnaces (electrically heated) are present: existing or old Eastside IANUA (installed in 2001) and new Westside LandGlass (installed in 2016) located at opposite sides of the building (East & West).

One IANUA (Eastside) electrically heated glass tempering furnace is present. The process consists of heating and cooling (air quenching) sections. The furnace operates at 670 °C (average). Twelve (12) fans are present for forced convection heating. The residence time in the furnace depends on thickness of glass. The hot glass is air quenched; liquid quenching breaks glass due thermal stresses.

One LandGlass (Westside) electrically heated glass tempering furnace (installed about April 2016) is present. The process consists of heating and cooling (air quenching) sections. The furnace operates at 670 °C (average). Seven (7) fans are present for forced convection heating. The residence time in the furnace depends on thickness of glass. The hot glass is air quenched; liquid quenching breaks glass due thermal stresses. Furnace and Quench are integrated into one machine. In addition, before glass is tempered, glass is washed using Handong washing machine with integrated dryer.

As expected, thicker glasses are tempered slowly than thinner glasses.

As stated above, tempering involves heating glass in a furnace to ≈ 650 °C with a prescribed residence time depending upon the thickness and then quenching using high pressure array of air nozzles. In such accelerated air quenching, variables such as air temperature, volume, velocity, nozzle size & nozzle location, etc. are considered. Obviously, quenching cools outer surfaces of glass much more rapidly than the center based upon resistance to heat transfer. As the center cools, it tries to pull back from the outer surfaces. As a consequence, the center remains in tension and outer surfaces go into compression. Such compressive and tensile forces give glass its strength. According to federal regulations, tempered glass must have surface compression of 10,000 psi or greater. Chemical tempering is more expensive and generally not used. Tempered glass should not be confused with heat-treated glass and annealed glass. While annealed glass is ordinary glass, heat-treated glass (surface compression of 3,500 – 7,500 psi) is cooled slower than tempered glass. In other words, heat-treated glass surface compression is lower than that of tempered glass. However, heat-treated glass is twice as strong as annealed (untreated) glass.

As stated above, chemical, aka ion-exchange, strengthening is lot more expensive and is used for high priced glass such as smart phone protection glass, optical instruments, electronics. The process treats glass by submerging in potassium salt bath (≈ 300 °C) causing sodium (Na) ions in glass to be replaced by potassium (K) ions from the bath. Potassium ions, which are larger than sodium ions, squeeze themselves into the gap left by smaller sodium ions when migrating to potassium solution. Hence, the surface of the glass is in a state of compression while core is in compensating tension. Chemical composition of the solution is tailored for specific application. Chemical tempering can be applied to very thin glass for distortion-free tempering for special applications (optics, semiconductors, medicine, etc.). Unlike air

tempering, chemical tempering creates uniform layer of stress owing to uniform ion-exchange.

The glass tempering furnaces (2) are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1282(2)(a) because the furnace is electrically heated and, also, emissions are discharged to in-plant environment (Rule 336.1285(2)(I) although not listed).

CNC tables (3)

Large glass pieces are cut using FORVET CNC cutters (2 machines: installed in 2004 and 2014). Unlike two old machines (mill and drill only and no polish), one brand new CMS Brembana machine installed in January 2017 can mill, drill and polish. No emissions controls and the emissions, if any, are released to in-plant environment.

The machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(2)(I).

Polishing machines (5)

Five (reduced from 6 to 5: 1 of 6 removed about April 2015) glass polishing machines are present. Four Schiatti and one Babonelloni machines, in all five machines, are present. No emissions controls and the particulate emissions, if any, is released to in-plant environment.

The machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(2)(I).

Paint spray booths (2)

Two paint booths (1. Small 5 ft. width * 5 ft. depth * 5 ft. height and 2. Large 20 ft. width * 5 ft. depth * 10 ft. height) with back-draft dry filter systems are present. While the small booth is mostly used for color matching (production painting is outsourced), the large booth is used for spray painting silicone-based paint in the glass insulation department. Both small and large booths are made by Global

Finishing Systems (GFS: 800-848-8738). Pressure differential (ΔP) measuring instrument, for ΔP across filters, Dwyer Mark II inclined manometer, is present. $\Delta P = 0.6$ inches of water during the inspection, upon starting the fan.

30-50 gallons per month (<< 200 gallons per month) of the paint materials (including water) are sprayed. The booths are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1287(2)(c). The booths are a source of VOC emissions. Most paints are water based although some paints are solvent based.

Per my MS Excel spreadsheet calculations based upon the data provided the coatings usage is as follows:

1. Opaci-Coat (Water-based Silicone paint, liters per year): **1,824** in CY 2019; **750** in CY 2020-YTD-AUG.
2. Frit (Water-based Ceramic paint, pounds per year): **163** in CY 2019; **250** in CY 2020-YTD-AUG.

All weights and measures include water. 1 gallon = 3.785 liters. CY 2019 Total = 1987 liters = 525 gallons of coatings, including water, per year for two booths. The Rule 287 limit is 200 gallons of water-free coatings per month per booth. Glass and Mirror uses water-based coatings.

I asked Mr. Moore to install the filters such that they fit, at all times, snugly without gaps and holes. I also asked him to keep records of paint and solvent usage. Purchase records are available. I asked him to change or check filters when the pressure drop is out of the ordinary for good working conditions.

Glass drilling and milling machines (2)

Glass pieces are drilled and milled using CNC machines (2). Soaking water flow is used for cooling tools and glass as well as for particulate emissions control. The particulate emissions are released to in-plant environment.

The machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(2)(I).

Glass insulation manufacturing lines (2)

Two glass insulation lines (one manual and one automated) are present. No emissions controls and the particulate emissions are released to in-plant environment.

The machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(2)(I).

Silkscreen printing machine (one table)

Silkscreen printing machine (one table) is present. All paints are water based. A digital printing machine is not installed yet.

The machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1287(2)(e).

Sandblast machine (1)

One sandblast machine is present. The machine, with full enclosure, has its own capture device for particulate matter emissions. The captured grit is collected using a filter system and recycled / reused. The sandblast machine is exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(2)(I). The machine is idled at this time (Feb 2018).

Cold-cleaner

There is one 3 ft. * 2 ft. parts cold-cleaner with spray a brush and a solvent tank. The cleaner is only equipped with a soaker tank but no drum to collect drained solvents. The cold-cleaner is subject rule 336.1611 or 336.1707 depending on if it is existing or new. A cold-cleaner is exempt from Rule 336.1201 pursuant to Rule 281(2)(h) or Rule 285(2)(r)(iv). Existing (611) cold cleaners were placed into operation prior to July 1, 1979. New (707) cold cleaners were placed into operation on or after July 1, 1979.

Mechanically assisted lid was closed and the operating procedures (DEQ Decal) were posted during the FY 2018 inspection.

The Cold-cleaner is NOT Subject to: 40 CFR, Part 63, Subpart T, NESHAP/ MACT T, since solvents containing halogenated compounds are not used.

Gray Mills 2RE49 solvent (Graymills Corporation of Chicago 800-424-9300) is used

About October 2014, I gave DEQ's decals for "cold-cleaner operating procedures" for posting and complying with work-practice rules. I asked the company to follow the common-sense work practice in the procedures. The procedures were posted during the inspection.

100% VOC solvent; 97% aliphatic petroleum distillates. Flash Point (FP) = 145 °F Tag CC. Auto Ignition = NA °F. Boiling Point (BP) = 360-410 °F @ 760 mm Hg. Vapor Pressure (VP) = NA mm Hg at 68 °F. Specific Gravity (SG, Water = 1.0) = 0.8. Density (ρ) @ 68 °F = 800 grams / liter. Flammability range = 0.9 %v (LEL) – 7%v (UEL).

Conclusion

Two paint spray booths, several glass cutting / grinding CNC machines, etc. and two glass tempering furnaces are present. All process equipment and processes are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rules 336.1285, 336.1287, 336.1282, etc. Glass and Mirror's operations appear to be in compliance with the Air Quality Regulations.

NAME *J. S. Marshall* DATE January 4, 2021 SUPERVISOR *Joyce*