

**The Free Flow Fittings™**



**REDUCE HAZARDS | REDUCE RISKS | REDUCE ENVIRONMENTAL IMPACT | REDUCE COSTS**

## Introduction:

The Award Winning and Patented Free Flow Technologies™ were innovated to operate where contamination may be present in the delivery lines of safety critical systems.

The Free Flow Nozzles™ were innovated in 2012 with the Free Flow Adaptor™ and Free Flow Reducing Bush™ (The Free Flow Fittings™) following soon after to protect other industry nozzles from blocking through delivery line contamination.

The Free Flow Fittings™ have a Nine-Year track record and have been utilised by both tier one operators and service companies. The Products are allowing companies to introduce “Dry Compliance Testing” to their fire safety systems through the reliability they introduce for when the systems need to go wet during a real time fire incident.

The fittings have gone through blockage tests and flow tests, they have been independently certified by Bureau Veritas. The products are engineered to comply with API 14G and ASME B31.3 good engineering practices.

The technology has been noted by the world’s largest fire products company as paving the way for a new environmental classification for deluge nozzles used in a saltwater service and where delivery line contamination may be a risk.

In 2018 the technology won the Safety Innovation of the year award through Oil & Gas UK in association with Step Change in Safety. This accolade goes hand in hand with its Patent status where it is recognised as a new and inventive way of introducing an engineered solution to prevent deluge nozzles from blocking where administrative controls have previously only been available. The logical engineering behind the technology has allowed the “Fail & Fix” method of fire system compliance to be mitigated, where you never get a second chance with a fire as required with the “Fail & Fix” process, the technology allows for a new level of reliability on first time system activation.

When the correct fittings are matched with the correct nozzles a 5% flow reduction can be achieved and implemented to the systems hydraulic model, this value will vary on product selection and the purchasers own design requirements. A maximum level of 10% flow reduction is also suggested in-line with the purchaser’s own design requirements.

Zero-flow reduction can also be achieved with certain fittings if correctly paired with the nozzle to be protected, this can also be achieved by utilizing the equivalent Free Flow Nozzle™. For new builds and replacement systems we would suggest the performance of nozzles and fittings be optimized.

With such a large selection of standard fittings and the opportunity to have bespoke fittings manufactured the integration of the technology can be done without affecting production as retrofit to instantly reduce the risk of nozzles failing through delivery line contamination to ALARP. (As Low as Reasonably Practicable)

The technology has been used in 40-year-old systems where 100% no blocked nozzles were recorded where heavy delivery line contamination was recorded, notably this asset is now fully integrated with the technology where annual dry testing has been implemented with a 5 yearly wet test regime.

To fully understand the Free Flow Fitting™ selection process contact one of our product line champion on [support@freeflownozzles.com](mailto:support@freeflownozzles.com) they will take you through the selection process and provide an opportunity for an on-site lunch and learn or where applicable set up an on-line introduction to the technologies.

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## Fitting Selection:

The design of individual safety systems can vary considerably as can the purpose, characteristics, cause, and hazards associated with them. All designs should be performed by experienced designers competent at a level to ensure all safety and performance parameters are achieved to the codes and standards noted along with any local authority requirements.

It is the duty of the purchaser to ensure that the systems where the Free Flow Fittings™ are utilised are operated, designed, commissioned, serviced, and maintained in line with API 14G / NFPA standards at all times and recorded as such.

If there is any doubt regarding the selection, installation, operation and maintenance of the Free Flow Fittings™ the purchaser should contact [support@freeflownozzles.com](mailto:support@freeflownozzles.com) directly or call on +44 (0) 1224 749420 or +44(0)7971 024214 for instruction as required.

With all technologies competency is paramount on product selection, with over nine years lessons learned in-house with the products we suggest all product selection go through one of our product line champions to avoid the purchaser utilising or purchasing the wrong products for their intended use.

To best optimize selection, we suggest that the nozzles to be protected and their mechanical connection and position in-line be advised where we will then do a real-time function test on our in-house demonstration rig to enable Two K-Factors to become One as a single line-item node point for the hydraulic model.

For large projects we suggest that all nozzles specified are tested this way and that an Independent Attestation be complete to validate the results prior to purchase and design specification. It will be the sole responsibility of the purchaser to provide the correct information relating to the test to ensure it meets the correct operating parameters of where the fittings will be used.

We also suggest that the purchaser provide inherent contamination from the location or system which the fittings will be used to enable real time performance blockage tests to be recorded.

All real time testing associated with the product selection can be submitted to the local regulator and or duty holder to justify the introduction of a 5 Yearly wet test compliance regime with annual "Dry". This will also allow for a predictive service and maintenance plan to be associated with the asset to be protected.

**NOTE:** The Free Flow Fittings™ are not guaranteed to stop systems from failing but are designed specifically to reduce the risk to as low as reasonably practicable of deluge heads from blocking through delivery line contamination. No K-factors are listed to avoid any incorrect selection, with k-factors being calculated differently by different nozzle manufactures and there being so many we suggest the alignment of a single k-factor with the Free Flow Fitting™ and nozzle selected to mitigate any incorrect product selection by the purchaser in relation to flow.

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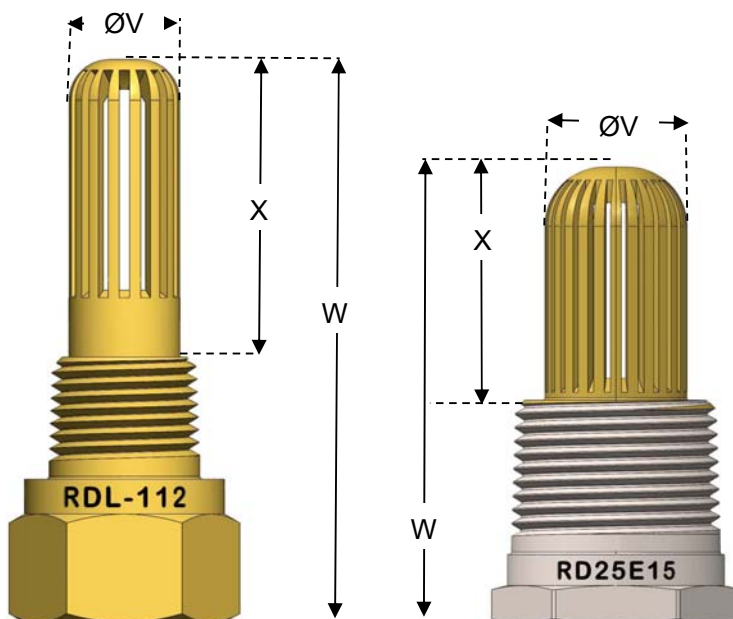
## Free Flow Fittings™

For half inch Nozzles we suggest the following fittings:

#Not all variations are listed

CODE	DESCRIPTION	Female Connection	Male Connection	ØV	X	W	Weight
RDL-101	Free Flow Adaptor™	0.5"	0.5"	15.9	33.0	71.1	132g
RDL-102	Free Flow Adaptor™	0.5"	0.5"	15.9	42.5	80.6	132g
RDL-103	Free Flow Adaptor™	0.5"	0.5"	15.9	68.1	106.2	142g
RDL-111	Free Flow Adaptor™	0.5"	0.5"	15.9	33.0	71.1	132g
RDL-112	Free Flow Adaptor™	0.5"	0.5"	15.9	42.5	80.6	132g
RDL-113	Free Flow Adaptor™	0.5"	0.5"	15.9	68.1	106.2	142g
RD25E15	Free Flow Reducer™	0.5"	1.0"	22.86	37.6	75.7	175.5g
RD25T15	Free Flow Reducer™	0.5"	1.0"	22.86	25.7	63.8	164.5g
RD40E15	Free Flow Reducer™	0.5"	1.5"	38.1/31.75	53.7	92.9	509.5g
RD40T15	Free Flow Reducer™	0.5"	1.5"	38.1/31.75	36.2	75.4	424.0g
RD50E15	Free Flow Reducer™	0.5"	2.0"	48.3	58.7	99.4	724.5g
RD50T15	Free Flow Reducer™	0.5"	2.0"	48.3	36.2	76.9	661.0

Weights will vary on material



The flow entering the nozzle must always be greater than the flow of the nozzle to ensure the correct K-Factor is achieved. A single K-factor will be supplied on selection to ensure the purchaser can use a combined number with the specific nozzle type for in-put to the hydraulic model.

**NOTE:**

Flow and circulation around the ID of the pipe and OD of the fitting should be optimized during the selection process.

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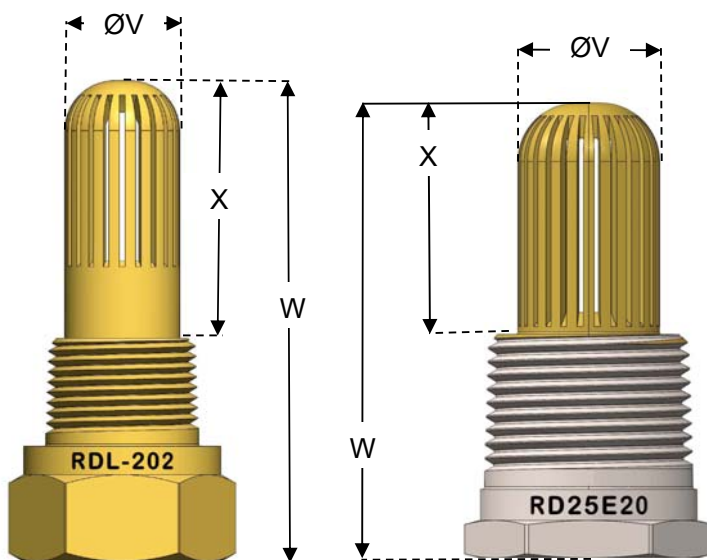
## Free Flow Fittings™

For three quarter inch Nozzles we suggest the following fittings:

#Not all variations are listed

CODE	DESCRIPTION	Female Connection	Male Connection	ØV	X	W	Weight
RDL-201	Free Flow Adaptor™	0.75"	0.75"	20.3	33.0	72.4	157g
RDL-202	Free Flow Adaptor™	0.75"	0.75"	20.3	45.7	85.1	177g
RDL-203	Free Flow Adaptor™	0.75"	0.75"	20.3	68.6	108.0	187g
RDL-211	Free Flow Adaptor™	0.75"	0.75"	20.3	33.0	72.4	157g
RDL-212	Free Flow Adaptor™	0.75"	0.75"	20.3	45.7	85.1	177g
RDL-213	Free Flow Adaptor™	0.75"	0.75"	20.3	68.6	108.0	187g
RD25E20	Free Flow Reducer™	0.75"	1.0"	22.86	37.6	75.7	165.5g
RD25T20	Free Flow Reducer™	0.75"	1.0"	22.86	25.7	63.8	144.5g
RD40E20	Free Flow Reducer™	0.75"	1.5"	38.1/31.75	53.7	92.9	489.5g
RD40T20	Free Flow Reducer™	0.75"	1.5"	38.1/31.75	36.2	75.4	404.0g
RD50E20	Free Flow Reducer™	0.75"	2.0"	48.3	58.7	99.4	704.5g
RD50T20	Free Flow Reducer™	0.75"	2.0"	48.3	36.2	76.9	641.0

Weights will vary on material



The flow entering the nozzle must always be greater than the flow of the nozzle to ensure the correct K-Factor is achieved. A single K-factor will be supplied on selection to ensure the purchaser can use a combined number with the specific nozzle type for in-pu to the hydraulic model.

**NOTE:**

Flow and circulation around the ID of the pipe and OD of the fitting should be optimized during the selection process.

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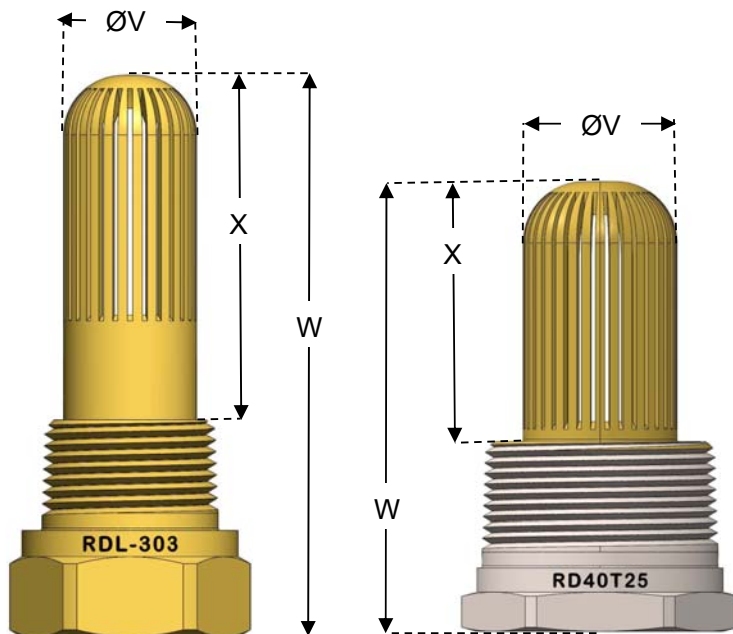
## Free Flow Fittings™

For one-inch Nozzles we suggest the following fittings:

#Not all variations are listed

CODE	DESCRIPTION	Female Connection	Male Connection	ØV	X	W	Weight
RDL-301	Free Flow Adaptor™	1.0"	1.0"	25.4	45.7	87.1	288g
RDL-302	Free Flow Adaptor™	1.0"	1.0"	25.4	52.1	93.5	312g
RDL-303	Free Flow Adaptor™	1.0"	1.0"	25.4	66.0	107.4	330g
RDL-304	Free Flow Adaptor™	1.0"	1.0"	23.4	66.0	107.4	238.5g
RDL-305	Free Flow Adaptor™	1.0"	1.0"	20.3	45.7	87.1	238.5g
RDL-306	Free Flow Adaptor™	1.0"	1.0"	20.3	66.0	107.4	238.5g
RDL-307	Free Flow Adaptor™	1.0"	1.0"	20.3	66.0	107.4	238.5g
RD40E25	Free Flow Reducer™	1.0"	1.5"	38.1/31.75	53.7	87.9	305.4g
RD40T25	Free Flow Reducer™	1.0"	1.5"	38.1/31.75	36.2	70.4	295.0g
RD50E25	Free Flow Reducer™	1.0"	2.0"	48.3	58.7	94.5	698.5g
RD50T25	Free Flow Reducer™	1.0"	2.0"	48.3	36.2	72	621.0g

Weights will vary on material



The flow entering the nozzle must always be greater than the flow of the nozzle to ensure the correct K-Factor is achieved. A single K-factor will be supplied on selection to ensure the purchaser can use a combined number with the specific nozzle type for in-pu to the hydraulic model.

**NOTE:**

Flow and circulation around the ID of the pipe and OD of the fitting should be optimized during the selection process.

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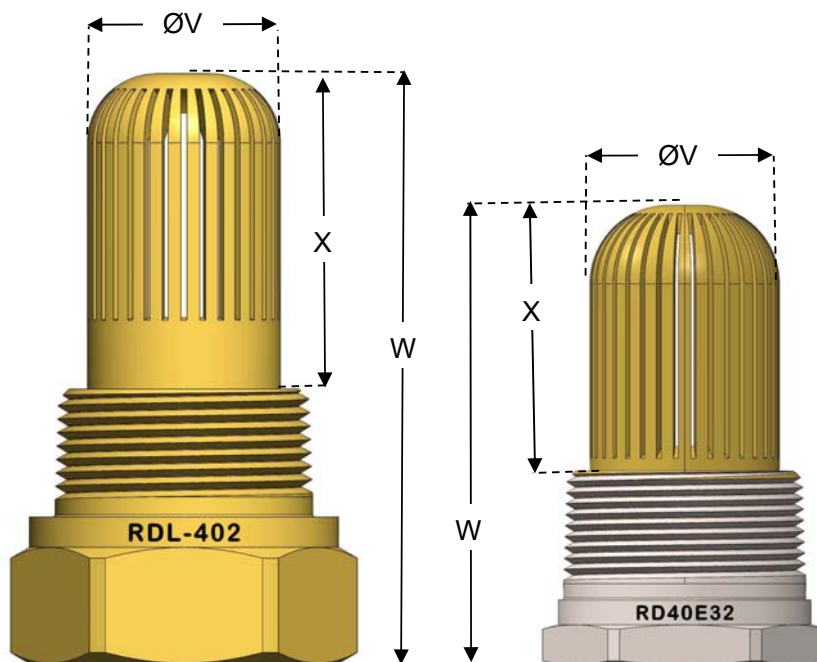
## Free Flow Fittings™

For inch and a quarter Nozzles we suggest the following fittings:

#Not all variations are listed

CODE	DESCRIPTION	Female Connection	Male Connection	ØV	X	W	Weight
RDL-401	Free Flow Adaptor™	1.25"	1.25"	20.3	33.0	72.4	401.0g
RDL-402	Free Flow Adaptor™	1.25"	1.25"	20.3	45.7	85.1	412.0g
RDL-403	Free Flow Adaptor™	1.25"	1.25"	20.3	68.6	108.0	440.0g
RDL-404	Free Flow Adaptor™	1.25"	1.25"	20.3	33.0	72.4	389.0g
RDL-405	Free Flow Adaptor™	1.25"	1.25"	20.3	45.7	85.1	389.0g
RDL-406	Free Flow Adaptor™	1.25"	1.25"	20.3	68.6	108.0	389.0g
RDL-407	Free Flow Adaptor™	1.25"	1.25"	20.3	68.6	108.0	389.0g
RD40E32	Free Flow Reducer™	1.25"	1.5"	38.1/31.75	53.7	87.9	509.0g
RD40T32	Free Flow Reducer™	1.25"	1.5"	38.1/31.75	36.2	70.4	424.0g
RD50E32	Free Flow Reducer™	1.25"	2.0"	48.3	58.7	94.5	678.5g
RD50T32	Free Flow Reducer™	1.25"	2.0"	48.3	36.2	72	601.0g

Weights will vary on material



The flow entering the nozzle must always be greater than the flow of the nozzle to ensure the correct K-Factor is achieved. A single K-factor will be supplied on selection to ensure the purchaser can use a combined number with the specific nozzle type for in-pur to the hydraulic model.

**NOTE:**

Flow and circulation around the ID of the pipe and OD of the fitting should be optimized during the selection process.

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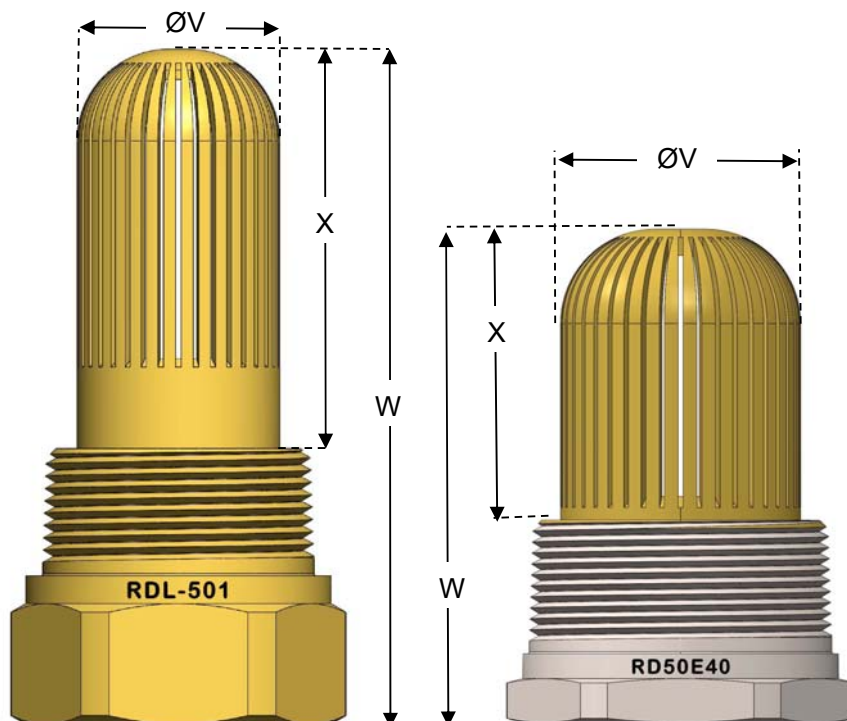
## Free Flow Fittings™

For inch and a half Nozzles we suggest the following fittings:

#Not all variations are listed

CODE	DESCRIPTION	Female Connection	Male Connection	ØV	X	W	Weight
RDL-501	Free Flow Adaptor™	1.5"	1.5"	36.3	71.9	121.4	546g
RD50E15	Free Flow Reducer™	0.5"	2.0"	48.3	58.7	99.4	724.5g
RD50T15	Free Flow Reducer™	0.5"	2.0"	48.3	36.2	76.9	661.0
RD50E20	Free Flow Reducer™	0.75"	2.0"	48.3	58.7	99.4	704.5g
RD50T20	Free Flow Reducer™	0.75"	2.0"	48.3	36.2	76.9	641.0
RD50E25	Free Flow Reducer™	1.0"	2.0"	48.3	58.7	94.5	698.5g
RD50T25	Free Flow Reducer™	1.0"	2.0"	48.3	36.2	72	621.0g
RD50E32	Free Flow Reducer™	1.25"	2.0"	48.3	58.7	94.5	678.5g
RD50T32	Free Flow Reducer™	1.25"	2.0"	48.3	36.2	72	601.0g
RD50E40	Free Flow Reducer™	1.5"	2.0"	48.3	58.7	94.5	658.0g
RD50T40	Free Flow Reducer™	1.5"	2.0"	48.3	36.2	72	580.0g

Weights will vary on material



The flow entering the nozzle must always be greater than the flow of the nozzle to ensure the correct K-Factor is achieved. A single K-factor will be supplied on selection to ensure the purchaser can use a combined number with the specific nozzle type for in-pu to the hydraulic model.

**NOTE:**

Flow and circulation around the ID of the pipe and OD of the fitting should be optimized during the selection process.

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## General Design Information:

Independently Certified by Bureau Veritas, all certificates can be reviewed on request.

### Certification No:

<b>RDL – 100 Series</b>	Bureau Veritas IRC 22ABD10074 Rev. 0
<b>RDL – 200 Series</b>	Bureau Veritas IRC 22ABD10075 Rev. 0
<b>RDL – 300 Series</b>	Bureau Veritas IRC 22ABD10076 Rev. 0
<b>RDL – 400 Series</b>	Bureau Veritas IRC 22ABD10077 Rev. 0
<b>RDL – 500 Series</b>	Bureau Veritas IRC 22ABD10078 Rev. 0
<b>RDL – RB25 Series</b>	Bureau Veritas IRC 22ABD10087 Rev. 0
<b>RDL – RB40 Series</b>	Bureau Veritas IRC 22ABD10090 Rev. 0
<b>RDL – RB40/32 Series</b>	Bureau Veritas IRC 22ABD10091 Rev. 0
<b>RDL – RB50 Series</b>	Bureau Veritas IRC 22ABD10088 Rev. 0

<b>Performance Maximum design working pressure:</b>	16 barg
<b>Criteria Design working pressure:</b>	1 - 16 barg
<b>Design test pressure:</b>	24 barg
<b>Service temperature range:</b>	-10 °C to + 200 °C
<b>Service:</b>	Standard (Sea Water) <b>*Foam Proven</b>

### Materials:

- (1) Gun Metal (LG2): Yield  $\geq$  110 MPa; Tensile  $\geq$  230 MPa
- (2) Brass (CW602N): Yield  $\geq$  120 MPa; Tensile  $\geq$  280 MPa
- (3) Stainless Steel (303): Yield  $\geq$  190 MPa; Tensile  $\geq$  500 MPa
- (4) Aluminium Bronze (CA104): Yield  $\geq$  400 MPa; Tensile  $\geq$  600 MPa
- (5) Super Duplex (S32760): Yield  $\geq$  530 MPa; Tensile  $\geq$  730 MPa

Additional materials can be used on special request.

### Design references:

ASME B31.3: 2020  
API RP 14G: 14th Edition: 2007

### NOTE:

The above design information has been reviewed against the specified design references. As a result, BUREAU VERITAS considers that equipment manufactured to this design will satisfy the specified performance criteria. Consequently, this certificate is considered to contribute towards a duty holder's obligation for the verification of the equipment's design under the requirements of the following regulations and / or associated guidance:

SI-913 (1996) The Offshore Installations and Wells (Design and Construction, etc.) Regulations  
SI-2306 (1998) The Provision and Use of Work Equipment Regulations (PUWER)

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## Installation:

As noted, it is important to select the correct product for the operation, use and installation which is solely the responsibility of the purchaser. It is also important that the products are installed by a competent person to reduce the risk of damage and improper connection to the system.

Never force the fittings into a connection as this may damage and impair the fitting performance. Inspect all connections and ensure the connection where the fitting is to be placed is free from obstruction and debris with a clear path into the flow path of the pipe.

If an aging asset or existing system, ensure the delivery lines have been flushed and inspected with condition recorded in writing and visually prior to installation. In a new system we suggest a full system flush prior to fitting installation to remove any installation contamination which may be left with-in the flow lines. Again, we advise the condition to be recorded both in writing and visually.

We would suggest the following pipe fitting guidelines be followed for the NPT threaded fittings.

**STEP 1** Inspect port and fitting to ensure that both are free of contaminants and excessive burrs and nicks, we recommend all thread connection be re-dressed on ageing assets.

**STEP 2** Apply a stripe of an anaerobic liquid pipe sealant around the male threads leaving the first two threads uncovered. If no liquid sealant is available, wrap Teflon tape 1-1/2 turns in a clockwise direction, from the pipe end, leaving the first two threads uncovered.

**CAUTION:** Teflon tape and some pipe sealants are destructive to hydraulic components. Always use extreme caution and follow manufacturer's recommendations for proper application of any sealant to prevent contamination. Never allow tape on slots.

**STEP 3** Screw finger tight into the port ensuring no distortion on the slotted section of the adaptor, a free turn must be achieved with the circulation flow area.

**STEP 4** Wrench tighten the fitting to the correct Turns Past Finger Tight position (See following table). When installing elbows or tees, consider final orientation position as to not exceed the recommended TPFT. A properly assembled fittings total thread engagement should be 3.5 to 6 turns

**CAUTION:** Do not over tighten and never back of an installed pipe fitting to achieve proper alignment. Loosening installed pipe fittings will corrupt the seal and contribute to leakage and failure. Torque installation of pipe fittings is not a recommended practice. Thread taper and quality, different port and fitting materials, plating thickness and types, varying thread sealants, orientation, and other factors reduce the reliability of a torqued connection. If torque installation is required, refer to the following table for a suggested guide of torque values.

Fitting Size	Dash Size	Turns Past Finger Tight	Torque ft/lbs (Steel)	Torque ft/lbs (Brass)
0.50"-NPT	-08	1.5 - 3	54	7-14
0.75"-NPT	-12	1.5 - 3	78	10-20
1.00"-NPT	-16	1 - 2.5	112	20-30
1.25"-NPT	-20	1 - 2.5	154	-
1.50"-NPT	-24	1 - 2.5	211	-
2.0"-NPT	-32	1 - 2.5	300	-

Higher levels of torque may distort the fitting and cause leakage and damage.

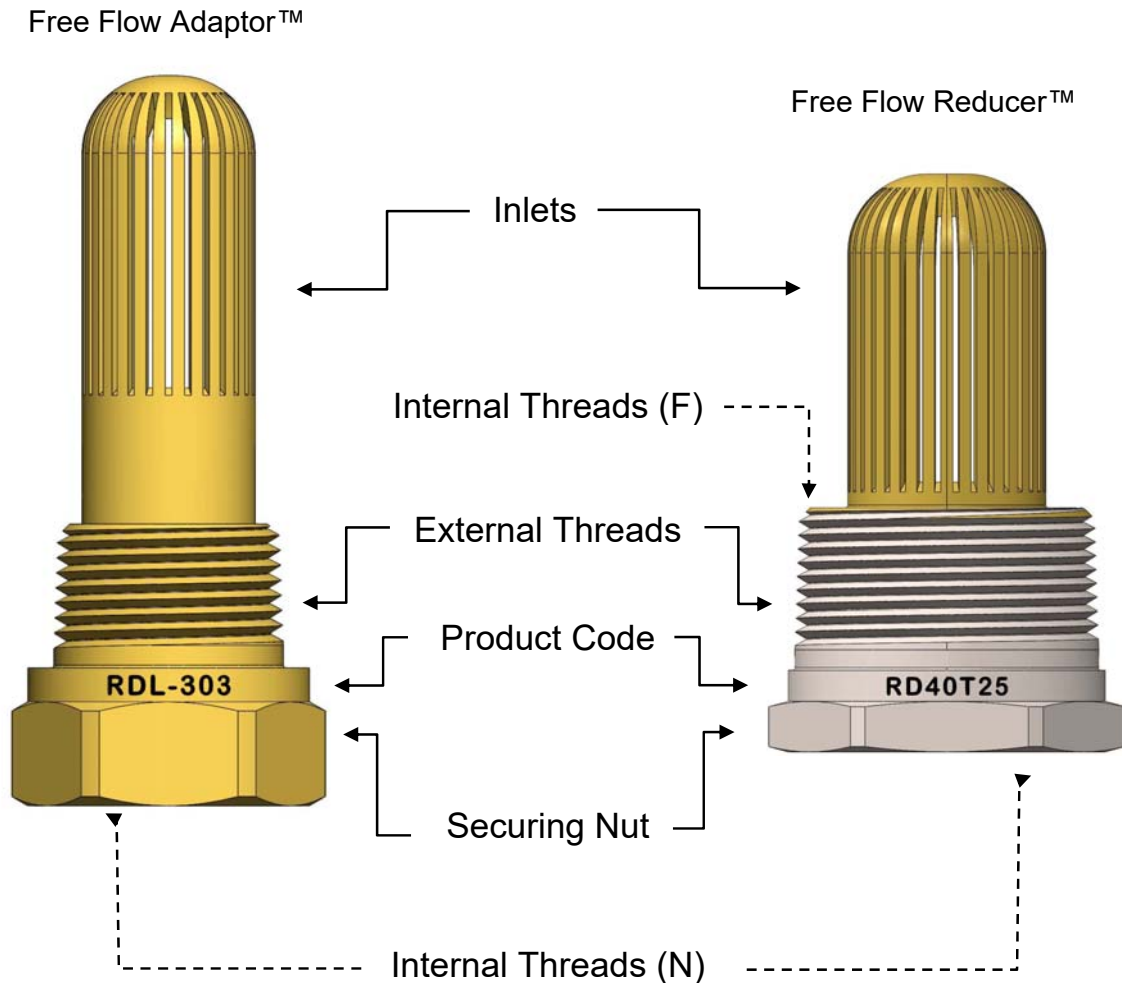
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## Maintenance:

The maintenance of the Free Flow Fittings™ should not be confused with the maintenance of the system in which they are placed, these are two very different requirements.

We would however suggest an annual “Dry Compliance” regime be implemented with a 5 yearly wet test to be complete in line with the duty holders or local authorities’ specific compliance testing rules and standards for systems which use the Free Flow Fittings™

When the fittings are removed by a competent person for servicing the following should be applied.



- Remove fitting and inspect all inlets
- Record condition and clean with a soft wire brush until free from any contamination
- Inspect and clean all threads with a soft wire brush
- Re-dress where applicable and make ready for re-installation

NOTE: We suggest all locations where heavy debris is found are recorded as “Bad Actor” locations to assist with annual “Dry Testing” and a predictive service and maintenance plan.

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## Ordering Guidance:

To best understand the technology, we would suggest a Lunch and Learn with a product line champion either on-site in Aberdeen or on-line where real-time demonstrations which can be recorded.

To help our clients prove and validate the upgrade of their safety critical systems with the Free Flow Fittings™ we offer an on-site or on-line FAT (Factory Acceptance Test) where all stake holders can attend or view real-time online.

Brining the regulator, duty holder, design engineers and maintenance teams together on site or online will allow for a uniformed plan on the adoption of the technology without having to conduct an on-site pilot where it can be difficult to record the data and have it witnessed by all interested parties.

This will also allow an expedited integration of the technology across organisations with a primary case study complete and approved by all departments as a unified project where communication is paramount to allow such projects to be rolled out through large entities.

Or ordering can be a simple as talking to one of our product line champions on [support@freeflownozzles.com](mailto:support@freeflownozzles.com) where we can advise on the correct fitting to protect your chosen nozzle or suggest an alternative Free Flow Nozzle™.

We suggest an Independent Attestation be provided for the two products (Nozzle) & (Fitting) is complete to allow for a single K-factor Value to be added to the safety systems hydraulic model.

This attestation can then be used in the safety case for the facility to be protected.

#Live fire demonstrations with water & foam are also available on special request:



Come visit us or give us a call to hear about the Free Flow Technologies™ and how they are paving the way for a new fire industry compliance standard.

**Unit 4, Cothill, Fintray, Dyce,  
Aberdeen, Scotland, AB21 0JD**

**TEL: +44 (0)1224 749420**

**TEL: +44 (0)7971 024214**

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