

# **HYDROPLUGS**

## **TYPES RS and R**

### **Selection, Application and Maintenance**

#### **Safety**

- Whilst the Chalwyn Hydroplug system reduces some of the potential hazards inherent in pressure testing, it is still essential that good practice and all relevant safety precautions arising from National and EU Health and Safety requirements are fully observed. (Refer to HSE Guidance Note GS4 - Third edition).
- Pressure testing must be supervised by a technically qualified engineer. This instruction manual must be read before testing starts and its contents fully observed during testing.
- Only Group II liquids should be used as the test fluid.

## DESCRIPTION

Apparatus for the hydrostatic pressure test of pipework, tubes or vessels with a suitable parallel length of bore in the size range 9.5mm to 19mm diameter (Type RS) or 19mm to 208 mm diameter (Type R). Hydroplugs Type RS or R are typically used in pairs. For example one 'inlet' Hydroplug with a connection for test fluid sealing one end of a pipe to be tested and one 'outlet' Hydroplug with an air exhaust valve sealing the other. Maximum permitted test pressure is typically 550 bar but lower maximums are applicable to some of the smaller sized Hydroplugs - see page 5.

### Important Notes:

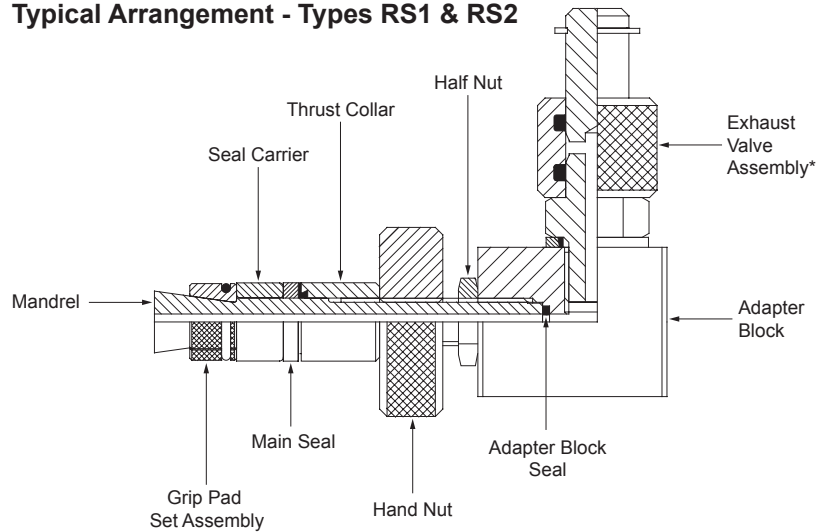
- Hydroplugs are designed for use with water or mineral oils as the test fluid. Other Group II liquids may be used subject to due regard to the action of aggressive substances on the Hydroplug and seals and any special precautions for handling and safe use.

Hydroplugs **are not** designed for use with Group 1 fluids as defined in Article 2 (2) or Council Directive 67/548/EEC.

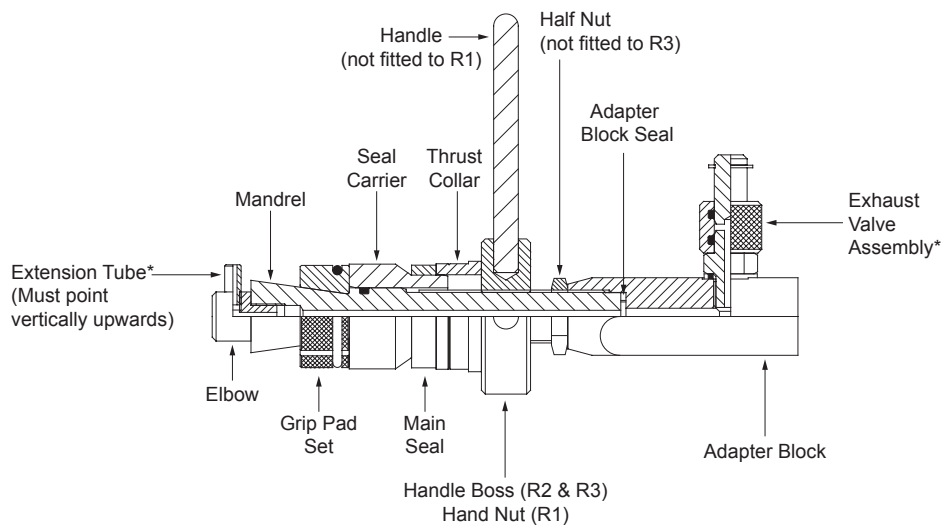
- Under additional special precautions test pressures higher than the levels specified herein may be possible. Please contact Chalwyn for details.

\* This item is only fitted to the outlet Hydroplugs

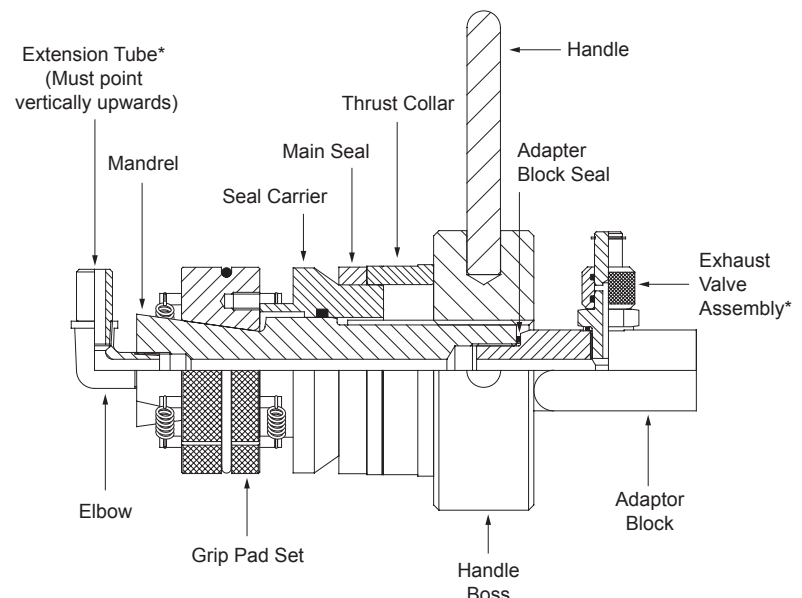
**Figure 1A**  
Typical Arrangement - Types RS1 & RS2



**Figure 1B**  
Typical Arrangement - Types R1, R2 & R3



**Figure 1C**  
Typical Arrangement - Types R4 and R5



## SELECTION

The correctly sized Hydroplug must be selected to suit the bore of the item to be tested. Table 1 on page 5 is used for this purpose. In addition to the diameter being correct, the minimum length of parallel bore in the item to be tested must exceed the 'insertion length' given in Table 1 for the selected Hydroplug. CAUTION: The Extension Tube of the Outlet Hydroplug projects beyond the quoted 'insertion length'. Check that it clears the wall of the item to be tested. If not, consideration should be given to using a modified Extension Tube shortened to just clear the wall. system. Refit the standard Extension Tube before using the Hydroplug elsewhere.

**Important note:** When thin walled tube or pipe is to be tested it may be necessary to specify a support collar to avoid distortion at the position the Chalwyn Hydroplug grip pads lock against the internal diameter. The following formula must be used to determine whether support collars are required.

$$\text{Max: Test pressure (lb/in}^2\text{)} = \frac{1.625 \times T \times W \times w/t}{d^2}$$

Where: T = Yield stress of tube material in lbs/in<sup>2</sup>  
 W = Length of grip pad in inches (see table below)  
 w/t = Wall thickness of tube in inches  
 d = Internal diameter of tube in inches

| Hydroplug Number | W (ins) |
|------------------|---------|
| RS1              | 0.37    |
| RS2              | 0.37    |
| R1               | 0.62    |
| R2               | 0.75    |
| R3               | 1.00    |
| R4               | 1.75    |
| R5               | 2.25    |

Support collars are available from Chalwyn.

It is also possible to convert an existing Hydroplug to suit a different test bore but only within the Hydroplug type range. For example, a Type R3 can be converted to any size within the R3 range (see Table 1). Conversion kits are available from Chalwyn.

*Approximate weights and overall dimensions for Types RS and R Hydroplugs are given in Table 2.*

## APPLICATION

1. Carry out pre-test checks (see under Maintenance).
2. Type R Hydroplugs must be assembled with the large diameter of the "Thrust Collar" abutting the seal. (see Figure 2).
3. Make certain the bore of the item to be tested is clean and free from sharp edges.
4. Unscrew the "Handle Boss" or "Hand Nut" (see Figures 1) to retract both the grip pads and the seal to their smallest diameter.
5. Insert the Hydroplug into the bore. The thrust collar of Type R Hydroplugs must be aligned with the item under test as shown in Figure 2. Type RS Hydroplugs must be aligned such that one half of the thrust collar protrudes from the end of the item under test.

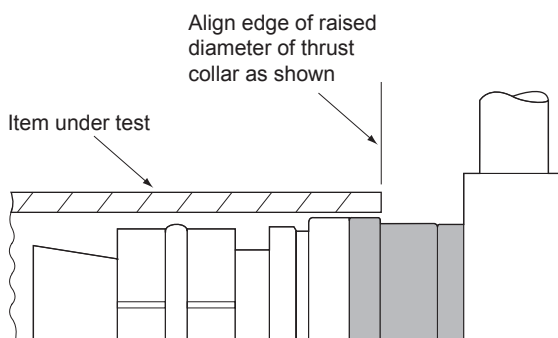


Figure 2.  
Preferred way of aligning hydroplug  
with item under test (type R)

If the Type R thrust collar will not fit into the bore it may be reversed as shown below. This is a non-preferred way of assembling for test and must only be used when the larger diameter of the thrust collar will not slide into the bore.

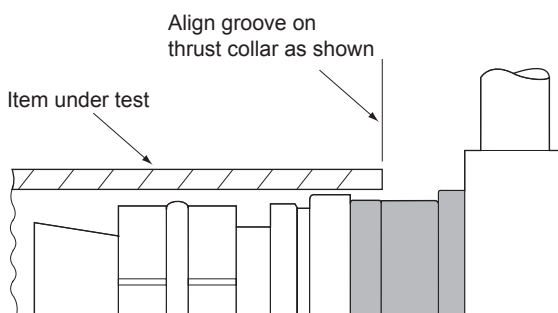


Figure 3.  
Non preferred way of aligning hydroplug  
with item under test (type R)

**VERY IMPORTANT.** The Outlet Hydroplug (fitted with an air exhaust vent) must be sited at the highest point in the equipment under test. The extension tube (see Figures 1) must be fitted pointing vertically upwards as shown. If the equipment cannot be arranged with the air venting Hydroplug at the highest point then other means to vent trapped air must be provided.

6. Ensure exhaust vent is open.
7. Turn the handle boss/hand nut clockwise to tighten each Hydroplug in position. Prevent Hydroplugs from turning by holding the adaptor block (see Figures 1). Once an initial slight increase in turning resistance is felt as the grip pads start to contact the bore, recheck and adjust the alignment of the thrust collar as necessary. Continue to turn the handle boss/hand nut until a more positive resistance is felt as the seal makes full contact with the bore. Tighten by a further one half turn. No further tightening is required at this stage.
8. Connect the test fluid delivery pipe from the test pump to the Inlet Hydroplug.
9. Pump test fluid via the Inlet Hydroplug until virtually air free test fluid is being expelled through the exhaust vent of the Outlet Hydroplug. Close exhaust vent.
10. Gradually apply test pressure taking all relevant safety precautions. NB: If a small amount of test fluid leaks from the bore due to irregularities in the surface finish, this can be overcome by tightening the handle boss/hand nut by up to one half turn. DO NOT tighten the handle boss where fitted by any means other than by hand pressure using the tommy-bar supplied. DO NOT tighten the hand nut where fitted by any means other than by hand tightening.
11. After completion of test, release the pressure at the supply pump. DO NOT use the Hydroplug exhaust vent to release pressure.
12. If the pressure test is to be repeated, check that the Hydroplug thrust collar is still properly aligned and that the handle boss/hand nut is tight.
13. Once the test cycle is completed and pressure released, unscrew the handle boss/hand nut some five or six turns. Strike the adaptor block with a soft mallet to cause the grip pads and seal to free up.
14. Withdraw Hydroplugs.

## MAINTENANCE

### Prior to each test:

1. Inspect the Hydroplug main seal and grip pads for freedom from damage. Arrange to replace if not suitable for further service.

2. Apply a light coat of silicone grease to the Hydroplug threads and moving parts except the knurled surfaces of the grip pads.

### Subsequent to the completion of test series:

Strip Hydroplug for inspection and cleaning. Any significantly corroded or damaged parts should be replaced. All parts except the knurled faces of the grip pads should be lightly coated with silicone grease and the unit rebuilt with new seals. When required for further service any excess grease on the outer surfaces making handling difficult should be removed.

Table 1  
Selection Data

| Hydroplug Type   | To test tube of bore size |          | Maximum test pressure (bar) |
|--|---------------------------|----------|-----------------------------|
|  | Min (mm)                  | Max (mm) |                             |
| <b>Insertion length 30 mm (length of straight tube req.)</b> |                           |          |                             |
| RS1 - 3/8  | 9.50                      | 9.90     | 270                         |
| RS1 - 25/64  | 9.90                      | 10.30    | 270                         |
| RS1 - 13/32  | 10.30                     | 10.70    | 410                         |
| RS1 - 27/64  | 10.70                     | 11.10    | 550                         |
| RS1 - 7/16   | 11.10                     | 11.50    | 550                         |
| RS1 - 29/64  | 11.50                     | 11.90    | 550                         |
| RS1 - 15/32  | 11.90                     | 12.30    | 550                         |
| RS1 - 31/64  | 12.30                     | 12.70    | 550                         |
| RS1 - 1/2  | 12.70                     | 13.00    | 550                         |
| RS1 - 33/64  | 13.00                     | 13.50    | 550                         |

|  |       |       |     |
|--|-------|-------|-----|
| <b>Insertion length 30 mm (length of straight tube req.)</b> |       |       |     |
| RS2 - 35/64  | 13.90 | 14.30 | 130 |
| RS2 - 9/16   | 14.30 | 14.70 | 270 |
| RS2 - 37/64  | 14.70 | 15.10 | 270 |
| RS2 - 19/32  | 15.10 | 15.50 | 270 |
| RS2 - 39/64  | 15.50 | 15.90 | 270 |
| RS2 - 5/8  | 15.90 | 16.30 | 270 |
| RS2 - 41/64  | 16.30 | 16.60 | 410 |
| RS2 - 21/32  | 16.60 | 17.00 | 410 |
| RS2 - 43/64  | 17.00 | 17.40 | 410 |
| RS2 - 11/16  | 17.40 | 17.80 | 410 |
| RS2 - 45/64  | 17.80 | 18.20 | 550 |
| RS2 - 23/32  | 18.20 | 18.60 | 550 |
| RS2 - 47/64  | 18.60 | 19.00 | 550 |

|  |       |       |     |
|--|-------|-------|-----|
| R1 - 3/4   | 19.00 | 20.60 | 130 |
| <b>Insertion length 45 mm (length of straight tube req.)</b> |       |       |     |
| R1 - 7/8   | 22.20 | 23.80 | 270 |
| R1 - 15/16   | 23.80 | 25.40 | 410 |
| R1 - 1   | 25.40 | 27.00 | 550 |
| R1 - 1 1/16  | 27.00 | 28.50 | 550 |
| R1 - 1 1/8   | 28.50 | 30.10 | 550 |
| R1 - 1 3/16  | 30.10 | 31.70 | 550 |
| R1 - 1 1/4   | 31.70 | 33.30 | 550 |
| R1 - 1 5/16  | 33.30 | 35.00 | 550 |

|  |       |       |     |
|--|-------|-------|-----|
| R2 - 1 1/4   | 32.00 | 35.00 | 130 |
| R2 - 1 3/8   | 35.00 | 38.00 | 270 |
| <b>Insertion length 60 mm (length of straight tube req.)</b> |       |       |     |
| R2 - 1 5/8   | 41.50 | 44.50 | 410 |
| R2 - 1 3/4   | 44.50 | 47.50 | 550 |
| R2 - 1 7/8   | 47.50 | 51.00 | 550 |
| R2 - 2   | 51.00 | 54.00 | 550 |

**Table 1**  
**Selection Data**

Note: All Hydroplugs listed on this page are subject to a maximum test pressure limit of 550 bar.

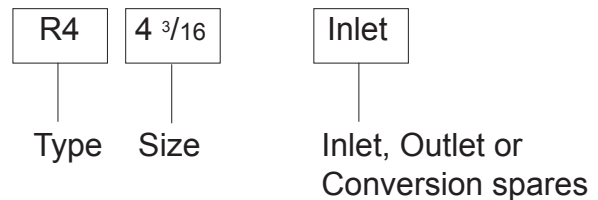
| Hydroplug Type   | To test tube of bore size |          |
|--|---------------------------|----------|
|  | Min (mm)                  | Max (mm) |
| <b>Insertion length 85 mm (length of straight tube req.)</b> |                           |          |
| R3 - 2 1/16  | 52.50                     | 55.50    |
| R3 - 2 3/16  | 55.50                     | 59.00    |
| R3 - 2 5/16  | 59.00                     | 62.00    |
| R3 - 2 7/16  | 62.00                     | 65.00    |
| R3 - 2 9/16  | 65.00                     | 68.50    |
| R3 - 2 11/16   | 68.50                     | 71.50    |
| R3 - 2 13/16   | 71.50                     | 74.50    |
| R3 - 2 15/16   | 74.50                     | 78.00    |
| R3 - 3 1/16  | 78.00                     | 81.00    |
| R3 - 3 3/16  | 81.00                     | 84.00    |
| R3 - 3 5/16  | 84.00                     | 87.50    |
| R3 - 3 7/16  | 87.50                     | 90.50    |

| Hydroplug Type  | To test tube of bore size |          |
|---|---------------------------|----------|
|   | Min (mm)                  | Max (mm) |
| <b>Insertion length 160 mm (length of straight tube req.)</b> |                           |          |
| R5 - 5 15/16  | 151.00                    | 157.00   |
| R5 - 6 1/16   | 154.00                    | 160.00   |
| R5 - 6 3/16   | 157.00                    | 163.50   |
| R5 - 6 5/16   | 160.50                    | 166.50   |
| R5 - 6 7/16   | 163.50                    | 170.00   |
| R5 - 6 9/16   | 167.00                    | 173.00   |
| R5 - 6 11/16  | 170.00                    | 176.00   |
| R5 - 6 13/16  | 173.00                    | 179.00   |
| R5 - 6 15/16  | 176.50                    | 182.50   |
| R5 - 7 1/16   | 179.50                    | 185.50   |
| R5 - 7 3/16   | 182.50                    | 189.00   |
| R5 - 7 5/16   | 186.00                    | 192.00   |
| R5 - 7 7/16   | 189.00                    | 195.00   |
| R5 - 7 9/16   | 192.00                    | 198.00   |
| R5 - 7 11/16  | 195.50                    | 201.50   |
| R5 - 7 13/16  | 198.50                    | 204.50   |
| R5 - 7 15/16  | 201.50                    | 208.00   |

| Hydroplug Type  | To test tube of bore size |          |
|---|---------------------------|----------|
|   | Min (mm)                  | Max (mm) |
| <b>Insertion length 115 mm (length of straight tube req.)</b> |                           |          |
| R5 - 3 9/16   | 90.50                     | 94.00    |
| R5 - 3 11/16  | 94.00                     | 97.00    |
| R5 - 3 13/16  | 97.00                     | 100.00   |
| R5 - 3 15/16  | 100.00                    | 103.00   |
| R5 - 4 1/16   | 103.00                    | 106.50   |
| R5 - 4 3/16   | 106.50                    | 109.50   |
| R5 - 4 5/16   | 109.50                    | 113.00   |
| R5 - 4 7/16   | 113.00                    | 116.00   |
| R5 - 4 9/16   | 116.00                    | 119.00   |
| R5 - 4 11/16  | 119.00                    | 122.50   |
| R5 - 4 13/16  | 122.50                    | 125.50   |
| R5 - 4 15/16  | 125.50                    | 128.50   |
| R5 - 5 1/16   | 128.50                    | 132.00   |
| R5 - 5 3/16   | 132.00                    | 135.00   |
| R4 - 5 5/16   | 135.00                    | 138.00   |
| R4 - 5 7/16   | 138.00                    | 141.50   |
| R4 - 5 9/16   | 141.50                    | 144.50   |
| R4 - 5 11/16  | 144.50                    | 148.00   |
| R4 - 5 13/16  | 148.00                    | 151.00   |
| R4 - 5 15/16  | 151.00                    | 154.00   |

## Customer Selection

Example:



## OVERALL WEIGHTS AND DIMENSIONS (MAX)

| Type | Inlet Assembly |          | Outlet Assembly |          | Max Weight per assembly (kg) | Max Weight per Conv'n set (kg) |
|------|----------------|----------|-----------------|----------|------------------------------|--------------------------------|
|      | Length (mm)    | Dia (mm) | Length (mm)     | Dia (mm) |                              |                                |
| RS1  | 105            | 40       | 105             |          | 40                           | 0.10                           |
| RS2  | 105            | 40       | 105             |          | 40                           | 0.10                           |
| R1   | 175            | 35       | 190             |          | 35                           | 0.25                           |
| R2   | 220            | 60       | 240             |          | 60                           | 0.75                           |
| R3   | 225            | 95       | 280             |          | 95                           | 3.00                           |
| R4   | 320            | 160      | 350             |          | 160                          | 18.00                          |
| R5   | 475            | 220      | 525             |          | 220                          | 30.00                          |



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