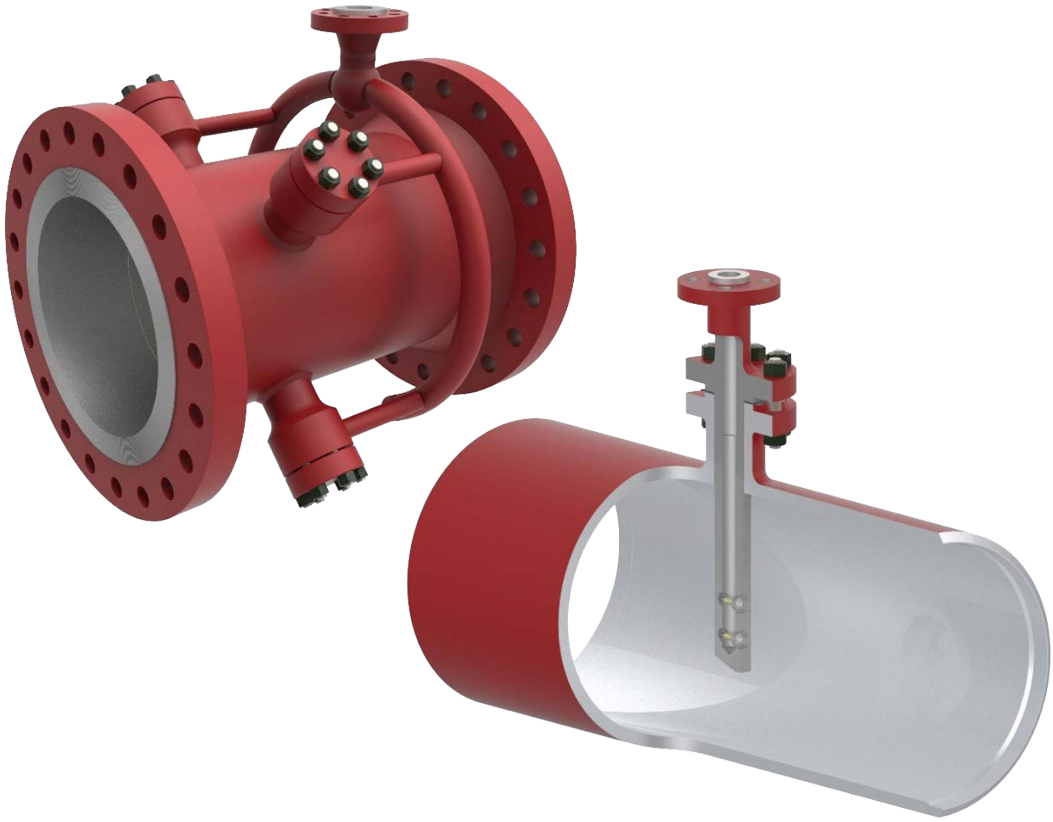
Masoneilan

a Baker Hughes business

DSH Series

Desuperheater

Instruction Manual (Rev.C)



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Safety Information

Important – Please Read Before Installation

These Instructions contain **DANGER**, **WARNING**, and **CAUTION** labels, where necessary, to alert you to safety related or other important information. Read the instructions carefully before installing and maintaining your desuperheater. **DANGER** and **WARNING** hazards are related to personal injury. **CAUTION** hazards involve equipment or property damage. **Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can lead to injury or death**. Total compliance with all **DANGER**, **WARNING**, and **CAUTION** notices is required for safe operation.

This is the safety alert symbol. It alerts you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠DANGER

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury

⚠WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in serious injury.

⚠CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury

CAUTION

When used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Note: Indicates important facts and conditions.

⚠CAUTION

Under certain applications this product:

- **Can result in surfaces that present burn (hot) hazards** to the end user including potential exposure to the media being processed by/through the product or equipment.
- **Can have sharp or protruding edges or surfaces**. When working on or with this product additional care may be necessary to avoid contact with these sharp surfaces.
- **Can result in surfaces that present slip or loss of footing** conditions to the end user. Additional measures should be considered during installation to prevent the collection of fluids/ media or the occurrence of slip or trip hazards.
- Can be installed in poorly ventilated or confined areas, or in areas that may contain gases other than oxygen, which **can lead to a risk of oxygen depletion and/or personnel asphyxiation**. Additional protection shall be used in such installations.
- **Can be installed in areas subjecting the end user to cramped or strained working positions**. Additional policies and procedures shall be considered to reduce or remove the end user exposure to these conditions.
- **Can produce elevated noise levels outside allowable limits for end user exposure**. Site monitoring and testing shall be performed to verify any need for engineering or administrative controls to eliminate or reduce hazardous noise levels.
- **Can be installed, serviced, or maintained at elevated heights**. The end user shall properly use fall protection and appropriate safety equipment and practices to prevent the dropping of tools or equipment when working at heights.
- **Can require manual or assisted lifting**. It is the end user's responsibility to ensure the lifting means (product lifting points or equipment) are properly installed, torqued, and inspected for use in accordance with local codes and standards.
- **Can shift during shipping/transportation**. The end user shall take all precautions to determining a load shift and avoid harm.
- **Can potentially release process/pressure if defects exist**. Additional policies and procedures shall be considered to reduce or remove the end user exposure to these conditions.
- **Can contain residual process media or stored energy** (eg. trapped pressures, loaded springs, heavy shifting or unstable parts, etc.).

Personal protective equipment (PPE) and safety equipment shall be used in accordance with local requirements. Proper techniques shall be followed to reduce the end users exposure to these hazards.

Note: Material safety data sheets (MSDS) shall be available and reviewed in accordance with local requirements. Products shall be installed, serviced, and maintained in accordance with all local and national codes and standards by properly qualified (licensed/ certified/ trained) personnel.

Prior to installing, maintaining, servicing, or inspecting the product or equipment, ensure the system or process is in a safe state (e.g., depressurized, adjusted to ambient temperature, properly secured, process properly contained/ isolated, etc.)

Prior to commissioning or returning the equipment to service, local codes and standards may require that testing (e.g., overpressure, leakage, mechanical or electrical operation, etc.) be conducted to verify the installation. Additional protection shall be taken into consideration to protect the end user from exposure to the hazards associated to the failure modes of the testing, potential hazards should leaks be found, etc.

⚠WARNING

Installation of this device in proximity of people, or property that may be adversely affected should the device fail, leak, generate excessive noise, or other such hazard, should be minimized and/or precautions taken to reduce the associated hazards. Loitering or gathering around this type of equipment should be avoided.

Recommendations Prior to Installation into Pipeline

It is recommended to ensure the installation site provides suitable space for installation and maintenance, and that the piping system can support the desuperheater. It is critical to ensure that the spray water source is properly flushed and a strained is in place to ensure no debris enters the flow nozzles. Refer to the Installation and System Requirement recommendations within this guide.

⚠DANGER

At a minimum, an envelope 3 feet (1m) from any working surface on the desuperheater body should be maintained to facilitate easy access.

About this Guide

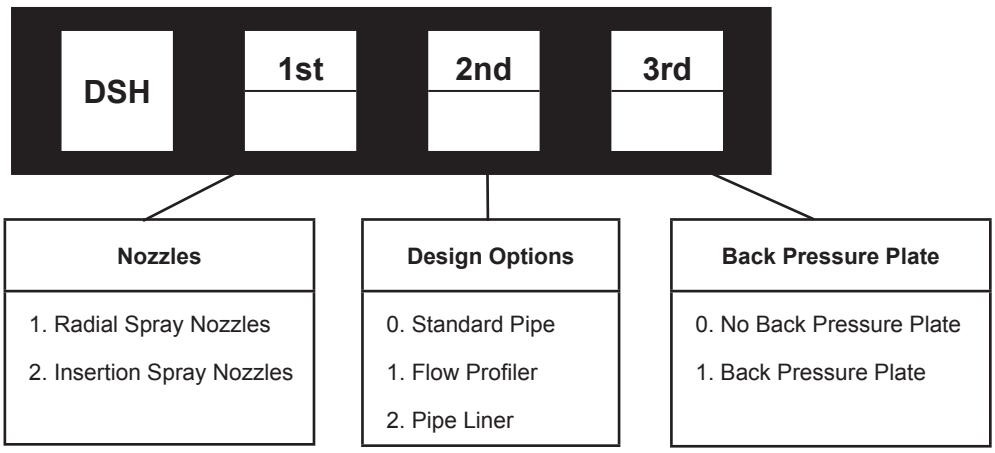
This installation guide provides recommendations and warnings for the **Masoneilan™** DSH Series product line. It is highly recommended to review the system requirements section in this document to ensure safe and proper installation of this product.

All information contained herein is believed to be accurate at the time of publication and is subject to change without notice. Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the device. In no case does this manual guarantee the merchantability of the hardware or the software or its adaptability to a specific client needs. Please report any errors or questions about the information in this manual to your local supplier.

Desuperheater Design

Masoneilan DSH Series Desuperheaters are designed to ASME B31.1/ B31.3 piping codes and the ASME Boiler & Pressure Vessel Code (BPVC), with optional S-Stamp (BPVC Section 1) or U-Stamp (BPVC Section VIII). Desuperheaters consist of two distinct sections: the steam pipe (header) and water manifold, each with seperate design pressures and temperatures.
Every Masoneilan DSH Desuperheater is special engineered for each application and is accompanied by unique project specific drawings which details the critical weights and interface dimensions as well as the bill of materials (BOM) and materials of construction. These drawings will be provided by Masoneilan requisition engineers after an order is placed. Refer to these drawings prior to installing the desuperheater.

1. Numbering System



2. Life Period

The estimated life period of a desuperheating system is highly dependent on the application. If desired, Baker Hughes can perform a comprehensive review for various design factors such as creep life, thermal fatigue, and seismic loading. The requirements of this study must be agreed upon prior to order remittance.

To maximize the useful life of the product it is essential to conduct annual inspections, routine maintenance and ensure proper installation to avoid any unintended stresses on the product. Refer to the Maintenance and Inspection section of this document for these recommendations

3. Warranty

Items sold by Baker Hughes are warranted to be free from defects in materials and workmanship for a period of one year from the date of shipment provided said items are used according to Baker Hughes recommended usages. Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

These instructions are written specifically for the Masoneilan DSH Series Desuperheater, and do not apply for valves or desuperheaters outside of this product line. The warranty for this product requires:

- The DSH Series Desuperheater must be installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- Periodic inspection of the desuperheater should be performed. Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death.
- All surrounding steam and water lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.

4. Unpacking

Each Masoneilan desuperheater is secured to customized skid for shipment and enclosed with crating. Care must be taken when unpacking the product to prevent personal injury or damage to the equipment. Contact the local Baker Hughes Sales Office or Service Center with any problems or concerns. Be sure to provide the model number and serial number in all correspondence.

5. Lifting

Lifting the desuperheater should only be done from the body using a single choked or double choked hitch, as demonstrated in Figure 1. Lifting straps must be properly rated for the full weight of the desuperheater. The product weight and center of gravity can be found within the documentation provided with the desuperheater. At no time should any person(s) be under or near the desuperheater while it is being lifted. The desuperheater should never be lifted from the water manifold

⚠WARNING

Never lift from welded water manifold, lifting straps should be secured around the main pipe section only.

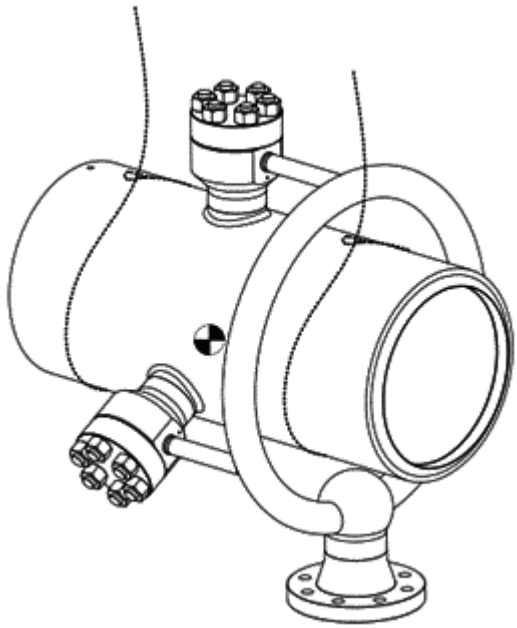


Figure 1 - DSH Lifting Diagram

6. Serial Plate

The serial plate is fixed to the nozzle housing (shown in Figure 2) and contains the information shown below. The information should be reviewed prior to pressurizing the system.

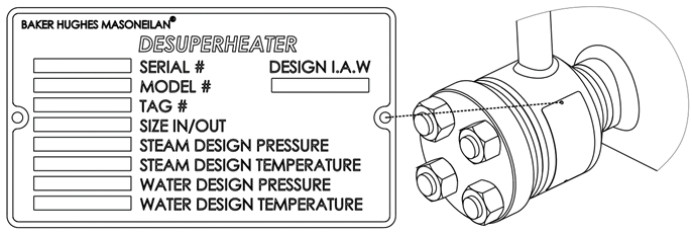


Figure 2 - Serial Plate

⚠WARNING

Prior to pressurization of each desuperheater, the information on the serial plate should be reviewed to ensure the design conditions of the steam line and water line are not exceeded.

7. Flow Direction

The direction of steam flow is indicated by the flow arrow located on the body. Designs which use a flow profiler (DSH-11X) must be installed so the flow profiler is upstream of the spray nozzle(s), see Figure 3.

Designs with a liner (DSH-12X) must be installed so the elongated portion of the liner is downstream of the spray nozzle(s), see Figure 4.

Designs with an insertion probe (DSH-200) must be installed so the spray nozzle(s) point downstream inside of the steam pipe, see Figure 5.

Refer the project specific drawings provided with the desuperheater for any additional installation requirements that may apply.

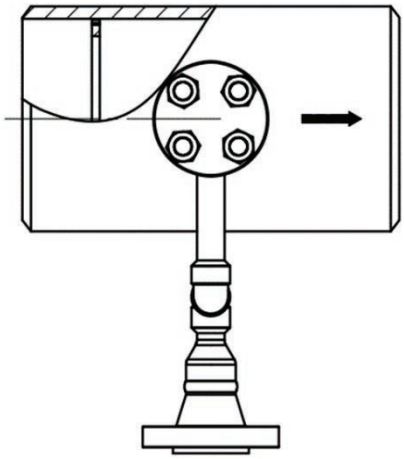


Figure 3 - DSH 110

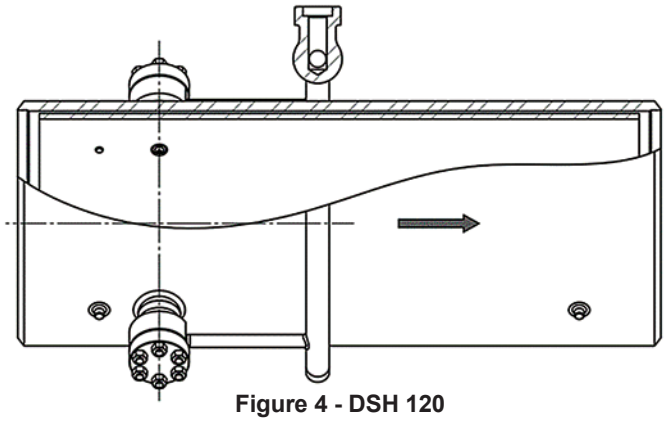


Figure 4 - DSH 120

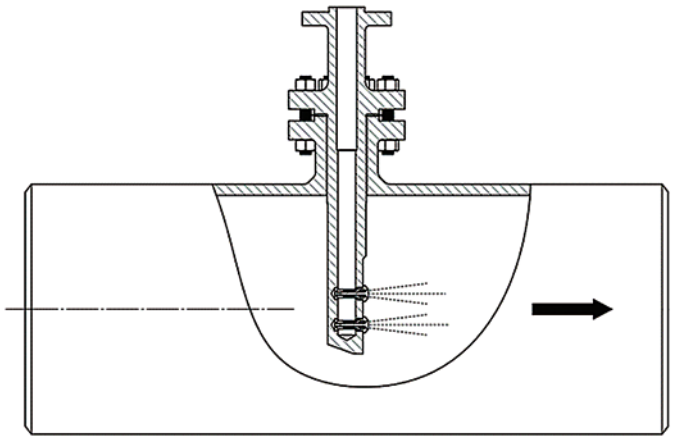


Figure 5 - DSH 200

8. Installation

8.1 Desuperheater Installation

Before installing the desuperheater, the receiving system should be free of weld debris, scale, oil, grease and dirt. Flange mating surfaces should be thoroughly cleaned and inspected for damage. For welded installations, fit-up, welding, and heat treatment should comply with ASME BPVC Sec IX, or an equivalent code.

8.2 System Hydro Testing

When commissioning a steam conditioning system, hydrostatic testing is often required per the piping code. To allow for hydro-testing of the spray water system, Baker Hughes offers blank nozzle fixtures, as shown in Figure 6, which isolates the water manifold from the steam pipe. This nozzle is assembled into the unit in the same way as the operational nozzles as shown below.

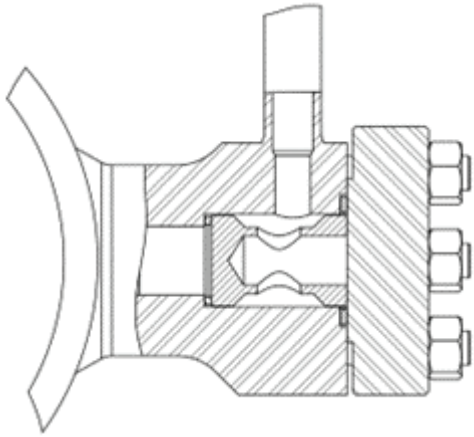


Figure 6 - DSH Hydro-testing fixture shown with solid end to isolate the water line from the steam line.

9. System Flushing

Prior to installing the operational nozzles, it is highly recommended to thoroughly flush the spray water system. This will remove any contaminants that can damage or clog the operational nozzles. Baker Hughes highly recommends installing flushing nozzles, as shown in Figure 7, to prevent damage to critical sealing surfaces in the nozzle housing. The flushing nozzle is assembled into the unit in the same way as the operational nozzles as shown below.

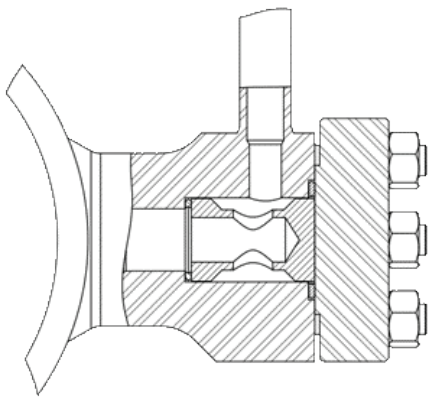


Figure 7 - System Flushing testing fixture shown with open end to allow debris to pass without damaging surfaces

⚠WARNING

Do not install spray nozzles until the pipelines have been thoroughly cleaned. All debris must be removed to protect the operation nozzles from damage.

10. Nozzle Housing Assembly (DSH-1XX)

Baker Hughes uses 2 types of Masoneilan nozzles depending on spray water requirements per application.

For high flow capacity, Baker Hughes uses a conical spray nozzle with a variable Cv that opens with water pressure, as shown in Figure 8.

For lower flow capacity, Baker Hughes uses a flat nozzle spray pattern as shown in Figure 9. Instructions will vary according to nozzle type used.

All Masoneilan spray nozzle assemblies are retained using a bolted flange and compression gaskets. The assembly may be installed with the operational nozzles, hydro nozzles, or flushing nozzles

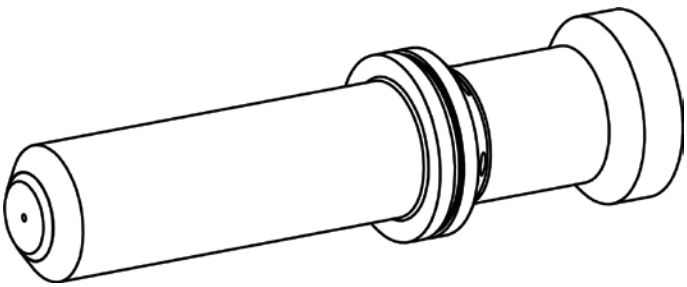


Figure 8 - Conical Spray Nozzle

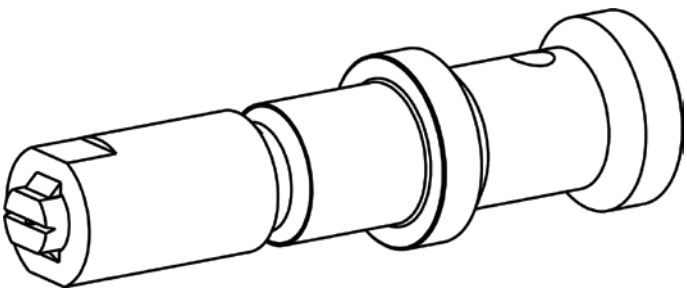


Figure 9 - Flat Spray Nozzle

Item	Description
1	DESUPERHEATER BODY/ NOZZLE HOUSING(S)
2	BOLTS
3	BODY GASKET
4	SPRAY NOZZLE ASSEMBLY
5	HYDRO BLIND NOZZLE (OPTIONAL)
6	FLUSHING NOZZLE (OPTIONAL)
7	FLANGE GASKET
8	ALIGNMENT PIN (FLAT NOZZLE DESIGN ONLY)
9	COVER FLANGE
10	NUTS

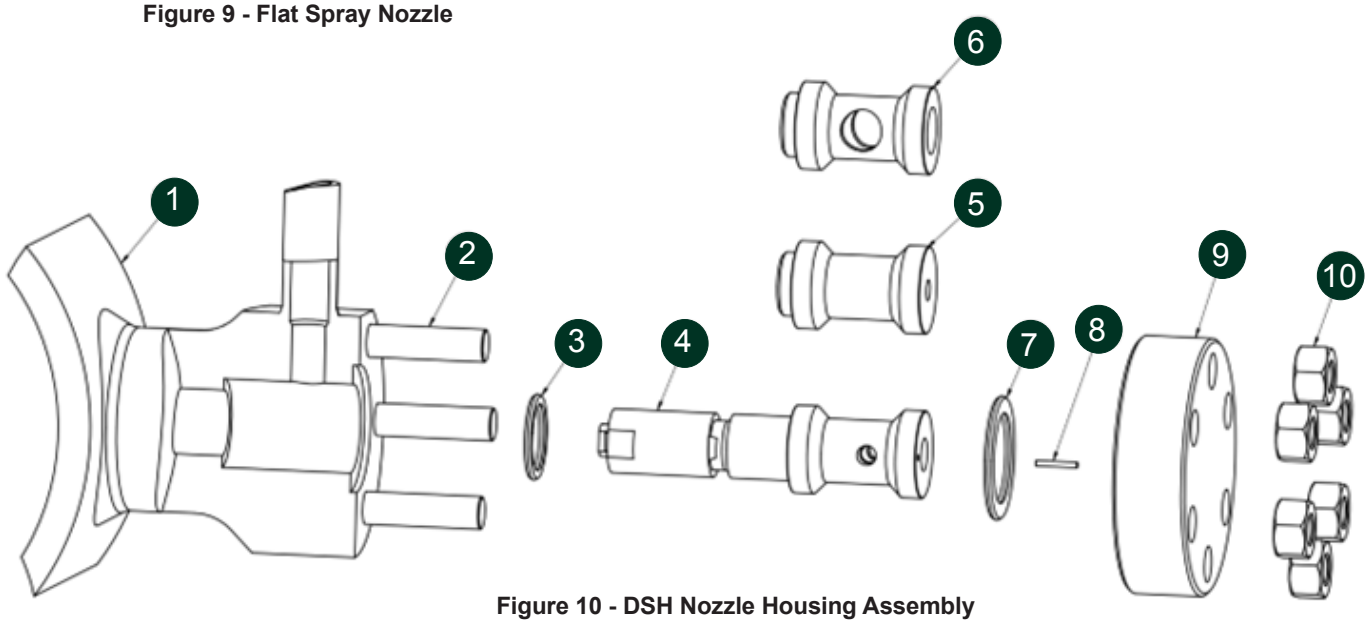


Figure 10 - DSH Nozzle Housing Assembly

11. Flat Spray Nozzles

(DSH-1XX)

Baker Hughes offers flat nozzle assembles for low-flow applications. Flat nozzles emit a flat spray pattern which must be perpendicular to the steam flow to perform properly. To achieve this, a pin is used to link the nozzle assembly to the cover flange. Depending on the quantity of nozzles, the alignment pin may be installed in hole “A” or hole “B”, with the flat faces of the nozzle housing and the cover flange aligned as shown in Figure 11 below. The correct placement of the pin can also be found in the documentation provided with the desuperheater.

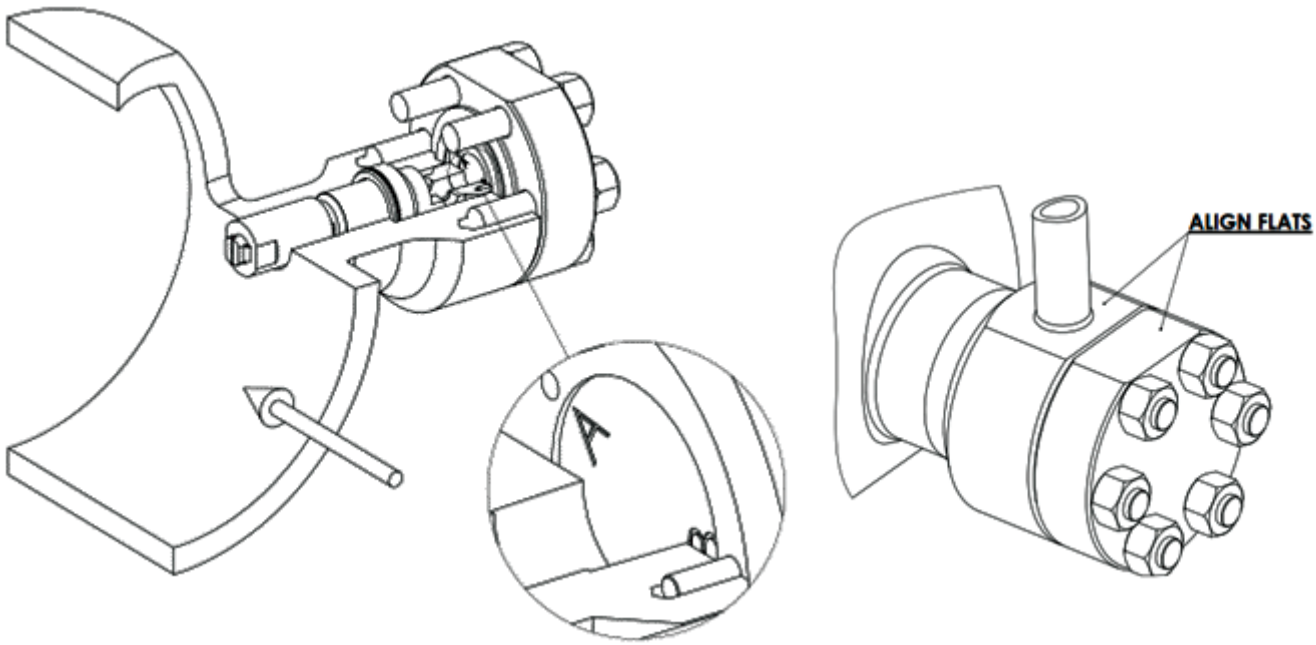
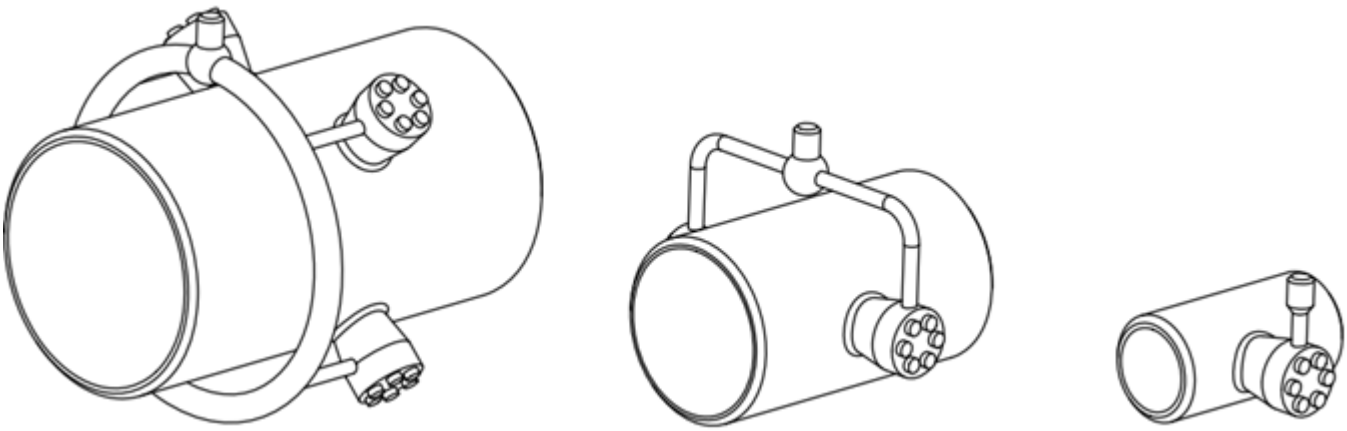


Figure 11 - DSH Assembly with Flat Spray Nozzles

Qty of Nozzles	Pin Location
1	A
2	A
3 and more	B



Three and more Nozzles arrangement **Two Nozzles arrangement** **One Nozzle arrangement**

Figure 12 - DSH Nozzle Arrangements

12. Assembly / Disassembly of the Nozzle Housing

(DSH-1XX)

Disassembly

1. Before disassembling, verify that replacement gaskets (items 3 and 7) are on hand.
2. Remove the nozzle flange nuts (item 10) from the nozzle housing.
3. Carefully lift the cover flange (item 9) from the nozzle housing.
4. If flat nozzles are installed, remove alignment pin (item 8) as shown in Figure 11.
5. Remove the nozzle flange gasket (item 7).
6. Remove the nozzle subassembly (item 4), hydro blind nozzle (item 5), or flushing nozzle (item 6).
7. Remove nozzle gasket (item 3) from the bottom of the nozzle housing.

⚠WARNING

Caution should be taken when assembling and disassembling the nozzles housing assemblies. Some of the components can be heavy and can cause injury or death if mishandled. For installations where the nozzles housings are installed from below, Baker Hughes recommends having two technicians perform the assembly and disassembly.

Re-assembly:

1. Inspect the upper and lower gasket surfaces or debris. Clean if necessary. Refer to the maintenance and inspection section in this document for acceptance criteria of these surfaces.
2. Insert a new body gasket (item 3) into the nozzle housing. If working against gravity, it is optional to install the body gasket (item 3) over the nozzle assembly (item 4).
3. Install the nozzle subassembly (item 4) into the housing.
4. Install a new cover gasket (item 7) in the gasket groove.
5. If flat nozzles are installed, install the pin (item 8) in the correct position.
6. Install the cover flange (item 9) ensuring the cover gasket stays in the gasket groove. If flat nozzles are installed, align the flat surfaces of the nozzle cover with the nozzle housing, and mate the pin (item 8) with the nozzle subassembly as shown in Figure 11.
7. Install all nuts (item 10) hand tight. Torque the nuts to 20% of the required value listed in the Recommended Torque table hereafter, following the torquing sequence shown in Figure 13. Repeat this sequence incrementally to 50%, 80%, and finally 100% of the specified torque.

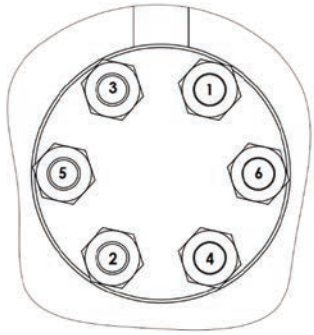


Figure 13- Torque Nuts Arrangement

Recommended Torque		
Stud Size (IN)	**Nm**	**FT.LB**
.625	95	70
.75	163	120
.875	264	195
1	393	290
1.125	583	430
1.25	827	610
1.375	1132	835
1.5	1491	1100

13. Inspection and Maintenance (DSH-1XX)

It is recommended to inspect the desuperheating system annually to ensure the welds and nozzle assemblies are in good condition. The table below lists the critical items to check on the Masoneilan Desuperheater. Maintenance and inspection must only be performed when the unit is unpressurized and at ambient temperature. All nozzle housings should be dismantled using the assembly/disassembly instructions in this manual. It is not recommended to remove the bolts from the nozzle housings.

Item	Description	Damage to Check For	If Damage is Discovered
V1	NOZZLE BRANCH CONNECTIONS	CRACKS	CONSULT FACTORY
V2	TUBE TO NOZZLE WELD(S)		
V3	TUBE TO WATER RING WELDS		
V4	TUBE TO WATER CONNECTION WELD(S)		
V5	PIN WELDS (LINER VERSION ONLY)		
V6	LINER (LINER VERSION ONLY)	CRACKS AND/ OR EROSION	
V7	DESUPERHEATER PIPE WELDS	CRACKS	
V8	FLOW PROFILER WELD	CRACKS AND EROSION	
V9	GASKET SURFACES	BLOCKAGE AND/OR EROSION	CLEAN SURFACES
V10	NOZZLE ASSEMBLY FLOW TIP		REPLACE

Desuperheater Weld Inspection
(DSH-1XX)

Each weld on the desuperheater should be visually inspected by a qualified person per ASME B31.1 Section 136.4.2.

A borescope camera can be inserted through the nozzle opening and used to inspect internal welds and the condition of the liner (if applicable). If any weld defects are discovered, consult factory by contacting your local Baker Hughes Sales Office or Service Center.

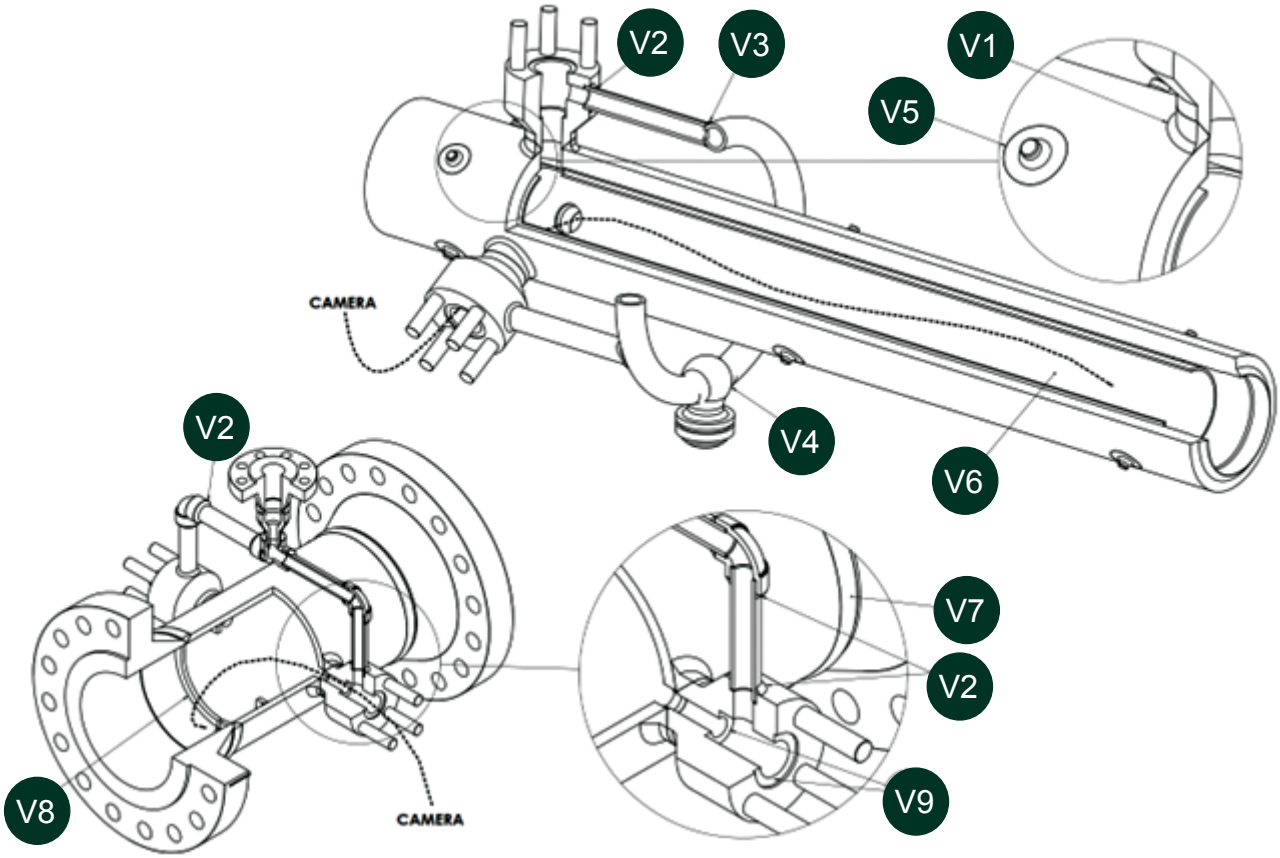


Figure 14 - Nozzle Inspection (DSH-1XX)

Nozzle Inspection

Inspect the nozzle tip and seating location to ensure there is no debris clogging the flow path.

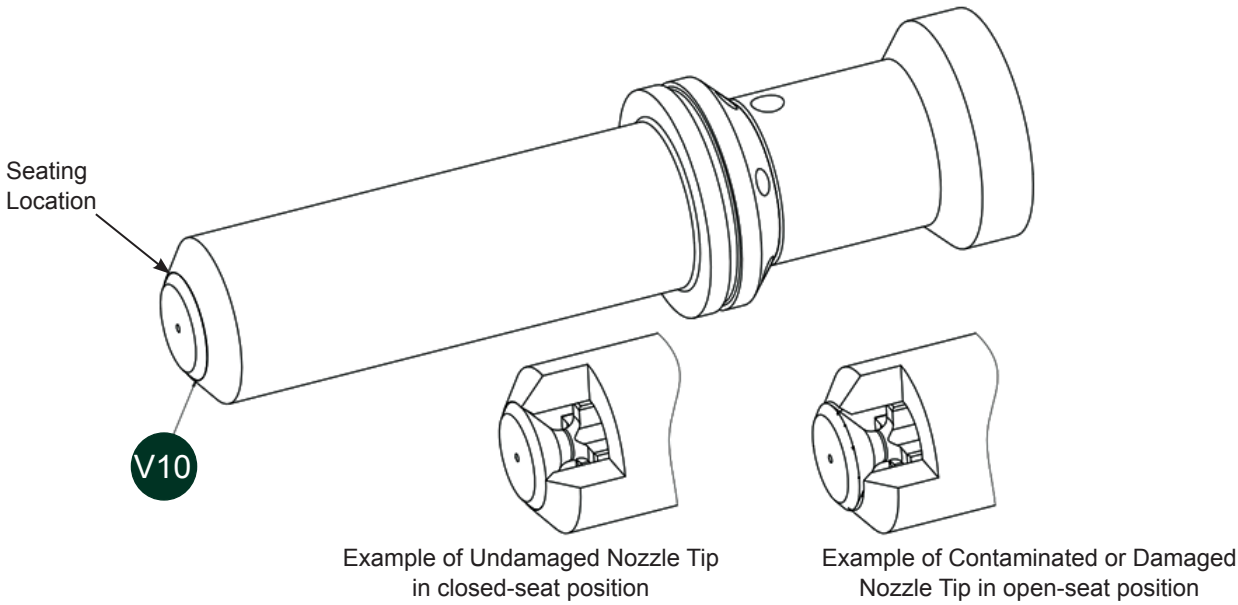


Figure 15 - Nozzle Inspection (DSH-1XX)

14. Nozzle Housing Assembly (DSH-200)

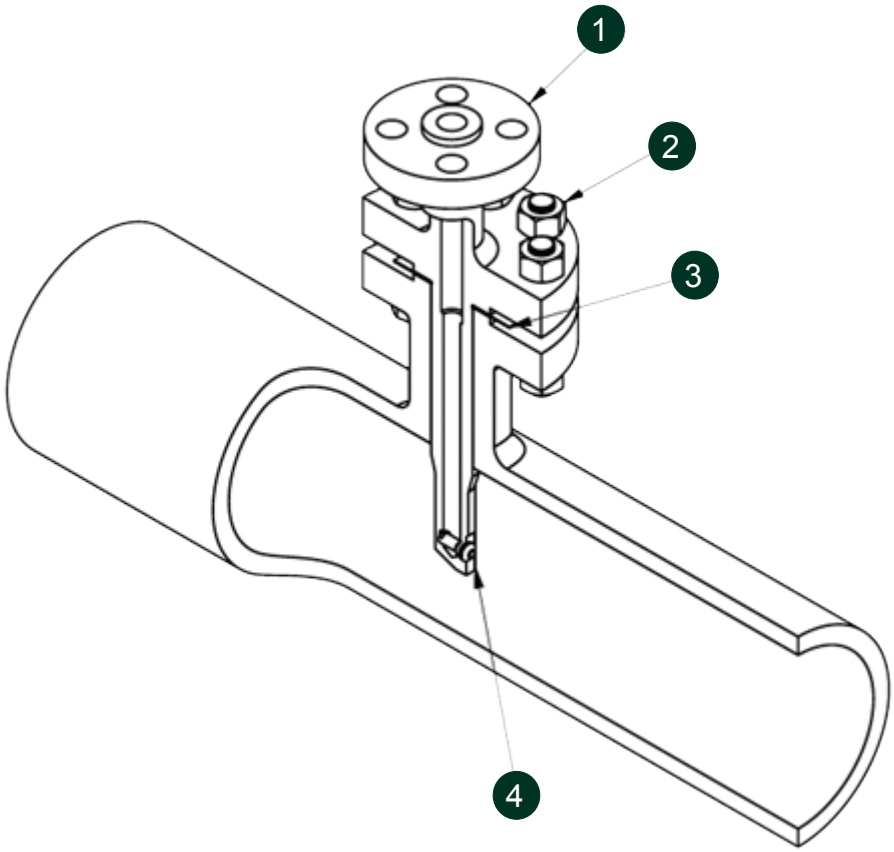


Figure 16 - Nozzle Housing Assembly (DSH-2XX)

Item	Description
1	DESUPERHEATER INSERTION PROBE
2	FLANGE BOLTING/NUTS
3	FLANGE GASKET
4	SPRAY NOZZLE ASSEMBLY

15. Assembly / Disassembly of the Nozzle Housing

(DSH-200)

Masoneilan DSH Insertion type desuperheaters (DSH-200) use standard ASME B16.5 flange connections to interface the spray probe into the steam pipe (header). Refer the project specific drawings provided with the desuperheater for the interface design details.

Disassembly:

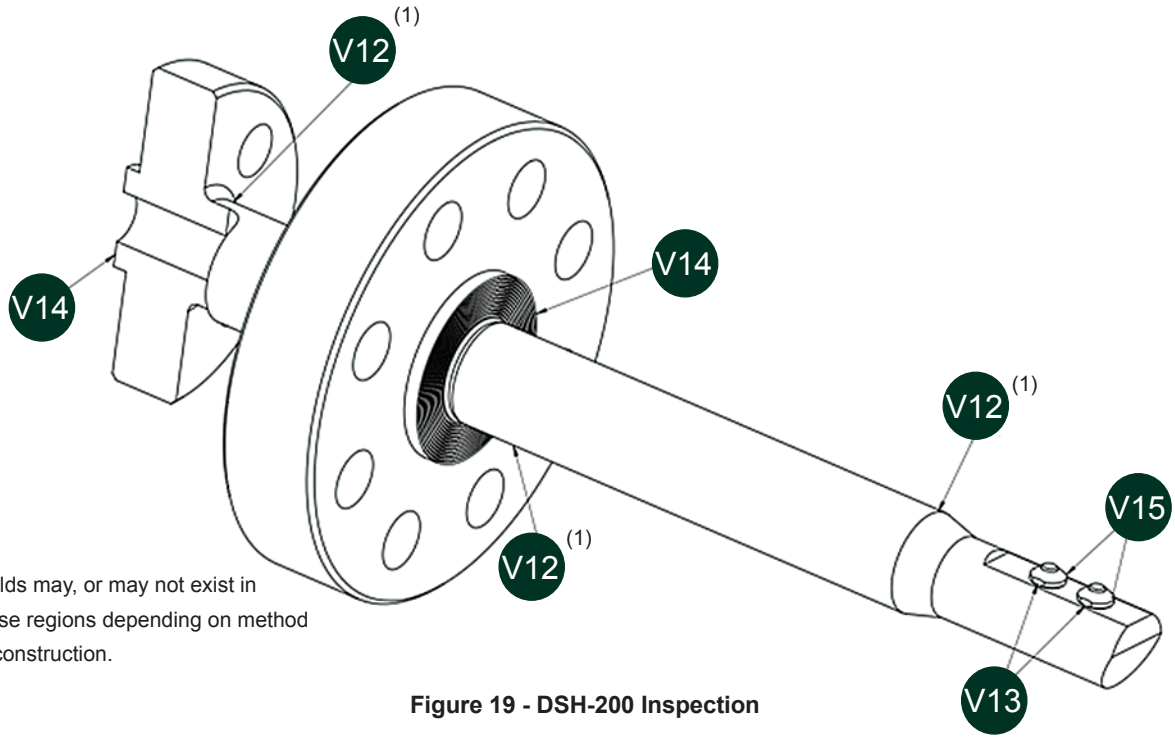
1. Remove DSH insertion probe assembly from line by disconnecting the water flange and steam pipe mounting flange bolting and nuts (item 2) and flange gasket (item 3).
2. Follow instructions provided in nozzle inspection (DSH-200) to thoroughly inspect the device for any issues.

Re-assembly:

1. Inspect the water flange and steam pipe flange mounting surfaces for debris and clean if necessary. Refer to the maintenance and inspection section in this document for acceptance criteria of these surfaces.
2. Install a new flange gasket (item 3) onto steam pipe mounting flange.
3. Re-install the DSH insertion probe assembly (item 1) into the steam pipe mounting flange.
4. Re-install all water flange and steam pipe flange bolting and nuts (item 2) and torque as directed. Please refer to ASME B16.5 standard for flange interface bolting and torquing recommendations.

16. Inspection and Maintenance (DSH-200)

Item	Description	Damage to Check For	If Damage is Discovered
V12	PROBE WATER CONNECTION WELD(S)	CRACKS	CONSULT FACTORY
V13	NOZZLE TIP WELDS		
V14	GASKET SURFACES	BLOCKAGE AND/ OR EROSION	CLEAN SURFACES
V15	NOZZLE ASSEMBLY FLOW TIP (QTY WILL VARY)		CONSULT FACTORY FOR REPLACEMENT INSTRUCTION



1. Welds may, or may not exist in these regions depending on method of construction.

Figure 19 - DSH-200 Inspection

17. Nozzle Flow Testing

Masoneilan nozzles can be flow tested to ensure that they meet the required flow rates and cracking pressures, and to evaluate the condition of the spray nozzles after seeing service. This is done by supplying a nozzle assembly using a direct source of flow. The nozzles can be tested with air or water.

For nozzles with Cv of 0.8 or less, the nozzles can be flow tested using standard NPT plugs on the sides and the top of the nozzle assembly. For nozzles with Cv of 1.5 or greater, a special fixture is required to flow test the nozzles assembly. Contact the local Baker Hughes Sales Office or Service Center with any inquiries related to flow testing of Masoneilan spray nozzles.

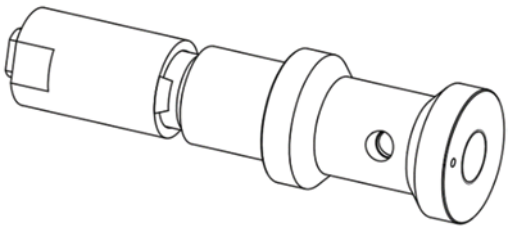


Figure 17 - NPT Connections (Cv 0.8 and below)

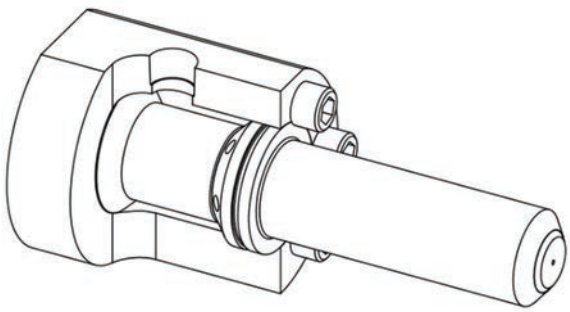


Figure 18 - Flow Fixture (Cv 1.5 and up)

18. Recommended Spares for Desuperheater

Baker Hughes recommends having spare parts for all critical components of a steam conditioning system. Recommended spare parts are listed below.

1. One set of spare nozzles to be provided for desuperheater (DSH-1XX) DSH package to include one spare set of nozzles, matching the quantity supplied with the valve. Each nozzle will include one gasket set.
2. Each nozzle will include one gasket set.
3. One set of soft goods to be provided for desuperheater DSH package to include soft goods for desuperheater. Soft goods for desuperheater will include one set of gaskets per nozzle, or insertion probe assembly, matching the quantity supplied with the valve.

19. System Requirements

Desuperheater sizing and selection

Sizing and selection of a desuperheater and control valve is achieved using proven software developed by Baker Hughes. The software performs the necessary thermodynamic calculations as well as critical design checks to ensure a successful installation. Specification sheets are generated using this software which includes the basic design details listed below:

1. Customer / project information
2. Desuperheater connections sizes / types / materials (ASME rating if applicable)
3. Design conditions for each connection
4. Sizing for each design case (resultant pressure / temperature / enthalpy / velocity/ etc.)
5. Inspection and test plan

Piping System

A successful desuperheater installation requires a properly designed piping system with respect to unit location and positioning of the control elements. The practices within this guide reflect the general desuperheater arrangements found in ASME B31.1 Figure 122.4.

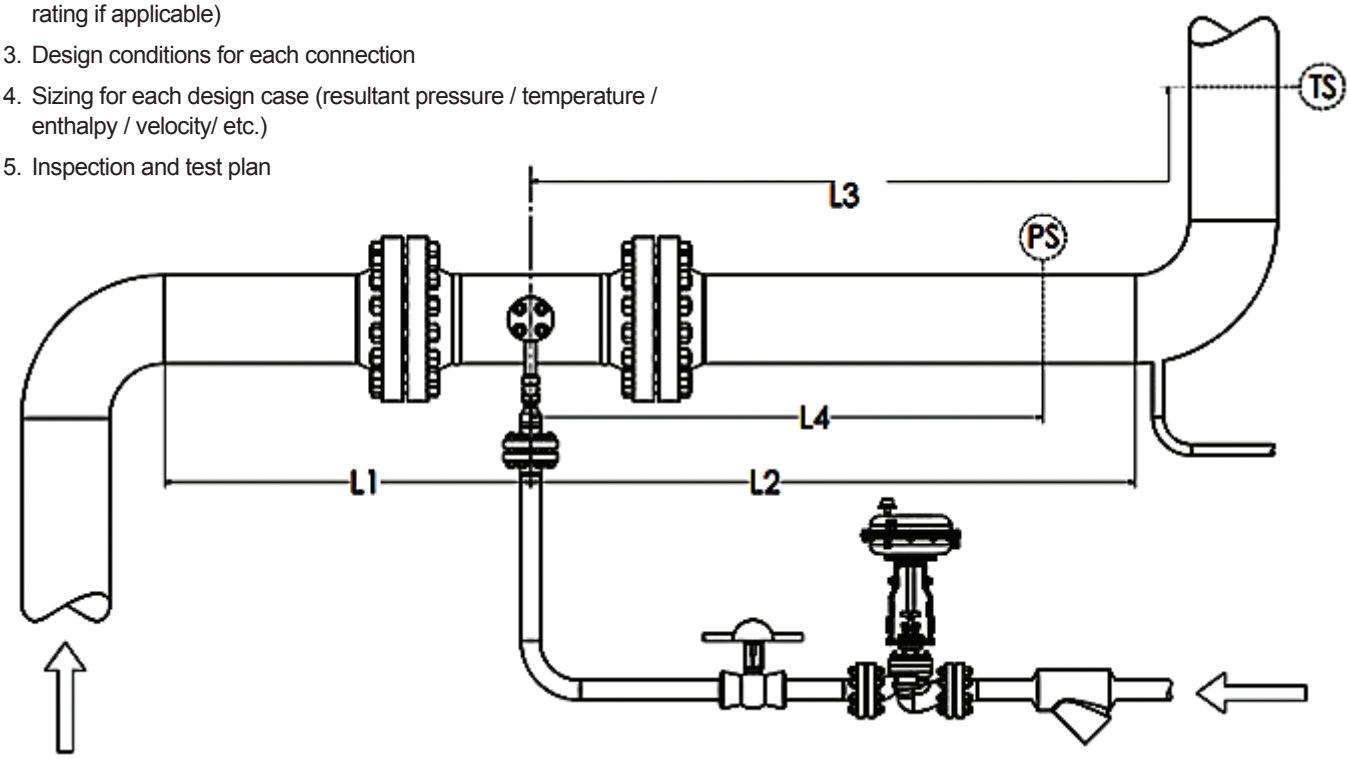
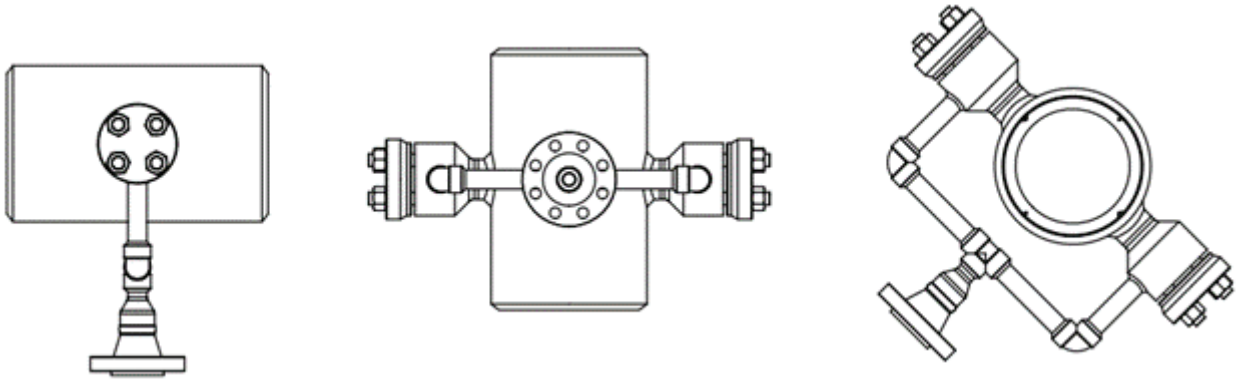


Figure 20 - Complete Desuperheater Piping System Layout

Orientation

Masoneilan desuperheaters can be installed in almost any orientation to accommodate different piping arrangements. For desuperheaters with a flow profiler, the desuperheater must be installed with the water connection vertical or horizontal to allow for proper drainage.

Special installations where the water connection is not horizontal or vertical shall be specially designed to allow for drainage across the flow profiler. When possible, Baker Hughes recommends that the spray water is fed from a low point, with the water connection facing down as shown in Figure 21.



Horizontal Line (Preferred installation) | **Vertical Line** | **Special**

Figure 21 - Optional Installation Orientations

Drains and Pipe Slopes

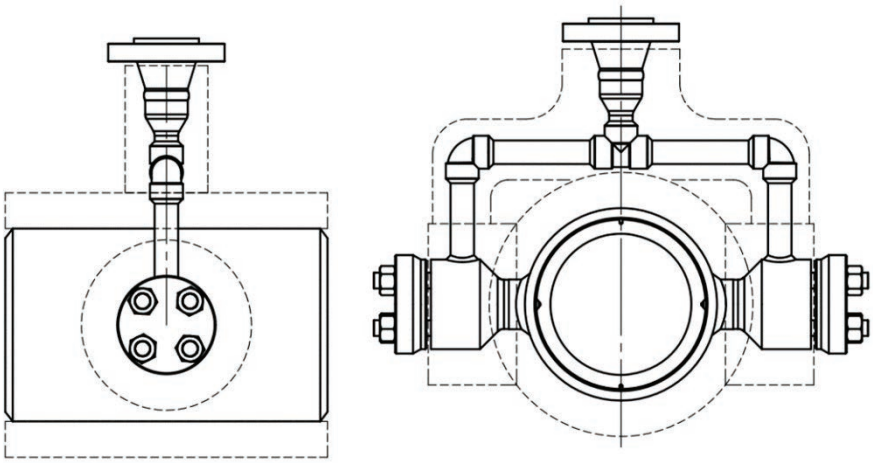
Steam piping should be designed with proper drainage to ensure no water can accumulate in the system. Steam piping upstream and downstream of the desuperheater should be sufficiently sloped in the direction of the steam low, with suitable drainage systems in place. Masoneilan desuperheaters are self-draining when installed in the orientations depicted in the previous section.

⚠WARNING

Failure to install a condensate drain at all piping low points can result in flashing and water hammer damage to the Desuperheater and piping system.

Insulation

Baker Hughes recommends adding 25mm [1in] – 50mm [2in] thick insulation around the desuperheater pipe and nozzle housings, and a minimum of 25mm [1in] thick insulation around the spray water manifold. The desuperheater spray nozzle flanges and bolting must be accessible through the insulation. Any surfaces of the desuperheater that are left exposed must have safe guards in place to prevent injury.



⚠WARNING

Steam piping and water piping can be very high temperature and can cause injury if touched. Safe guards must be in place around any surfaces that are left exposed.

Figure 22 - Piping Insulation

Strainers

To prevent damage or blockage of Masoneilan spray nozzles, it is **strongly** recommended to install a mesh strainer upstream of the spray water valve. Refer the table below for the recommended screen strainer for each nozzle size.

Nozzle Cv	Strainer Mesh Size
0.01-0.25	200
0.4	200
0.8	200
1.5	100
3	100
5	100
10	50

⚠WARNING

Failure to install a strainer can result in blockage of the nozzle, damage to heat sensitive equipment, and plant shutdown.

Upstream Pipe Recommendations (L1)

Desuperheaters perform best with uniform steam flow at the point of spray water injection. Piping interruptions directly upstream, such as piping tees and elbows, can produce flow irregularities which can lead to performance issues. Baker Hughes recommends maintaining a minimum distance, L1 (as shown in Figure 20), of five pipe diameters of straight pipe length upstream of the desuperheater. If this recommendation cannot be met, shorter distances may be acceptable upon application review.

Minimum upstream straight pipe length:
L1 = 5 x Nominal Pipe Diameter

Downstream Pipe Recommendations (L2)

Downstream considerations are more complex due to the addition of spray water. It is recommended to provide enough straight pipe length downstream of the spray nozzles to ensure enough water vaporizes prior to major piping interruptions. This length, L2 (as shown in Figure 20), is calculated using Masoneilan's sizing and selection software, and is limited to fifteen pipe diameters. Pipe bends after this point are encourage because they promote further mixing of water and steam.

Minimum downstream straight pipe length:
L2 = Lesser of Calculated, or
= 15 x Nominal Pipe Diameter

Temperature Sensor Recommendations (L3)

To achieve SIL3, it is recommended to install three (3) temperature sensors downstream of the desuperheater for 2-out-of-3 voting. The temperature sensor should be located far enough downstream where water is sufficiently absorbed into the steam. This length, L3 (as shown in Figure 20), is calculated using Masoneilan's sizing and selection software, or an approximate minimum of 33 ft (10 meters). If this recommendation cannot be met, shorter distances may be acceptable upon application review, and may better be controlled using alternative algorithm control.

Temperature sensor distance:
L3 = Minimum 33 ft (10m)

Pressure Sensor Recommendations (L4)

The pressure sensor location, L4 (as shown in Figure 20), must be located at a point downstream where flow has stabilized. The recommended installation point is five pipe diameters downstream of the outlet connection or any pipe elbows.

Minimum Pressure Sensor location:
L4 = 5 x Nominal Pipe Diameter

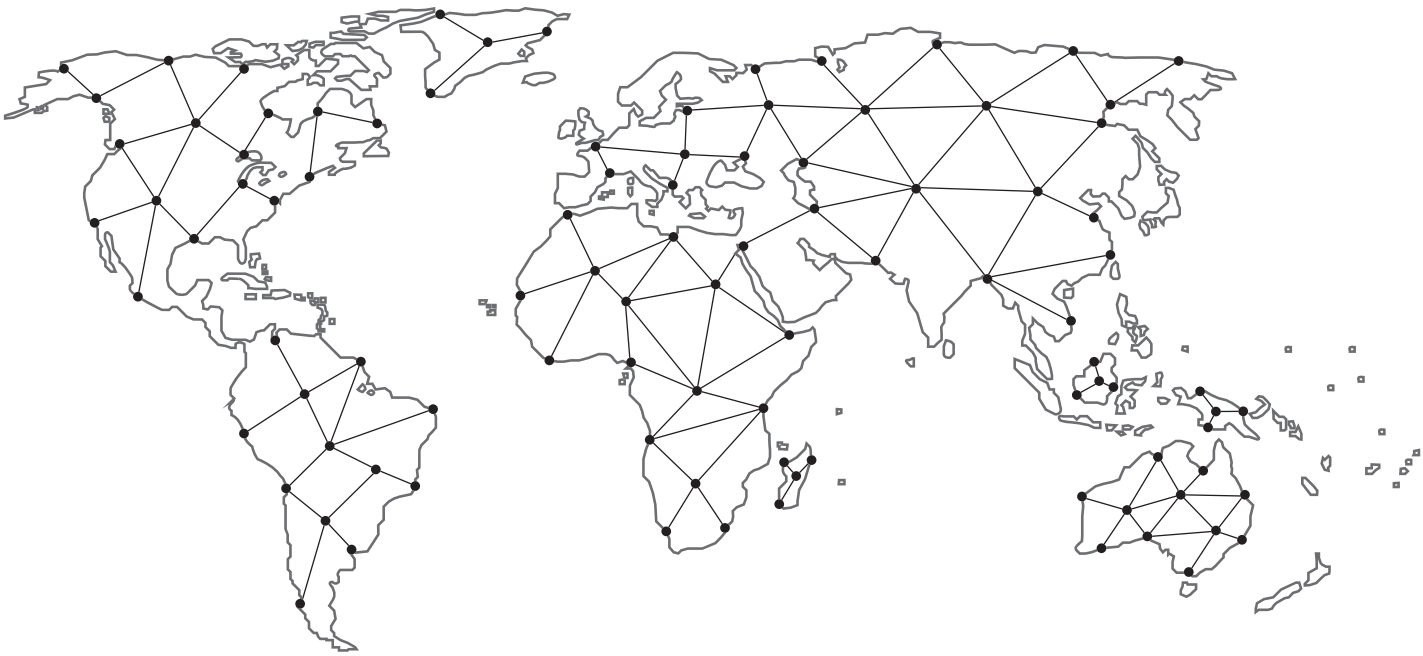
Notes:

Notes:

Notes:

Find the nearest local Channel Partner in your area:

valves.bakerhughes.com/contact-us



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BHMN-DSH-IOM-33464C-0824 08/2024

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