

Technical News Bulletin

Owensville, July 2015

585 Metering Spouts for Low and High Tonnage

Introduction

In 2002, Bucher Emhart Glass introduced the Metering Spout System designed to promote optimum gob forming conditions. The 585 metering spout series was designed for high tonnage operations pulling between 145 and 200 mtpd in conjunction with Bucher's servo driven NIS machine.

In the past 13 years, a great number of the large 585 feeders have been installed in glass plants around the world. However, market developments have recently pushed some those glass plants to slow down production, resulting in pull rates below what the 585 was originally designed for. These low pull rates can lead to excessive wear on the spout and tube refractories, as well as poor weight and temperature control for the gobs.

The reason for the operations issues with a 585 metering spout at low tonnage stems from the height of the refractory tube. For instance, to pull 120 mtpd of glass through a 585 metering spout, the tube may need to be lowered to as much as 0.25" above the spout. At this height, computer models show that there is a great deal of shear stress at the throat of the spout. This intense shear stress is also present on the tube, producing a greater rate of wear on both the tube and the throat of the spout resulting in shorter service life for the refractories.

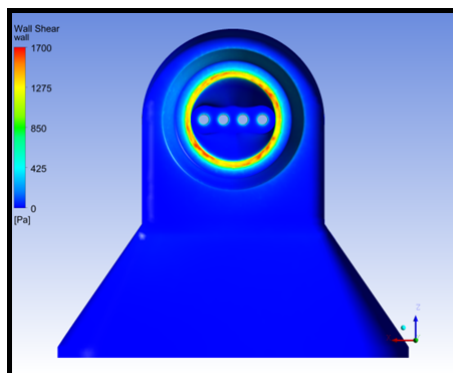


Figure 1 Computer model of shear stress in a standard, high tonnage 585 metering spout with a tube height of 0.25".

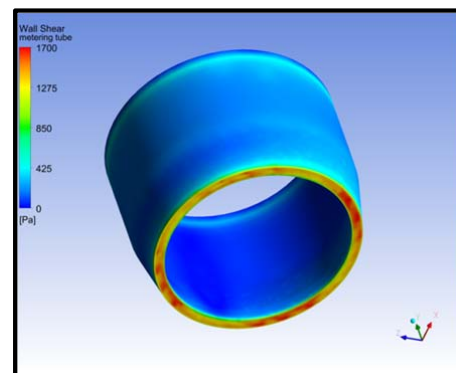


Figure 2 Computer model of shear stress on a 585 metering tube with a tube height of 0.25".

The short distance between the refractory tube and spout also has a significant effect on the flow of glass through the spout. At pull rates below 140 mtpd, computer models show evidence of a pressure imbalance inside of the spout bowl. This imbalance can create a temperature differential between 20 and 40°C from the front to the back of the spout. Variations in velocity from the front to the back of the spout are also present. These differences in temperature and velocity in the spout bowl can result in difficulties maintaining consistent gob weight and temperature.

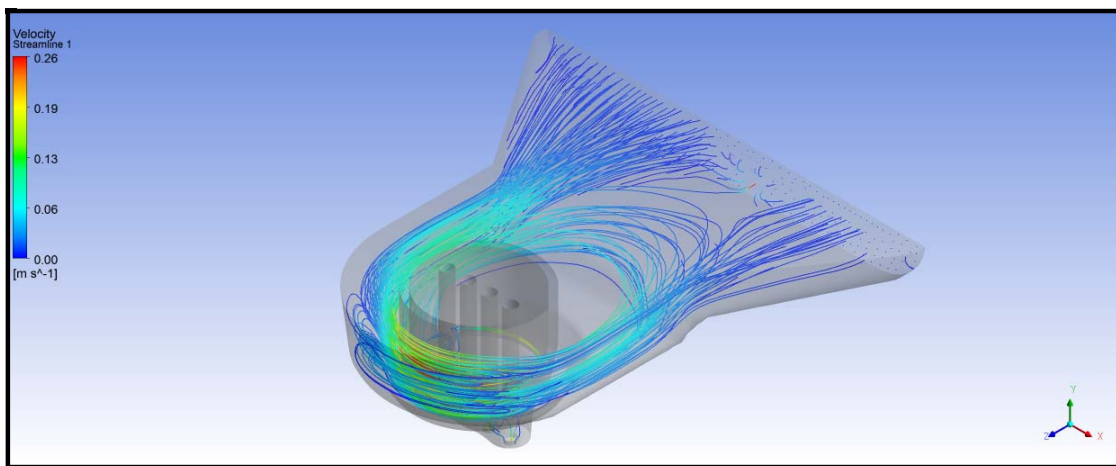


Figure 3 Computer model of glass flow in a standard, high tonnage 585 metering spout at a pull rate of 140 mtpd.

The Bucher Emhart Glass Refractory Plant in Owensville, Missouri, with assistance from the Bucher Emhart Glass Research Center in Windsor, Connecticut, has developed a new 585 metering spout designed to operate at pull rates between 110 and 160 mtpd. This was accomplished by reducing the volume inside the spout to allow for lower pull rates while maintaining tube heights sufficient for optimal glass flow.

| Tube height (in) Spout design | 0.75 (Minimum) | 2.5 (Maximum) |
|--|---------------------------------|--------------------------------|
| High Tonnage 585 Spout | 146 | 196 |
| Low Tonnage 585 Spout | 113 | 162 |

Table 1 Estimated pull rates based on computer modeling, assuming flint glass at 1200°C.

The new low tonnage 585 spout fits the standard 585 equipment, using the same feeder mechanism, orifice rings, refractory tubes, etc. In order to change a 585 metering spout to a low tonnage situation, a plant only needs to replace the spout refractory and the refractory burner blocks.

Bucher Emhart Glass has been conducting field trials with the new 585 metering spout for the past 18 months. Reports have confirmed excellent gob weight and temperature control, with greatly improved refractory wear. The new spout is now available as a standard Bucher Emhart Glass product.

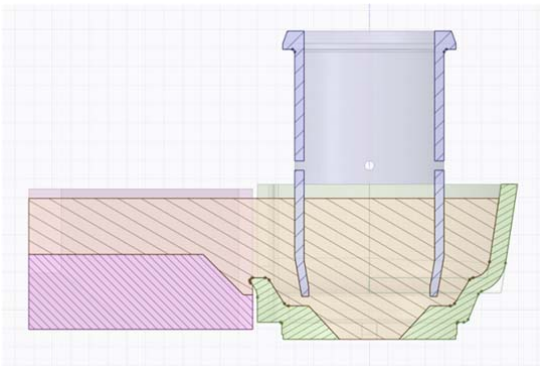


Figure 4 Standard High Tonnage 585 Metering Spout

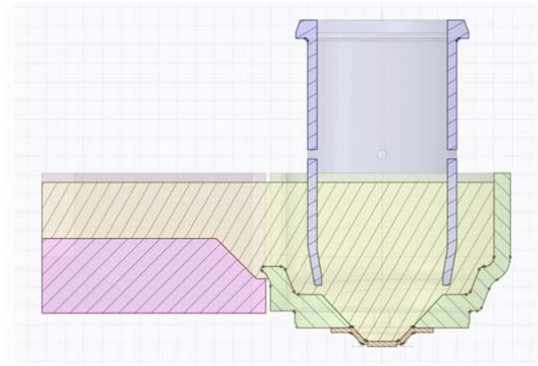
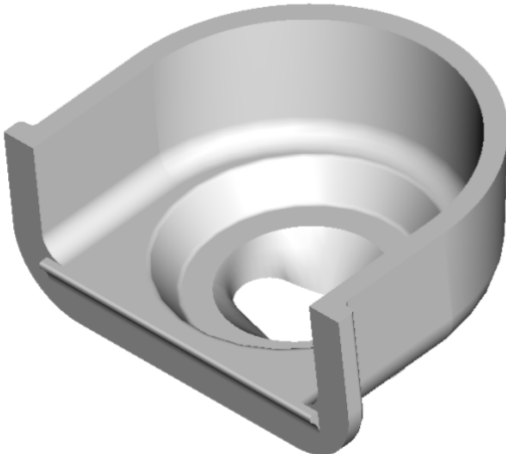


Figure 5 New Low Tonnage 585 Metering Spout

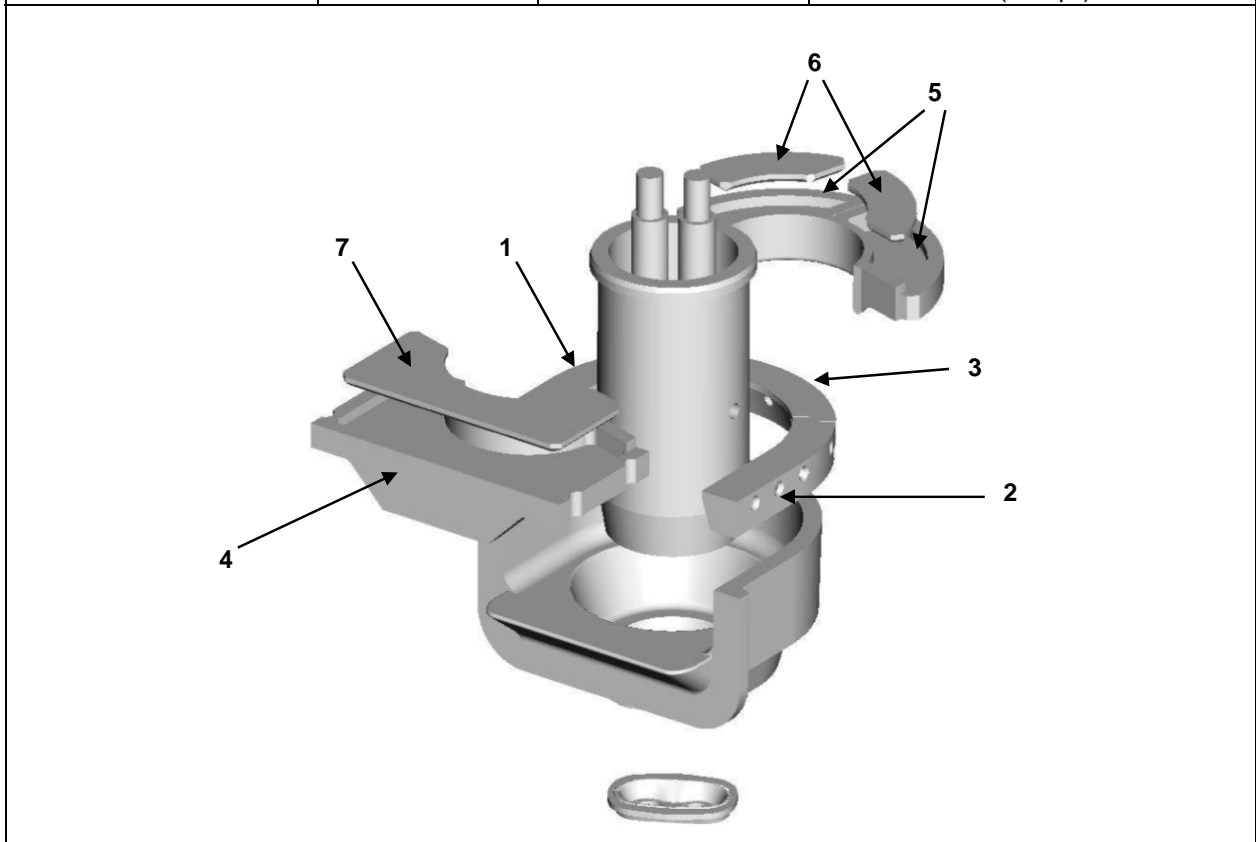
Specification

585 High Tonnage Metering Spouts – For 13” Tube – 13” Deep

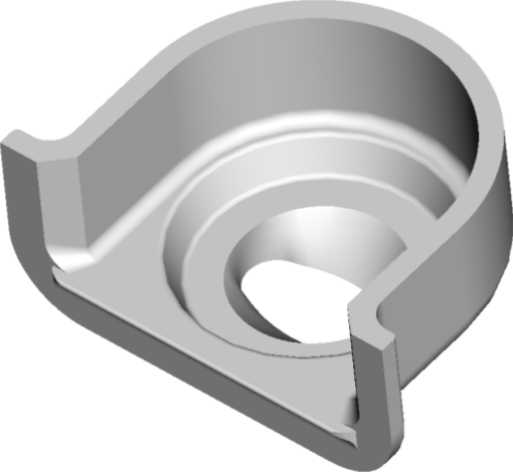
|  | Shear Angle | Part # | Shear Angle | Part # |
|--|--------------------|---------------|--------------------|---------------|
| | CL 0° | 585-1173-3XX | 90° L | 585-1191-3XX |
| | 5° R | 585-1174-3XX | 85° L | 585-1192-3XX |
| | 10° R | 585-1175-3XX | 80° L | 585-1193-3XX |
| | 15° R | 585-1176-3XX | 75° L | 585-1194-3XX |
| | 20° R | 585-1177-3XX | 70° L | 585-1195-3XX |
| | 25° R | 585-1178-3XX | 65° L | 585-1196-3XX |
| | 30° R | 585-1179-3XX | 60° L | 585-1197-3XX |
| | 35° R | 585-1180-3XX | 55° L | 585-1198-3XX |
| | 40° R | 585-1181-3XX | 50° L | 585-1199-3XX |
| | 45° R | 585-1182-3XX | 45° L | 585-1200-3XX |
| | 50° R | 585-1183-3XX | 40° L | 585-1201-3XX |
| | 55° R | 585-1184-3XX | 35° L | 585-1202-3XX |
| | 60° R | 585-1185-3XX | 30° L | 585-1203-3XX |
| | 65° R | 585-1186-3XX | 25° L | 585-1204-3XX |
| | 70° R | 585-1187-3XX | 20° L | 585-1205-3XX |
| | 75° R | 585-1188-3XX | 15° L | 585-1206-3XX |
| | 80° R | 585-1189-3XX | 10° L | 585-1207-3XX |
| | 85° R | 585-1190-3XX | 5° L | 585-1208-3XX |

585 High Tonnage Metering Assembly – 13” Tube

| Metering Tube Size | Pos. # | Part # | Description |
|--------------------|--------|--------------|-------------------------------|
| 13” (330 mm) | 1 | 585-1011-338 | Burner Block, RH |
| | 2 | 585-1010-338 | Burner Block, LH |
| | 3 | 585-1012-338 | Burner Block, Center |
| | 4 | 585-1090-345 | Spout Cover, Rear |
| | 5 | 585-1089-338 | Spout Cover, Front, (2 req'd) |
| | 6 | 585-1086-397 | Front Insulation (6 req'd) |
| | 7 | 585-1087-397 | Rear Insulation (3 req'd) |

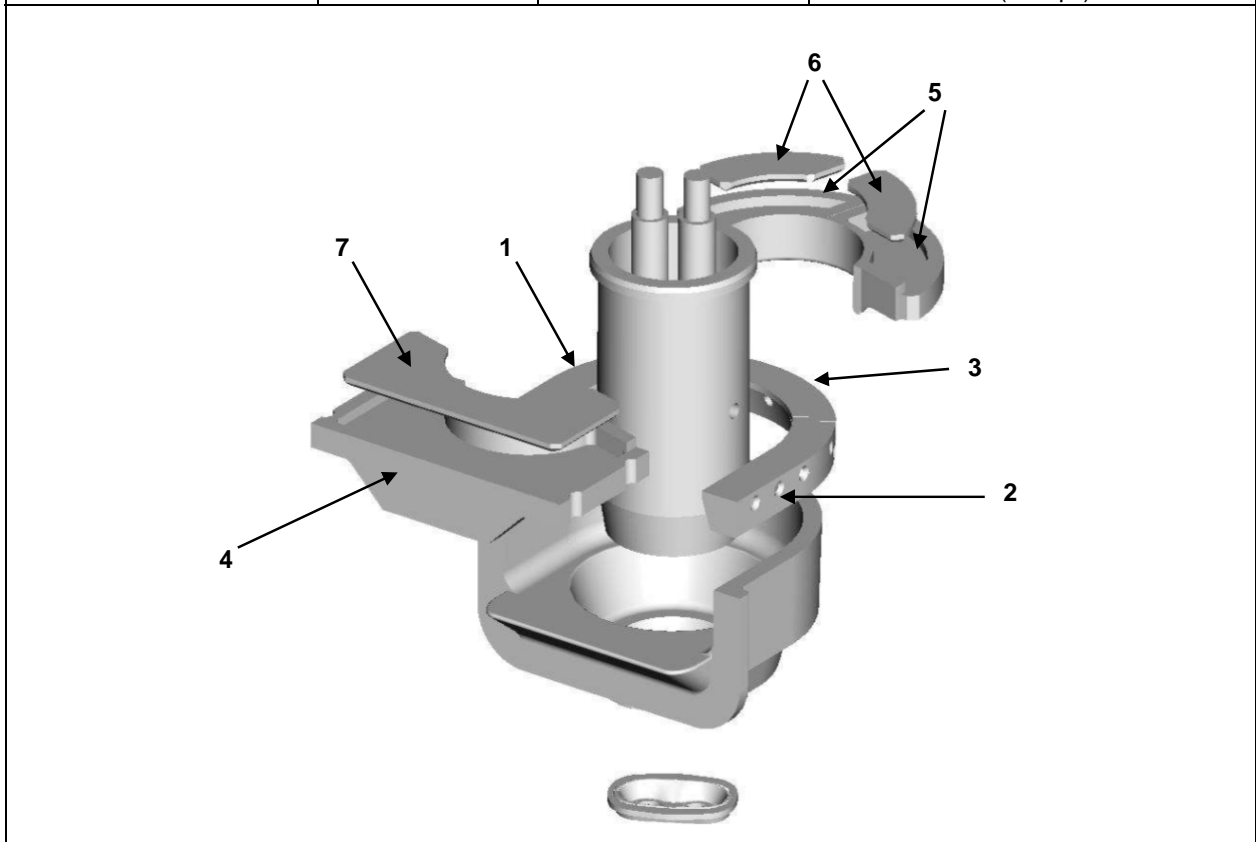


585 Low Tonnage Metering Spouts – For 13” Tube – 13” Deep

|  | Shear Angle | Part # | Shear Angle | Part # |
|--|--------------------|---------------|--------------------|---------------|
| | | CL 0° | 585-1303-3XX | 90° L |
| | 5° R | 585-1304-3XX | 85° L | 585-1322-3XX |
| | 10° R | 585-1305-3XX | 80° L | 585-1323-3XX |
| | 15° R | 585-1306-3XX | 75° L | 585-1324-3XX |
| | 20° R | 585-1307-3XX | 70° L | 585-1325-3XX |
| | 25° R | 585-1308-3XX | 65° L | 585-1326-3XX |
| | 30° R | 585-1309-3XX | 60° L | 585-1327-3XX |
| | 35° R | 585-1310-3XX | 55° L | 585-1328-3XX |
| | 40° R | 585-1311-3XX | 50° L | 585-1329-3XX |
| | 45° R | 585-1312-3XX | 45° L | 585-1330-3XX |
| | 50° R | 585-1313-3XX | 40° L | 585-1331-3XX |
| | 55° R | 585-1314-3XX | 35° L | 585-1332-3XX |
| | 60° R | 585-1315-3XX | 30° L | 585-1333-3XX |
| | 65° R | 585-1316-3XX | 25° L | 585-1334-3XX |
| | 70° R | 585-1317-3XX | 20° L | 585-1335-3XX |
| | 75° R | 585-1318-3XX | 15° L | 585-1336-3XX |
| | 80° R | 585-1319-3XX | 10° L | 585-1337-3XX |
| | 85° R | 585-1320-3XX | 5° L | 585-1338-3XX |

585 Low Tonnage Metering Assembly – 13” Tube

| Metering Tube Size | Pos. # | Part # | Description |
|--------------------|--------|--------------|-------------------------------|
| 13” (330 mm) | 1 | 585-1424-338 | Burner Block, RH |
| | 2 | 585-1423-338 | Burner Block, LH |
| | 3 | 585-1425-338 | Burner Block, Center |
| | 4 | 585-1090-345 | Spout Cover, Rear |
| | 5 | 585-1089-338 | Spout Cover, Front, (2 req'd) |
| | 6 | 585-1086-397 | Front Insulation (6 req'd) |
| | 7 | 585-1087-397 | Rear Insulation (3 req'd) |



Installation Requirements

Materials Needed for Spout Insulation

| Spout Casing | Spout Insulation Assembly Reference Drawing | Spout Style | Microporous Insulation Kit | EmCast 25 59-94657 | R-220 Lutting Cement 1320-455 | Anti-Adhesive 1320-460 | #312 Cement 1320-30 |
|--------------|---|--------------|----------------------------|--------------------|-------------------------------|------------------------|---------------------|
| 585 Spout | 585-7-01 | High Tonnage | 59-94684 | 125 lbs. | 80 lbs. | 5 lbs. | 80 lbs. |
| 585 Spout | 585-7-02 | Low Tonnage | 59-95504 | 150 lbs. | 80 lbs. | 5 lbs. | 80 lbs. |

Features / Benefits

For high pull rates, between 145 and 200 mtpd

⇒ Standard, High Tonnage 585 Spout

For low pull rates, between 110 and 160 mtpd

⇒ New, Low Tonnage 585 Spout

585 Equipment

⇒ The new, low tonnage spout fits the standard 585 equipment, including the casing and burner manifold.

585 Refractory

⇒ The new, low tonnage spout uses the same orifice ring, tube, plungers, and covers as the standard, high tonnage 585. Only the burner blocks must be changed.