PRODUCT ADVANTAGES

- **Reliable**: high mechanical strength due to GRP construction; design verified by Finite Element Stress Analysis; durable materials
- **Watertight**: resistant up to 1 bar (10 m head), back pressure (0.8 to 1.0 bar by model); integral rubber seals easily replaced if damaged
- **Light weight**: fast and easy installation, most sizes can be handled by one person; very low operating pressure (cracking head) compared with metal flap valves
- **Corrosion resistant**: high resistance to corrosion and UV degradation; no coatings needed; long service life; low maintenance
- **Quality**: NORHAM is certified to ISO 9001
For over 20 years, NORHAM has designed and manufactured MULTITUBE non-return and flap valves.

Our range in glass reinforced plastic using a isophtalic polyester resin is designed to prevent backflow in sewerage and drainage systems. Choosing as the main material GRP, NORHAM offers a innovative, lightweight and highly resistant MULTITUBE range (0.8 to 1 bar by model).

- **Flap valves** are designed to be installed at the end of pipelines either on vertical walls or directly onto the end of the pipe.
- **Non-return valves** are designed to be installed in line and located in inspection chambers or manholes for ease of maintenance.
- **Flexible couplings** enable watertight connection to any circular pipe.

**R&D**

The design of every valve has been modelled and tested by the NORHAM R&D department prior to manufacture to ensure optimum performance and durability.

The first stress analysis using Finite Element Modelling took place in 1993, in co-operation with the mechanical laboratory of the University of Lyon - France (L2M).

Since then, modelling is done internally to validate all conceptual designs. This enables optimisation of form, structure and thickness to satisfactorily resist the designated pressure requirement.

Example: Finite Element Analysis and validation test of the new MULTI-315

Finite Element Model of the new MULTI-315

Laboratory testing
**MATERIALS**

<table>
<thead>
<tr>
<th>Materials</th>
<th>Advantages</th>
</tr>
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<tbody>
<tr>
<td>Body and flap</td>
<td>Low weight combined with strength, durability and corrosion resistance</td>
</tr>
<tr>
<td>Seal</td>
<td>Long term resistance to ozone, UV and mechanical compression.</td>
</tr>
<tr>
<td>Hinge</td>
<td>Resistant to normal drainage and sewerage effluents and sea water</td>
</tr>
<tr>
<td></td>
<td>Self lubricating plastic.</td>
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<tr>
<td>Eye bolt**</td>
<td>Resistant to normal drainage and sewerage effluents and sea water</td>
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<td>Fittings</td>
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** Flap valves are supplied with or without eye bolt (See options by product)

**THE MULTITUBE RANGE**

- **MULTI-BD**
  - Flap valve (page 4)

- **MULTI-CD**
  - Flap valve (page 4)

- **MULTI-NB DN 200 à 600**
  - Inclined flap valve (page 5)

- **MULTI-NB DN 700 à 1500**
  - Inclined flap valve (page 5)

- **MULTI-N**
  - Inclined flap valve for direct pipe connection (page 6)

- **MULTI-250, MULTI-315 & MULTI-400&500**
  - Non-return valve (page 7)
### MULTI BD FLAP VALVE

+ ND 100 to 200 mm  
+ Straight flap  
+ Light & compact  
+ Flange ISO PN 10  
+ Back pressure: 1 bar (10 m head)  
+ Eye bolt an option

#### INSTALLATION

- Integral foamed EPDM rubber gasket for direct fixing to a flange or headwall  
- Stainless steel mechanical anchors are provided as standard for vertical wall mounting  
- For flange ISO PN 10 use standard stainless steel bolts and nuts (not provided)

#### DIMENSIONS

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<tr>
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<th>ND</th>
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<th>C</th>
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* Dimensions in mm, Weight in Kg.  
Due to NORHAM continual improvement policy, sizes and dimensions could be changed.

### MULTI CD FLAP VALVE

+ ND 250 to 600 mm  
+ Straight flap  
+ Light & compact  
+ Flange ISO PN 10  
+ Back pressure: 0,8 bar (8 m head)  
+ Eye bolt is supplied as standard

#### INSTALLATION

- Integral foamed EPDM rubber gasket for direct fixing to a flange or headwall  
- Stainless steel mechanical anchors are provided as standard for vertical wall mounting  
- For flange ISO PN 10 use standard stainless steel bolts and nuts (not provided)

#### DIMENSIONS

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* Dimensions in mm, Weight in Kg.  
Due to NORHAM continual improvement policy, sizes and dimensions could be changed.
MULTI NB INCLINED FLAP VALVE

INSTALLATION

- Integral foamed EPDM rubber gasket for direct fixing to a flange or headwall
- Stainless steel mechanical anchors are provided as standard for vertical wall mounting
- For flange ISO PN 10 use standard stainless steel bolts and nuts (not provided)

MULTI NB - ND 200 to 600 mm

- Inclined flap (minimum 15°)
- Flange ISO PN 10
- Back pressure: 1 bar (10 m head)
- Eye bolt an option

DIMENSIONS

<table>
<thead>
<tr>
<th>Ref. *</th>
<th>DN</th>
<th>A</th>
<th>B</th>
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* Dimensions in mm, Weight in Kg.
Due to NORHAM continual improvement policy, sizes and dimensions could be changed.

MULTI NB - ND 700 to 1500 mm

- Inclined flap (minimum 15°)
- Flange ISO PN 10 on the MULTI-1000-NB (other references, please consult us)
- Back pressure: 1 bar (10 m head)
- Eye bolt an option

DIMENSIONS

<table>
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<tr>
<th>Ref. *</th>
<th>DN</th>
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* Dimensions in mm, Weight in Kg.
Due to NORHAM continual improvement policy, sizes and dimensions could be changed.
VALVES/NON-RETURN AND FLAP VALVES

MULTITUBE The drainage & sewerage backwater protection

MULTI N INCLINED FLAP VALVE FOR DIRECT PIPE CONNECTION

+ ND 200 to 600 mm
+ For connection to any pipe (PVC, PEHD, Fibre-cement, Ductile Iron, Clay, Concrete, etc)
+ Inclined flap (minimum 15°)
+ Back pressure: 1 bar (10 m head)
+ Eye nut in option
+ Delivered "Ready to install" with NORHAM flexible coupling: EPDM and EN 10088-2 Grade 1.4401 (304) stainless steel (Grade 1.4401 (316) in option)

* The MULTI N flap valve is delivered with the appropriate flexible coupling (Please confirm the pipe type and outside diameter when ordering)

INSTALLATION

- For installation directly onto spigot end of pipe
- A NORHAM coupling is supplied and already connected on the MULTI N valve in order to an easy and quick installation. It provides a secure and watertight connection to all types of pipe. Make sure to order correctly by quoting both the pipe type and outside diameter.

DIMENSIONS

<table>
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<tr>
<th>Ref.*</th>
<th>ND</th>
<th>A</th>
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** According to the type of pipe:
- PFF: PVC/Fibre-Cement/Ductile Iron
- G: Clay
- BA: Concrete/Structural walled plastic

These codes enable fixed pricing categories.

* Dimensions in mm, Weight in Kg without couplings.

Due to NORHAM continual improvement policy, sizes and dimensions could be changed.
MULTITUBE
The drainage & sewerage backwater protection

VALVES/ NON-RETURN AND FLAP VALVES

MULTI NON-RETURN VALVE

+ ND 250 to 500 mm
+ In line non return valve
+ For connection to any pipe (PVC, PEHD, Fibre-cement, Ductile Iron, Clay, Concrete, etc)
+ Back pressure : 0,9 bar (9 m head)
+ Delivered «Ready to install» with NORHAM flexible couplings:
  EPDM and EN 10088-2 Grade 1.4401 (304) stainless steel (Grade 1.4401 (316) in option)

- The MULTI in line valves are delivered with the appropriate flexible couplings
  (Please confirm the pipe type and outside diameter when ordering)

ASSEMBLY

- In-line valves should be installed in an inspection chambers (or equivalent) for maintenance.
- Couplings are supplied and are already connected on the MULTI valve for an easy and quick installation. It provides a secure and watertight connection to rigid pipes. Make sure to order correctly by precising the pipe type and outside diameter.

DIMENSIONS

<table>
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<tr>
<th>Ref.*</th>
<th>ND</th>
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<th>B</th>
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* Dimensions in mm, Weight in Kg without couplings.
  Due to NORHAM continual improvement policy, sizes and dimensions could be changed.

** According to the type of pipe:
  PFF : PVC/Fibre-Cement/Ductile Iron
  G : Clay
  BA : Concrete/Structural walled plastic
  These codes enable fixed pricing categories.

NEW ACCESS COVER DESIGN WITH POSITIVE SEALING

Based on the pressure cooker idea : + back pressure = + compressed seal = optimal watertightness

1. Open
2. Fit in
3. Pull up
4. Align and screw tight

NEW DESIGN !
**TECHNICAL INFORMATION**

- **HEAD LOSS - NON-RETURN VALVE**

Dynamic head loss is a loss of pressure in a pipeline due to friction from pipe walls or as liquids flow through elbows, valves and other fittings.

The chart below shows head loss in full pipelines and compares different types of non-return valves.

Example: ND 250 non-return valve.
Section = π x Ø^2/4 = 0,05 m^2
Flow = 100 l/s = 0,10 m^3/s
Speed (m/s) = Flow (m^3/s) / Section (m^2)
= 0,10 / 0,05 = 2 m/s

Flap valve head loss (Flow 2m/s):
Loss of head NORHAM valve = 0,25 m
Loss of head non-return valve with double flap = 0,5 m
Loss of head Ball type check valve = 0,9 m

- **OPERATING HEAD - FLAP VALVE**

The head required to operate (crack open) a NORHAM MULTITUBE flap valve can be estimated as follows:

Operating head ΔH = Valve diameter (mm) / 10

Example : ND 250 flap valve; ΔH = 250/10 = 25 mm

- **INSTALLATION**

**General**: Flap valves should be fixed so as to avoid the accumulation of debris around the invert which could prevent the valve operating correctly.

**Tidal locations**: Turbulence of flow due to severe wave action will shorten the working life of a flap valve. Therefore, it is recommended that careful consideration is given to the positioning of the valves and they are installed within an outfall bay or otherwise protected from direct wave action by baffles.

**EXAMPLES OF APPLICATIONS**