Flushing Instruction

Gas Fuel System Piping

For WinGD DF Engines

Substitute for:									PC	Q-Code					
Modif															
	Number	Drawn Date		Number	Drawn Date		Number	Drawn Date		Number	Drawn Date				

WinGD Winterthur Gas & Diesel	Product **W-2S**	**Flushing Instruction** **Gas Fuel System Piping**	
Made 30.10.2017 W. Wang	Main Drw.	Page 1-1 / 10	Material ID **PAAD278947**
Chkd	Design Group **9727**	Drawing ID **DAAD094163**	Rev
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Abbreviation

DF	Dual Fuel
DW	Double Wall
GVU	Gas Valve Unit
GVU-ED	Gas Valve Unit - Enclosed Design
GVU-OD	Gas Valve Unit - Open Design
iGPR	integrated Gas Pressure Regulation unit
ME	Main Engine, particularly refer to WinGD DF engine in this document
WinGD	Winterthur Gas & Diesel Ltd.

1 Introduction

The Gas fuel piping for WinGD Dual Fuel (DF) Main Engine (ME) in the engine room must be double-walled according to the relevant IMO rules, i.e. the IGC and IGF code. The gas fuel system must be clean prior to ME operation to avoid any foreign particles and/or fluid from the inner pipe damaging the ME. The ME and the equipment such as Gas Valve Unit (GVU) are delivered clean and protected, therefore, the shipyard shall apply flushing for the gas fuel piping before the piping are connected to the ME.

The gas fuel piping is required to contain a series of valves to achieve the gas pressure regulation, gas release, gas segregation and air ventilation functions for proper ME work and system safety purpose. For WinGD DF engines, there are three options, i.e. a Gas Valve Unit – Enclosed Design (GVU-ED), a Gas Valve Unit – Open Design (GVU-OD) or a ME integrated Gas Pressure Regulation unit (iGPR). The GVU-ED is typically installed in the middle of the gas fuel system, separating the DW piping into two sections, while the GVU-OD and iGPR are installed on one end of the DW piping. Sections 2, 3 and 0 detail the flushing procedure based on the different piping arrangement.

The stainless steel DW piping, due to the manufacturing process and installation by either welded joint or flange joint, is normally clean. The DW pipe with welded joints are mostly fabricated in shipyards applying the argon protected arc-welding process. While the DW pipes with flanged joints are mostly prefabricated by a sub-supplier and delivered to the shipyard with protection against ingress. Therefore, flushing of the inner gas piping can be performed using only compressed air for a duration of approximately 5 – 10 minutes. Since the vent air in annular space is not directly injected to the ME, it is not required to flush the outer pipe, i.e. annular space. WinGD recommends flushing the gas piping with service air or work air with a pressure of 7 – 9 bar.

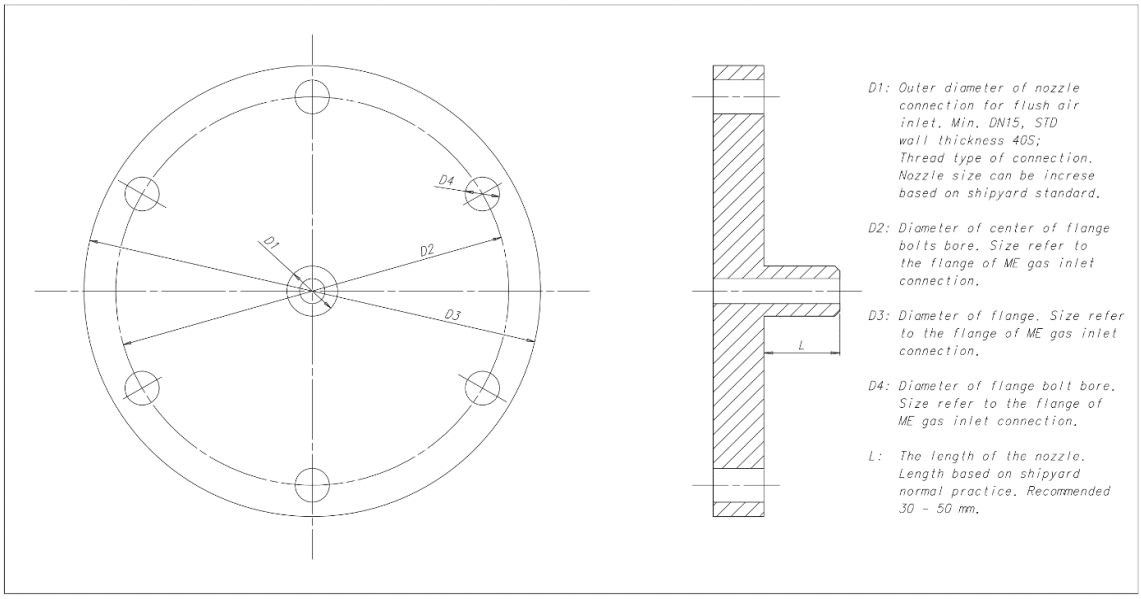

Figure 1: Flushing flange with nozzle connection for double wall pipe

To assist with the air flushing procedure, two types of counter flanges shall be prepared by the shipyard.

- Type 1: Blind flange – It is used for isolating the gas fuel piping connections not used as flushing vent outlets.
- Type 2: Flushing flange – It is a specially designed flange used for connecting the flushing air to the inner pipe of the double wall pipe. Figure 1 details the flushing flange with a flushing air nozzle connection to the inner pipe.

2 Air flushing of the gas fuel system with GVU–ED

The WinGD DF engines with GVU–ED can be connected to gas fuel piping via welded joints or flanged connections. WinGD recommend the flushing instructions in section 2.1 and section 2.2 depending on the pipe connection type.

2.1 Gas fuel piping with welded joints

WinGD recommend flushing the system after the gas fuel piping, the GVU–ED and other associated equipment have been fully welded and installed. This reduces the preparation complexity and time.

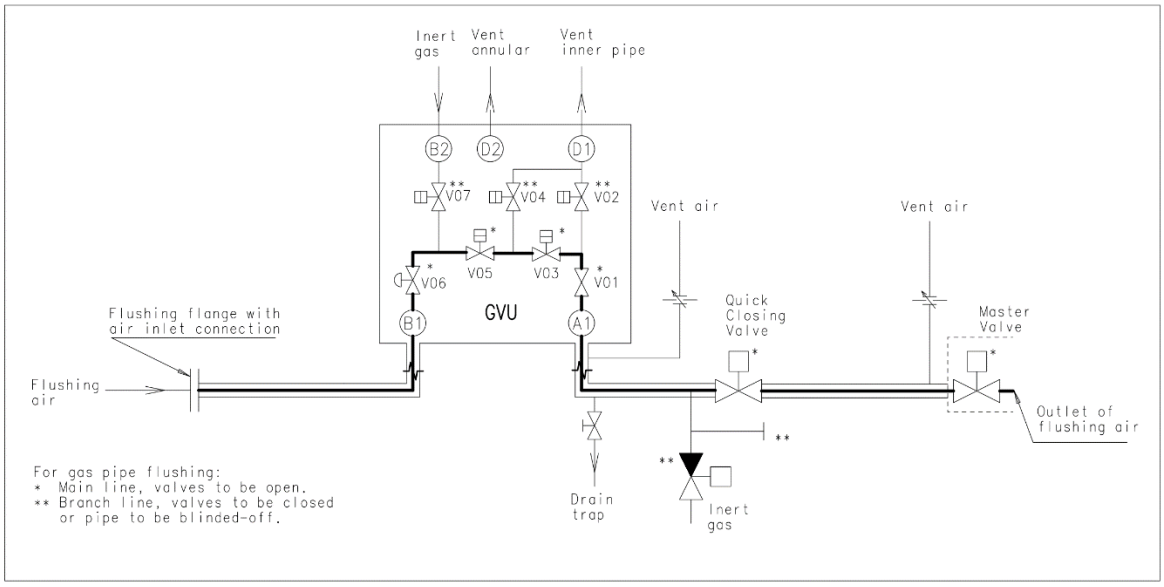

Figure 2: Flushing instruction for the welded piping after the GVU–ED assembly

Flushing of the gas fuel piping with welded GVU–ED shall be performed using the below steps:

1. Combine the gas pipe flange at ME connection with the flushing flange (type 2) as shown in Figure 1.
2. Open the valves on the main line of the inner pipe as marked with “*” in Figure 2.
3. Shut off the valves or blind off the pipe on the branched lines of the inner pipe as marked with “**” in Figure 2.
4. Keep the flushing air outlet of the inner pipe open and towards a personnel-safe area. Cover the flushing air outlet with fabric bag for protection and visual check of dirt.
5. Connect the compressed air (7 – 9 bar) to the nozzle on the flushing flange for the inner pipe flushing. Open the air supply valve (recommended ball valve type) and blow the inner pipe for 5 – 10 minutes. We recommend to repeatedly open and

close the air supply several times during the flushing to increase the flushing shock waves so the flushing effect is improved.

6. Visually check the fabric bag at flushing air outlet. Repeat the step 5 if the fabric bag shows obvious and excessive signs of dirt. Since there is no standard or norm to define the flushing quality, WinGD gives also no specific standard to define the cleanness. The visual check and the acceptance of the flushing quality is the shipyard or the ship owner's responsibility.

7. After the flushing, disconnect the flushing flange and the blind flanges on gas pipe, set all valves back to normal position. Then connect the gas pipe to the ME.

WinGD don not recommend flushing the gas fuel piping before the GVU–ED is installed because it brings of the following disadvantages:

- The GVU–ED is excluded from the air flushing and is welded onto the piping after the initial flush is complete. Potential for particles and dirt to enter the system due to welding of the GVU connections.
- The shipyard needs to prepare and weld the connection flange for each pipe section before flushing, and remove the flange after the flushing is complete. Furthermore, the flushing is performed in multiple stages for separated piping sections.

2.2 Gas fuel piping with flanged joints

WinGD recommends flushing the inner pipe only when the gas fuel piping and the GVU–ED are connected with flanged joints. Air flushing of gas fuel piping can be performed either before or after the GVU assembly, since the pipe connections have been equipped with flanges.

2.2.1 Flushing after the GVU–ED assembly

Flushing of the gas fuel piping and GVU inner pipes can be performed as a single system flush after the GVU assembly. Since the flushing is only performed for inner piping, the branch piping and valves connected to outer pipe do not need to be isolated with blind flanges or shut-off respectively.

Flushing of gas fuel piping with flange joints after the GVU–ED assembly shall be performed with similar steps as described for welded piping in section 2.1, only with reference to

Figure 3 for connection preparation.

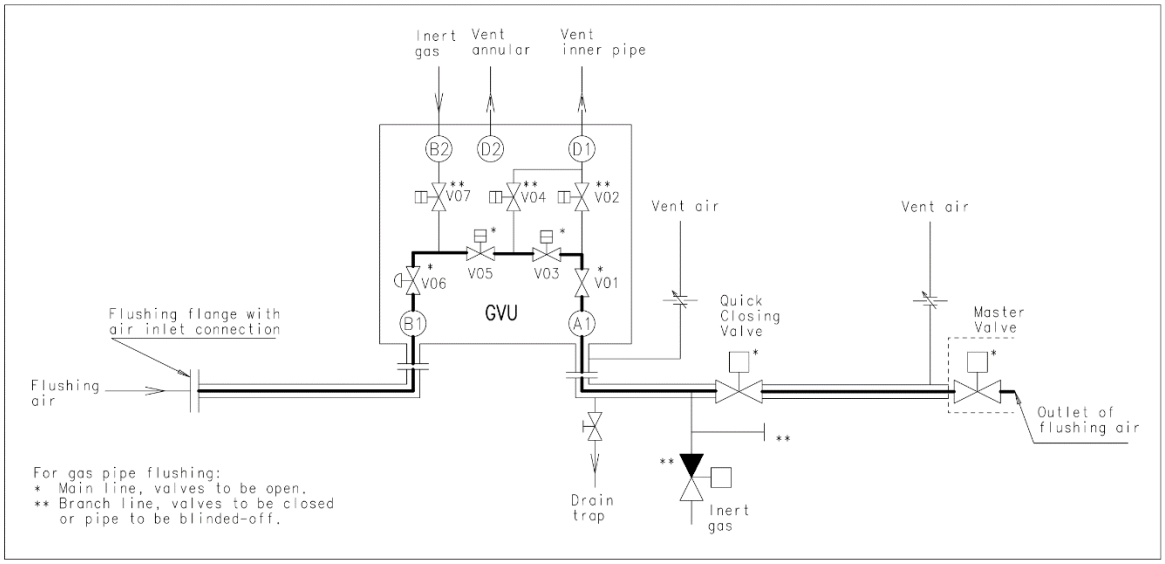

Figure 3: Flushing instruction for the flanged piping after the GVU–ED assembly

2.2.2 Flushing before the GVU–ED assembly

The pipe section of the “gas fuel pipe between ME and the GVU” and the “gas fuel pipe on the gas supply side” shall be flushed separately if shipyard performs the flushing before the GVU–ED is assembled and installed.

Flushing of each section of the gas fuel piping shall be performed with similar steps as described for welded piping in section 2.1, only with reference of Figure *4* for connection preparation.

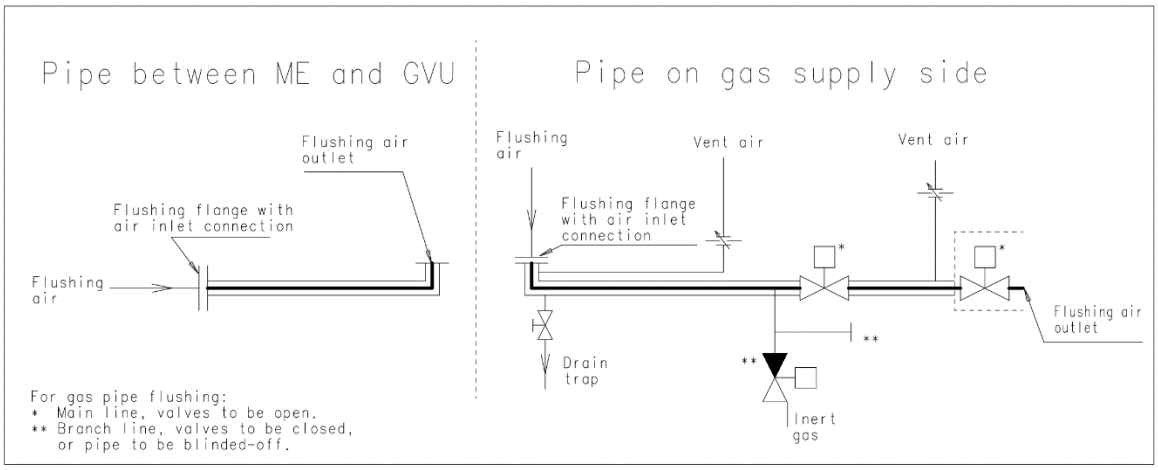

Figure 4: Flushing instruction for the flanged DW piping before the GVU–ED assembly

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3 Air flushing of the gas fuel system with GVU–OD

The gas fuel system with GVU–OD typically includes a dedicated GVU room and welded gas pipe. WinGD recommends flushing the inner gas pipe only after the GVU–OD is assembled and installed.

Flushing shall be performed with similar procedure as described in section 2.1, only with reference of Figure 5 for connection preparation.

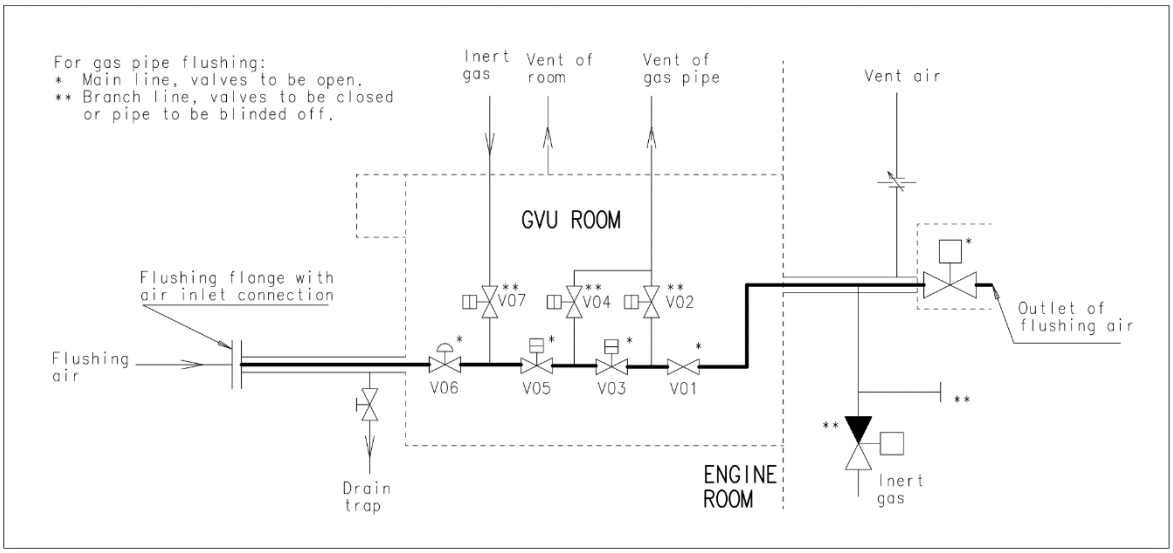

Figure 5: Flushing instruction for the gas fuel piping with GVU-OD

4 Air flushing of the gas fuel system for ME with iGPR

The WinGD ME with iGPR requires much simplified gas fuel piping at ship plant side as there is no need to install the GVU and its accessory components such as the quick-closing valve etc.

Consequently, the flushing procedure for the gas fuel piping for ME with iGPR is simplified and similar to either welded piping or flanged piping. Only the inner pipe of the gas fuel piping requires flushing and follows the procedure as described in section 2.1, only with reference of Figure 6 for connection preparation.

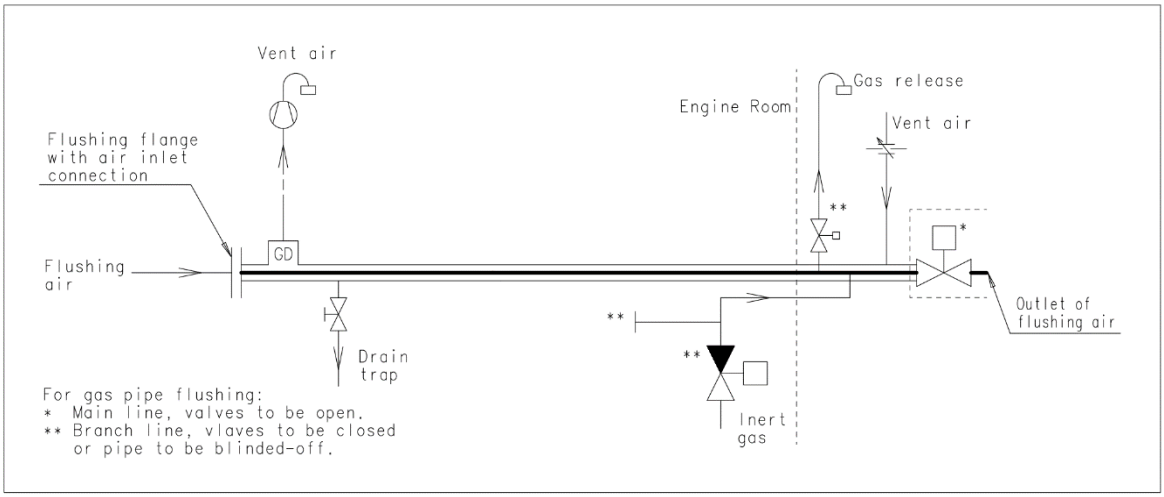

Figure 6: Flushing instruction for the gas fuel piping for ME with iGPR

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TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2017-11-03	INSTRUCTION	First web upload