

## Technical News Bulletin

March 2007

### InVertiFlow Blank Mold Cooling 5½” DG

The VertiFlow blank mold cooling systems as introduced by Emhart Glass SA in 1988 is a firmly established service-proven product and paved the way for enhanced productivity gains. These systems use plenum chambers on top of the blank molds, passing cooling air through vertical holes to the bottom of the blank molds.

With the new **InVertiFlow** blank mold cooling system the airflow has been “inverted”, passing the air from plenum chambers at the bottom – or lower end – to the top of the blank molds. This new cooling system offers additional benefits:

- Higher cooling efficiency
- Individual cooling of mold halves
- Fumes and heat carried away
- Easier mold change
- Speed increase potential
- Optimized cooling conditions
- Improved operator environment
- Reduced down time

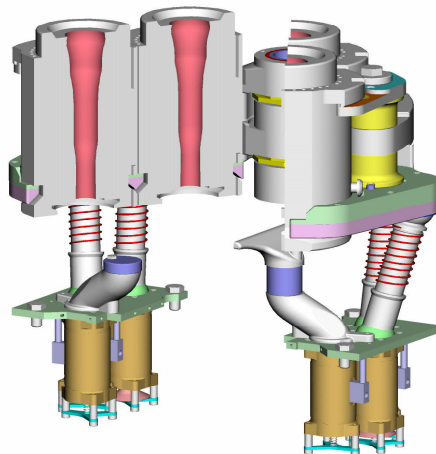


Figure 1 - InVertiFlow Blank Mold and Neck Ring Cooling System

## System Description

The InVertiFlow cooling system is designed to accept, with some minor modifications, existing blank molds used with the earlier VertiFlow cooling system. Blank molds used with conventional stack cooling may be used providing the cooling holes will not interfere with the cooling fins.

The system consists of the following major elements (Fig. 2).

- Universal mold holder arm
- Upper mold holder plates
- Plenum chambers
- On/Off controls
- Neck ring cooling

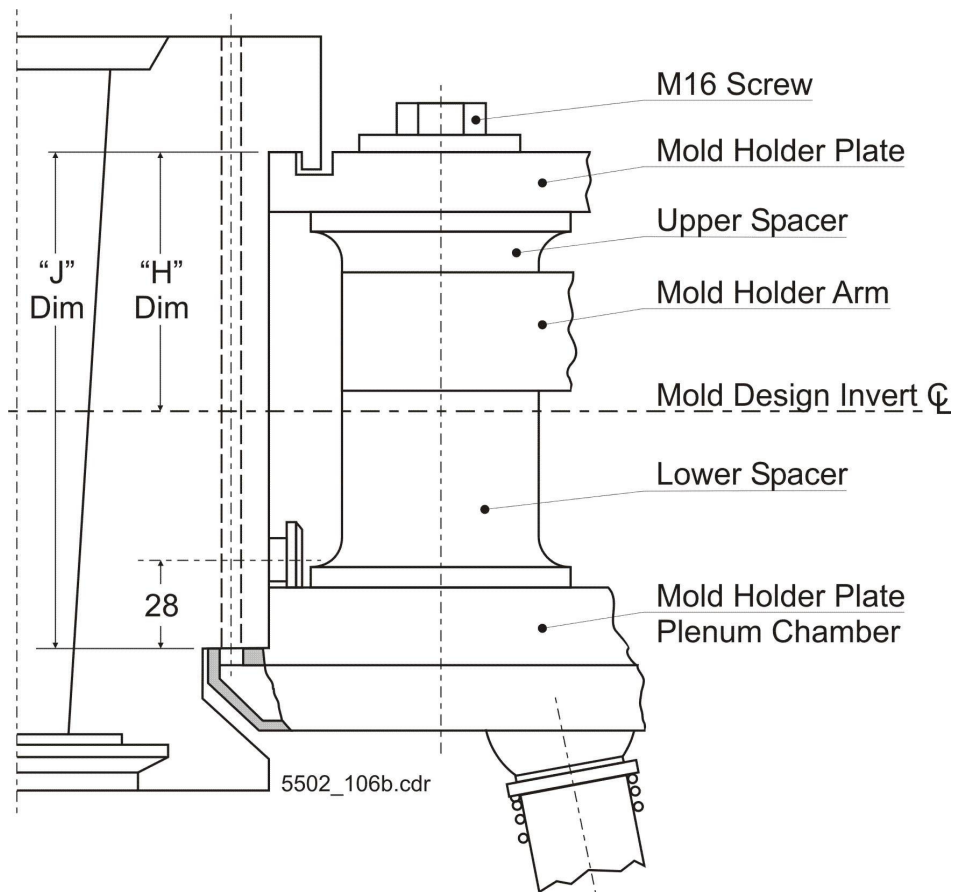


Figure 2 - InVertiFlow Mold Holder Set-up

The blank mold holder arm is a rigid design, which has, unlike conventional mold holder arms, single sprockets only. Spacers of different heights are used between the arm and the upper mold holder plates to obtain the required mounting positions or "H" dimensions.

The plenum chamber consists of two main parts, the lower mold holder plate and the air chamber, which is firmly attached to the underside of the mold holder plate.

Individual spacers mounted between mold holder arm and plenum chamber vary the position of the plenum chamber. The 6.35 mm ( ¼" ) height increment of these spacers gives full flexibility to match the blank mold "J" dimension and cooling requirements.

Upper mold holder plates, plenum chambers and spacers are mounted to the blank mold holder arm by M16 screws of individual length, according to the spacer combination.

Pins in the arm and mold holder plates and corresponding notches in the spacers prevent the spacers from turning and thus limit the swiveling of the mold holder plates.

The On/Off controls units have three damper valves. Two valves supply the cooling air to the blank molds, thus allowing individual timing of the cooling air for each mold half. The third valve is for neck ring cooling air. The valves are air operated for cooling ON and spring return for cooling OFF.

The cooling air supply from the section frame through the damper units to the plenum chambers is by means of telescopic tubes. The lower part of the tube is located in the damper unit by a spherical bearing. The upper tube is guided in the bore of the lower tube and its spherical end engages in a corresponding bearing in the plenum chamber. The contact between the spherical end of the upper tube and the bearing in the plenum chamber is maintained by the force of a compression spring.

The upper tube is of variable length, depending on the height of the lower spacers.

## Specification

The InVertiFlow blank mold cooling system will be available by October 2004 for the IS Type 5 ½" DG machine.

<b>Parts Specification InVertiFlow Cooling System 210-2000-2</b>		
Part Number	Quantity/ Section	Description
210-416-1	1	Blank Mold Holder Arm No.2
210-418-1	2	Mold Holder Plate, upper
210-2001-1	1	On/Off Control RH
210-2002-1	1	On/Off Control LH
210-2013-1	1	Plenum Chamber LH
210-2013-1	1	Plenum Chamber RH
210-2014-1	2	Neck Ring Cooling, Set
210-12251	2	Washer
210-425-XX	X	Accessories *

\* The accessories must be selected according to the "H" and "J" dimensions.

<b>Mounting Assembly Configurations</b>		
"H" Dimension	Min. "J" Dimension	"H" Dimension corresponds to the following mold holders:
69.85	88.9	Mounting assemblies No's. 21 & 24, stack wind cooling
82.55	101.6	VertiFlow double deck mounting 191-9150-10
107.95	127	VertiFlow single deck mounting 191-9150-11, No. 2 arm
117.50	136.6	Mounting assemblies No's. 22 & 23, stack wind cooling

<b>Service Requirements</b>			
Media	Pressure	Consumption per Section Nm <sup>3</sup> /min	Remarks
Operating Air	2.1 bar	0.02	At 15 cycles/min
Cooling Air, Blank Molds	1000 mm H <sub>2</sub> O	14	At 360° cooling time
Cooling Air, Neck Rings	1000 mm H <sub>2</sub> O	5	At 240° cooling time
Lubrication	-	-	Through operating air

## Installation

The installation of the InVertiFlow cooling system into existing section frames requires only some minor modifications. On section frames delivered after January 2004 the required modifications are already included.

The feature of the individual timing for each mold half requires two additional operating air connections in the section frame top plate. These additional connections are for the operating air supply to the On/Off controls for the outer mold halves. Should the individual timing not be desired the operating air supply to the On/Off controls for the inner and outer mold halves can be connected together.

The support bracket requires a slight machining to the casting in the area of the mold shaft supports to clear the plenum chambers in the open position.

The cylinder head of the baffle mechanism needs to be machined to clear the plenum chamber and blank mold.

Installation and Alteration Drawings	
Drawing No.	Description
210-B-12358	Blank Support Bracket Alteration
210-D-12359	Cylinder Head Alteration, Baffle Mechanism
210-D-12360	Section Frame Top Plate Alteration
210-C-12431	Section Frame Top Plate, Interface Dimensions

## Ware Range and Mold Design

The ware range given below is based on the use of standard mold equipment as specified in the Type IS 5 ½ DG Mold Design Data, Publication No. TW 1986/0104.

For the blank mold design refer to Data Sheet IS-550-2-1052 in the mentioned publication and to drawing 210-C-12302, Blank Mold 6" Diameter, for the plenum chamber interface dimensions.

Ware Range	Process	
	Blow & Blow	Press & Blow
Max. Height under Finish	343	302
Min. height under Finish	120	115
Min. Blank Glass Line	105	100
Max. Body Diameter	102	102
Max. Finish Diameter	48	90

## Features and Benefits

- Predictable cooling → → More consistent container quality
- Reduced cooling time → → Potential for higher production speed
- Easier mold change → → Reduced down time
- Fumes carried away → → Provides better working environment
- No heat load on section → → Increased mechanism life
- Conversion of VertiFlow Molds → → Use of existing mold stock
- One mold holder arm for wide ware range → → Reduced inventory