

# Approval Record

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## **TECHNICAL INSTRUCTIONS**

# **PIPE/RISER SUPPORTS**

**Revision Summary**

<b>Issue No.</b>	<b>Date</b>	<b>Text Affected</b>
1	22 Apr 2003	Initial Release
2	1 Sep 2003	Page 1 – Clause 2, “rods” added into example of associated fittings. Page 3 – Table 2 & Page 5 – Table 4, Amendment in size of rod, U-channel & angle iron
3	9 Feb 2004	Page 10 – Figure 5 revised to include U-bolts & nuts for the intermediate riser support.
4	20 Aug 2013	Page 4 – Section 5.8, revised to replace 3”, 4” & 6” angle stainless steel horizontal pipe supports by the new design. Page 5 – Table 4, added to separately show dimensions of the new horizontal pipe support IIa and Table 5, revised to show dimensions of other intermediate pipe supports. Page 13 – Figure 8, revised to also show the feature of the new pipe support IIa (Fig. 8a). Fig. 8a & 8b replace fig. 8
5	15 Sep 2016	Page 2 – Clause 4.1, revised to replace BS1387 & BS3601 with EN10255 & EN10217. Page 2 – table 1, revised the mass of pipe per EN10255 for sizes ½” to 6” and EN10217 for sizes 8” to 12” Page 2 – Section 4.2, revised to replace service riser base bracket supports by the new design. Page 3 – Table 2, revised to show the selection table of the newly designed base support. Page 3- Table 3, added to show the dimensions of large and small size base supports. Page 3 – Clause 4.4, revised to meet the requirements of the new design. Page 5 – Clause 5.8 - simplify the naming by renaming pipe supports (I), (IIa), (IIb), (IV) & (III) to (D), (G), (H), (F) & (J). - rearranged to show application of each pipe support - added new designs (E) & (I) for better flexibility to suit site conditions Page 6 – Table 5, revised to show the dimensions of pipe support (D), (E) & (F) Page 6 – Table 6, added to show dimensions of pipe support (G) & (H) Page 7 – Table 7, added to show the dimensions of the pipe support (I) & (J). Page 10 – Figure 3, revised to replace the typical base bracket support by the new design. Page 11 – Figure 4, added to show the dimensions of large and small size base supports. Page 16 – Figure 9, added to show the feature of the new pipe support (E).

		Page 20 – Figure 13, added to show the feature of the new pipe support (I)
6	8 Oct 2018	<p>Page 1 – Clause 3.3, “bushings” added into prohibited installation.</p> <p>Page 2 – Table 1, revised to omit 2 ½” GI pipe.</p> <p>Page 2 – Clause 4.2, renamed special design service riser base support as typical service riser base support.</p> <p>Page 3 –</p> <ul style="list-style-type: none"> <li>- Clause 4.4 &amp; 4.5, revised to show application of typical duckfoot support or a support which is subject to special design.</li> <li>- Table 4, added to show the dimensions of recommended typical duckfoot support.</li> </ul> <p>Page 11 – Figure 3, revised to replace the FxF elbow by a Tee.</p> <p>Page 13 – Figure 5, added to show the features of typical duckfoot support.</p> <p>Page 16 to 22 – Figure 8 to 14, revised to show available nominal pipe sizes.</p> <p>Page 22 – Figure 14, revised to omit the title.</p>
7	17 May 2021	<p>Page 1 – Section 3.3, revised the extension pipes should be not less than 100 mm (4”).</p> <p>Page 4 – Chapter 5, added to describe the installation of intermediate load bearing support.</p> <p>Page 5 – Chapter 6, revised the title to “Pipe Supports” and deleted the Section 5.4 about the intermediate load bearing support.</p> <p>Page 6 – Section 6.8, added to describe the application of other design of pipe support.</p> <p>Page 10 – Figure 1, added minimum pipe length “100”.</p> <p>Page 14 – Figure 6, revised the title from “intermediate riser support” to “intermediate load bearing support” and the design.</p>
8	9 Mar 2022	<p>Revised the technical instruction reference number from HKCG/TI/G/01 to be HKCG/AG/TI/06.</p> <p>Deleted “SERVICE” in title.</p> <p>Page i – Deleted the approver in the cover page.</p> <p>Page 1 – Section 3.3, added the service laterals should not be connected with MxF elbow, hexagonal nipples or bushings.</p> <p>Page 5 – Section 6.4, added the minimum distance between a pipe joint and a pipe clip of extension pipe should be 100mm.</p> <p>Page 10 – Revised Figure 1 and Figure 2.</p>

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This Technical Instruction does not make the use of any method or procedure obligatory against the judgement of the responsible engineer.

Technical Instructions have been drawn up in the light of the best information available at the time; these will be amended from time to time in line with changes in materials and methods.

## **Foreword**

This Technical Instruction supersedes HKCG/TI/G/01, Issue 7. This revision has been undertaken to cover current practice and changes. The major changes include:

- a) Revise the technical instruction reference number from HKCG/TI/G01 to be HKCG/AG/TI/06.
- b) Delete the approver in the cover page.
- c) Add the service laterals should not be connected with MxF elbow, hexagonal nipples or bushings
- d) Add the minimum distance between a pipe joint and a pipe clip of extension pipe should be 100mm

## 1. **Scope**

This Technical Instruction specifies requirements of pipe/riser supports for retaining a pipeline in a particular manner or position. The instruction covers steel pipes of nominal size 15 mm to 300 mm, used for conveying town gas within the normal operating temperature range.

Recommendations on design considerations, method of fixing and illustrations of typical pipe/riser support assemblies are given in this instruction.

The document considers only common situations and suggests workable solutions in resolving the problems accordingly.

## 2. **Materials**

Pipe supports, including the associated bolts, nuts, washers, rods and anchors etc., should be made from stainless steel of grade 304.

Other materials may be used providing they have equal or higher mechanical properties.

Information on the materials to be used should be made available to and be consented by the Gas Company.

## 3. **General**

- 3.1 The primary aim in the design of pipe/riser supports is to prevent the occurrence of excessive stresses in pipes or connected equipment by safe, adequate and economic means. It is not possible to devise standard designs for every application, as in many cases for reasons of economy and convenience, supports are attached to existing structures. In such cases, spacing and details are pre-determined largely by existing circumstances.

The designer of pipe/riser supports should exercise his knowledge, experience and preference in order to provide equipment of ample strength at reasonable cost.

- 3.2 In using anchors and plugs for fastening pipe supports, the proper procedures shall straightly be followed, the correct drill bits and screws shall be used and the holes shall be drilled to the precise depth.

- 3.3 Besides adequately supporting the risers, to prevent excessive stresses in service extensions, the extension pipes should be not less than 100 mm (4"), (see Figure 1), and the **service** laterals should not be **connected with** MxF elbows, hexagonal nipples or bushings (see Figure 2).

#### 4. Service Riser Base Supports

- 4.1 Every service riser shall be suitably and safely supported at its base. The support shall be capable of taking up the total weight of the pipe up to a position where it changes direction. In situations where a base support cannot be fixed to support a vertical riser at its base, the layout of the riser should be redesigned by offsetting the position of its base so as to reserve enough space for accommodating the base support (see Appendix 1).

The pipe weight of any part of a riser under consideration may be estimated from the data given in Table 1. For pipes of 150 mm and below, the mass refers to "heavy" steel pipes to EN10255, and for 200 mm and above, it refers to steel pipes of 6.3 mm thick to EN10217.

Nominal Pipe Size		Mass of Pipe	
in	mm	lb/ft.	kg/m
½	15	0.97	1.45
¾	20	1.26	1.88
1	25	1.98	2.95
1¼	32	2.57	3.82
1½	40	2.96	4.41
2	50	4.21	6.26
3	80	7.06	10.5
4	100	9.95	14.8
6	150	14.72	21.9
8	200	22.24	33.1
10	250	27.82	41.4
12	300	33.13	49.3

**Table 1 - Mass per Unit Length of Steel Pipe**

- 4.2 A typical service riser base support is illustrated in Figure 3. The base support should be bolted on to the structural wall of a building by an appropriate stud anchor with washer at an appropriate location where the weight of the riser can safely be supported. The purpose of the support is to allow for adjustment on site in ensuring good support at the riser base. The riser base shall rest properly on the base support without gaps facilitated by the turning of the socket (A) relative to the bush (B). The selection of the size of base support depends on nominal size and length of vertical riser, and distance between riser centre-line and wall. But in most practical cases, it should comply with the recommendations given in Table 2. And the dimensions of small and large size of base supports can be referred to Table 3 and Figure 4.



Nominal Pipe Size		Length of Vertical Riser (R)	Distance between Riser Centre-line and Wall (C)	Recommended Base Support Size
in	mm	m	Mm	
2	50	$16 < R \leq 160$	$\leq 170$	Small Size
			$170 < C \leq 270$	Large Size
3	80	$9 < R \leq 97$	$\leq 160$	Small Size
			$160 < C \leq 260$	Large Size
4	100	$6 < R \leq 68$	$\leq 150$	Small Size
			$150 < C \leq 240$	Large Size
6	150	$4 < R \leq 45$	$\leq 230$	Large Size

**Table 2 - Recommended Base Support Size**

Base Support Dimensions	Small Size (mm)	Large Size (mm)
Length (L)	200	300
High (H)	200	300
Width (W)	150	150
Thickness (T)	4.5	4.5

**Table 3 - Dimensions of Base Support (Figure 4)**

- 4.3 Where the dead load of a riser is insignificant, say less than 100 kg, no base support may be required, and the pipe may be laid straight from the underground service.

- 4.4 Any vertical riser having a dead weight from 1,000 kg to 3,500 kg, or installed out of values specified in Table 2 should be supported at its base by a typical duckfoot support (see Figure 5). The riser base shall rest properly on the typical ductfoot support without gap facilitated by turning of the socket(A). The support pipe(D) should insert to the steel base(E). If nominal pipe size is larger than 150mm, the socket should be connected to a nipple(B) and inserted to a steel cap(C) which is positioned on the support pipe. The selection of the size of typical duckfoot support depends on nominal size of vertical riser and is recommended in Table 4.

Nominal Pipe Size		Typical Duckfoot Support Size				
		Socket (A)	Nipple (B)	Steel Cap (C)	Support Pipe (D)	Steel Base (E)
in	mm	in				
1	25	1	Nil	Nil	1	1
1¼	32	1¼			1¼	1¼
1½	40	1½			1½	1½
2	50	2			2	2
3	80	3			3	3
4	100	4			4	4
6	150	6			6	6
8	200	6	6	8	8	8
10	250			10	10	10
12	300			12	12	12

**Table 4 - Recommended Typical Duckfoot Support Size**

- 4.5 Other design of duckfoot support (referred to BS 3974 : Pipe Support) or a support which is subject to special design should be used for any vertical riser having a dead weight greater than 3,500 kg.

## 5. Intermediate Load Bearing Support

Whenever a service riser is installed commencing at some height above the ground/floor level, it is necessary to provide an intermediate load bearing support at a position where the upper part of the pipeline can be sufficiently supported. A typical intermediate load bearing support is shown in Figure 6. As shown, weight of the vertical riser is taken up by a malleable iron cross resting on two angle brackets bolted to the structural wall. The dimensions of the brackets should be decided on site to suit particular circumstances. Special design(s) may be required in case the riser is installed in limited spaces, e.g. narrow columns of a building.

## 6. Pipe Supports

- 6.1 Pipes shall be secured clear of the wall or other surfaces with suitable intermediate pipe supports or clips located at appropriate positions to prevent lateral movement.

The maximum distances between pipe supports are given in Table 5.

Pipe Size (Bore)		Vertical Runs		Horizontal Runs	
mm	in	M	ft	m	ft
15	½	3.0	10	2.5	8
20	¾	3.0	10	2.5	8
25	1	3.0	10	2.5	8
32	1¼	3.0	10	2.7	9
40	1½	3.5	12	3.0	10
50	2	3.5	12	3.0	10
80	3	4.5	15	3.0	10
100	4	4.5	15	3.0	10
150	6	5.5	18	5.5	18
200	8	5.5	18	5.5	18
250	10	6.5	21	6.5	21
300	12	7.0	23	7.0	23

**Table 5 - Maximum Distances between Pipe Supports**

- 6.2 In order to provide support at positions of concentrated loads and changes of direction, it may be necessary to use smaller spans while, in other cases, it may be advisable to provide supports near the pipe joints.
- 6.3 In addition to the recommended distance details in Table 5, pipe supports shall be fitted on the horizontal section of a pipeline in close proximity to a change in direction from horizontal to vertical or from vertical to horizontal. The pipe support shall be fitted as close as practicable to the centre-line of the vertical pipe, but in any event, no more than 200 mm or 4 times the pipe diameter, whichever is the lesser, from the centre-line of the vertical pipe.
- 6.4 For pipes of nominal size of 15 mm (½"), 20 mm (¾") and 25 mm (1"), either Type 'A', Type 'B' or Type 'C' pipe clips, (see Figure 7), can be used as pipe supports. [The minimum distance between a pipe joint and a pipe clip of extension pipe should be 100mm.](#)
- 6.5 Pipes of size of 32 mm (1¼"), 40 mm (1½") and 50 mm (2") can be supported by Type 'A' pipe clips. For pipe size of 80 mm (3") & 100 mm (4"), Type 'A' pipe clips can be used as support for vertical pipe and as pipe hangers, and if the pipe is close to the wall, (pipe centre less than 100 mm from the wall), Type 'A' clips can also be used as horizontal pipe supports.

- 6.6 Type 'A' clips are to be fixed by screwing into masonry bolts (anchors) with internal thread. Type 'B' clips can be fastened by masonry bolts with 1/4" B.S.W. external thread, whereas Type 'C' clips can be fixed by 7 mm (1/4") plastic plugs and 5 mm (3/16") screws.
- 6.7 Specially fabricated brackets and hangers should be provided as supports for large pipes of nominal size of 80 mm (3") and above. Typical examples of such brackets and hangers are shown in Figures 8 to 14. Their key dimensions are given in Table 6, Table 7 and Table 8.
- 6.7.1 Pipe support (D) can be used for both horizontal pipes and vertical pipes of nominal sizes 80mm (3") to 300mm (12").
- 6.7.2 Horizontal pipe support (E) & (F) are to be used for nominal pipe sizes 80mm (3") to 300mm (12").
- 6.7.3 Horizontal pipe support (G) is to be used for nominal pipe sizes 80mm (3") to 150mm (6") whereas horizontal pipe support (H) is to be used for pipe >150mm (6").
- 6.7.4 Horizontal pipe support (I) is to be used for nominal pipe sizes 80mm (3") – 150mm (6").
- 6.7.5 Pipe support (J) can be used for both horizontal pipes and vertical pipes of the following sizes:
- 80mm (3") to 150mm (6") horizontal pipe
  - 80mm (3") to 300mm (12") vertical pipe
- 6.7.6 Pipe supports (E) & (F) are the preferred designs for horizontal pipes as they cater for a wide range of pipe sizes and are relatively easy to install. Pipe supports (I) & (J) are to be considered only when (E) & (F) are less favourable for the particular site conditions.
- 6.8 If the above-mentioned designs cannot be applied due to installation environment or other constraints, special design of pipe clips/supports with sufficient loading capability should be used.

Pipe Support	Nominal Pipe Size		Dimensions (mm)					
	in	mm	Steel Rod/ U-bolt Diameter	N	M	K (Min.)	Size of U-channel	Size of Angle Iron
D, E, F	3	80	12	110	140	55	80 x 40 x 4	40 x 40 x 4
	4	100	12	140	165	55		
	6	150	16	195	225	65		
	8	200	16	250	275	65	100 x 50 x 5	50 x 50 x 5
	10	250	16	305	335	75		
	12	300	20	355	385	75		

**Table 6 – Dimensions of Pipe Support (Figures 8 , 9 & 10)**

Pipe support	Nominal Pipe Size		Dimensions (mm)						
	in	mm	Steel Rod /U-bolt Diameter	N	M	K (Min.)	Size (mm)		Size of angle iron
							Width (mm)	Thickness (mm)	
G	3	80	12	110	115	55	40	3.5 or 4.0*	---
	4	100	12	140	140	55	40	3.5 or 4.0*	---
	6	150	16	195	200	65	45	4.0	---
H#	8	200	16	250	275	65	---	---	50 x 50 x 5
	10	250	16	305	335	75	---	---	
	12	300	20	355	385	75	---	---	

\* for horizontal pipe to be installed with centre from wall distance  $\geq 260\text{mm}$ # for horizontal pipe to be installed with centre from wall distance  $< 300\text{mm}$ **Table 7 – Dimensions of Pipe Support (Figure 11 & 12)**

Pipe Support	Nominal Pipe Size		Dimensions (mm)					
	in	mm	Steel Rod/ U-bolt Diameter	N	M	K (Min.)	Size of U-channel	Size of Angle Iron
I	3	80	12	110	140	55	80 x 40 x 5	---
	4	100	12	140	165	55		---
	6	150	16	195	225	65		---
J	3	80	12	110	140	55	---	40 x 40 x 4
	4	100	12	140	165	55	---	
	6	150	16	195	225	65	---	
	*8	200	16	250	275	65	---	50 x 50 x 5
	*10	250	16	305	335	75	---	
	*12	300	20	355	385	75	---	

\*for vertical pipe only

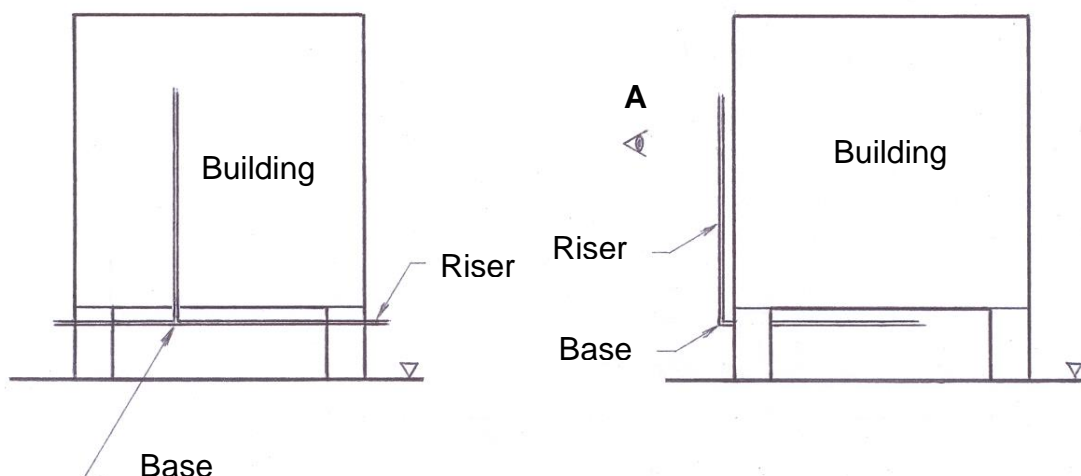
**Table 8 – Dimensions of Pipe Support (Figure 13 & 14)**

## 7. **Reference Document**

BS 3974 : Pipe Supports.

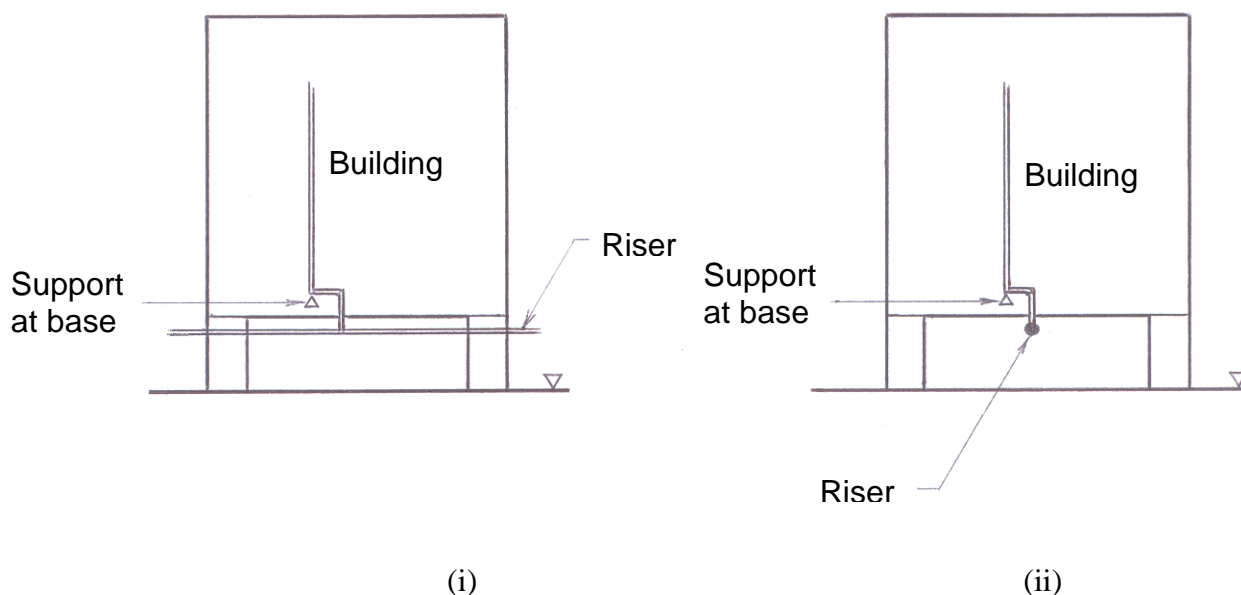
**Appendix 1 - Method of Relocating Base Position of Vertical Pipe****Problem**

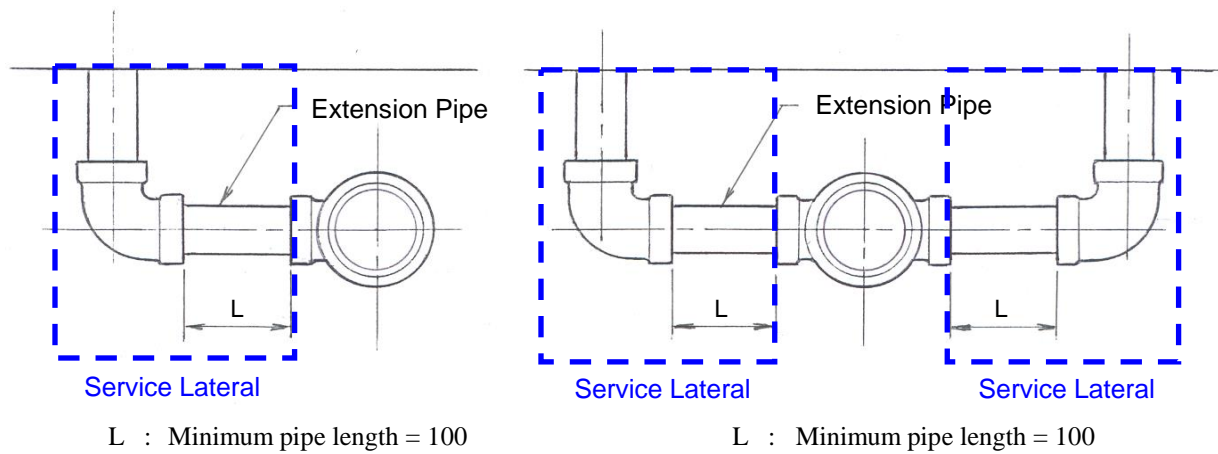
There are cases, as illustrated in the examples below in which a service riser cannot easily be supported at its base by a pipe support or clip due to inaccessibility problem of bolting the support to the adjacent structure or building.

**Solution**

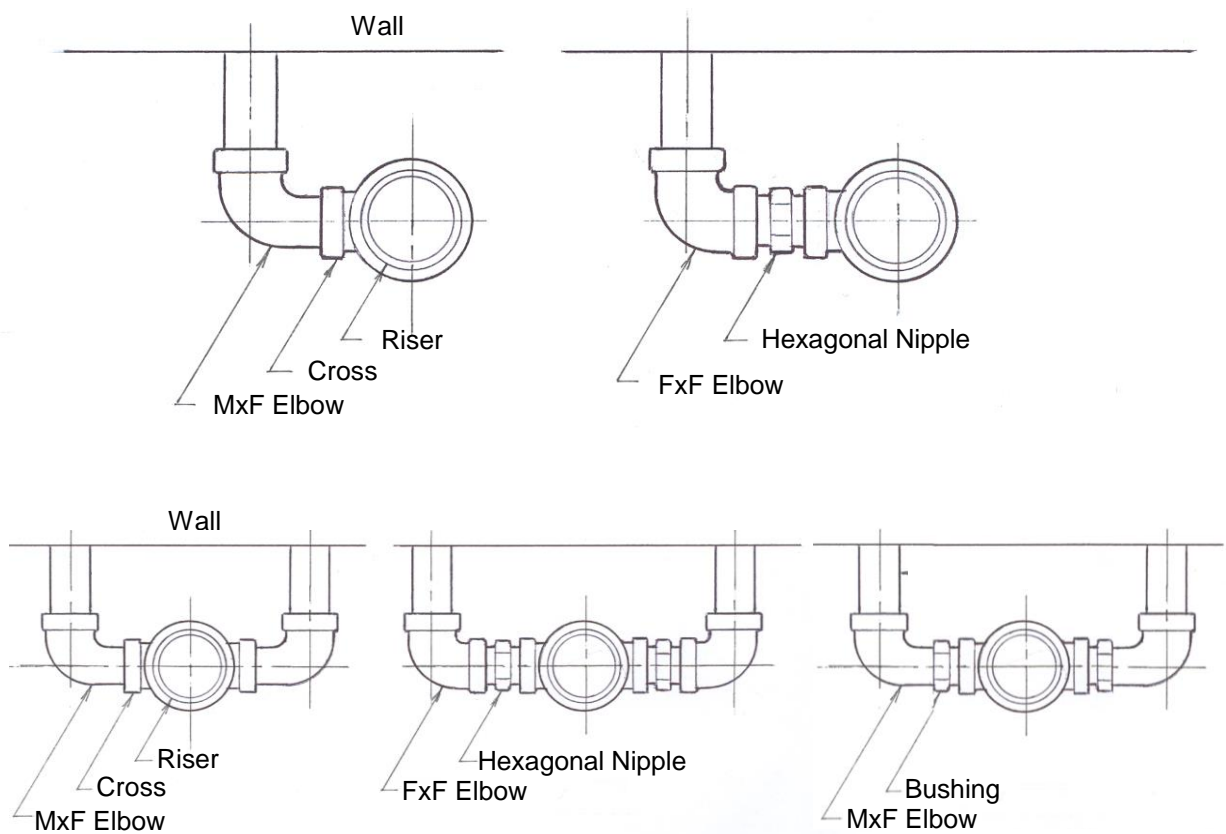
The problem may be overcome effectively by changing the routing of a riser in such a way that the base of the vertical pipe is shifted slightly upward providing adequate space for a support to be bolted to the structure of a building. The solution is shown schematically as follows:

View from A



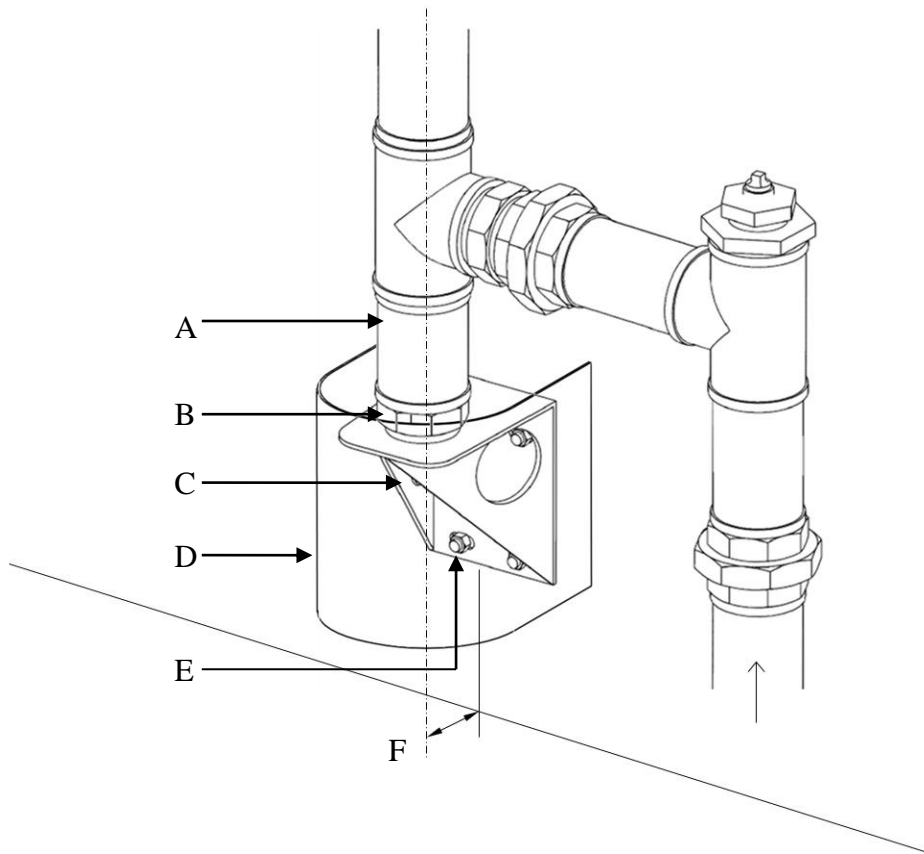


**Figure 1 - Minimum Length of Extension Pipe (mm)**

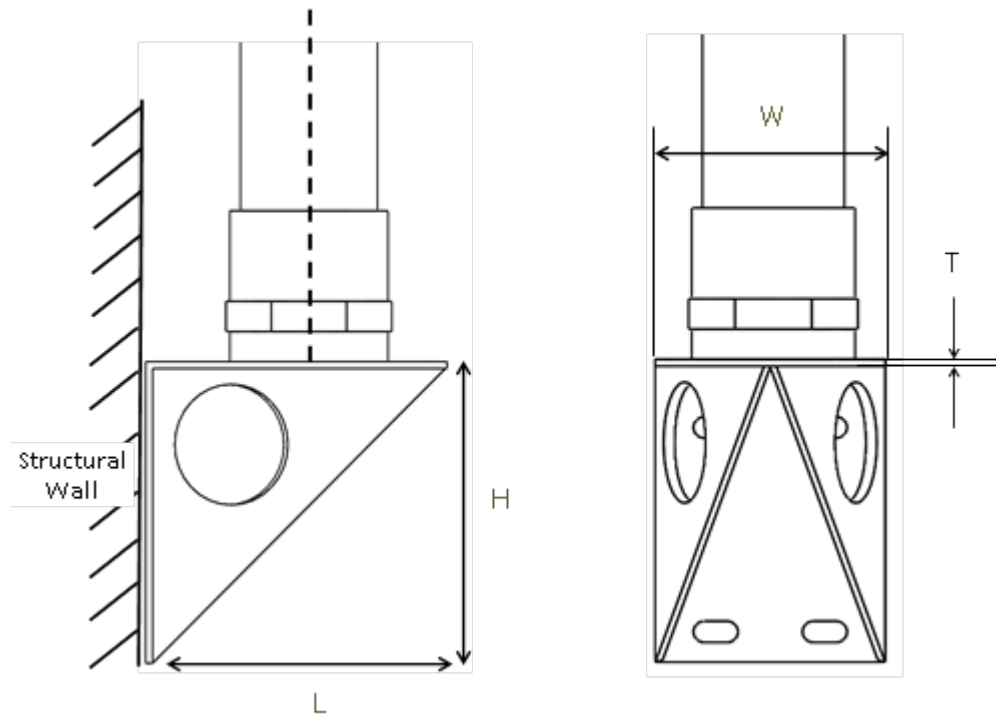


**Figure 2 - Prohibited Installations**

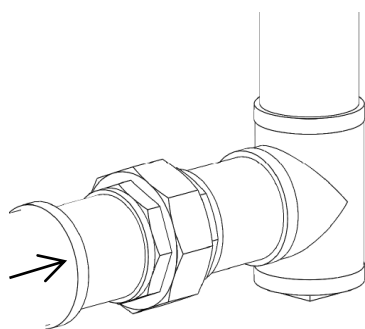
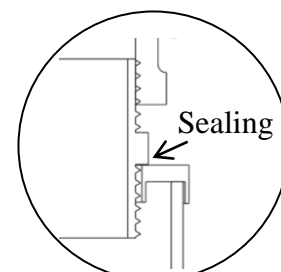
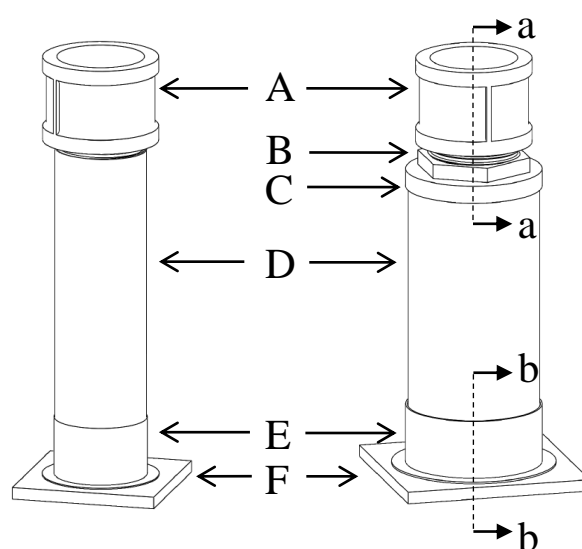
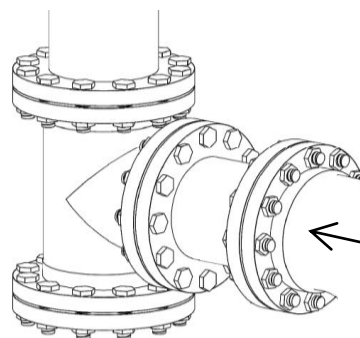
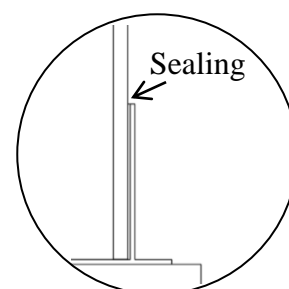


**Structural Wall****Figure 3 - Typical Base Support**

- A - Socket
- B - Bush
- C - Base Support
- D - Optional Cover to Guard against Injuries. Cover shall be made of anti-corrosion material, e.g. 1 mm thick grade 304 stainless steel plate and to be fixed by stainless steel screws.
- E - M12 stud anchor with washer
- F - Distance between riser centre-line and wall

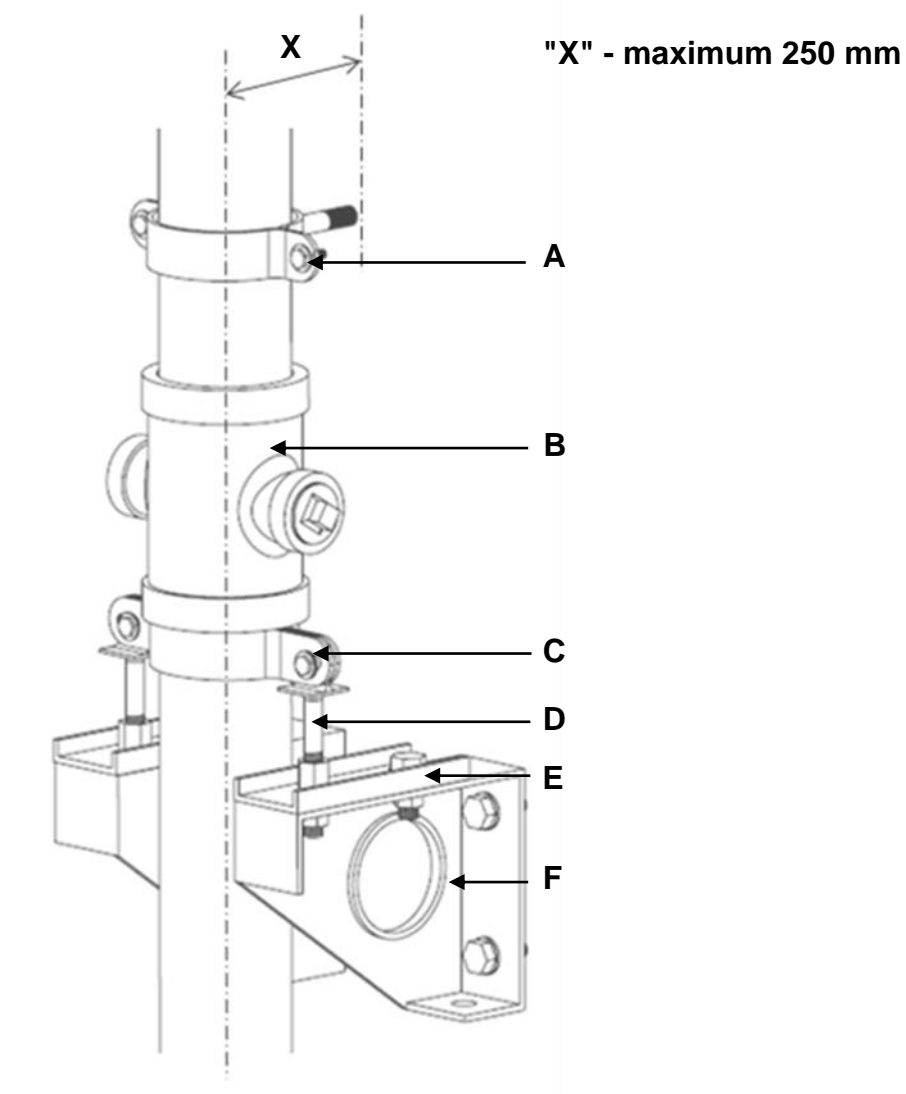


**Figure 4 - Base Support Dimensions**

Nominal Pipe Size  $\leq 150$  mmNominal Pipe Size  $> 150$  mmSection a-aSection b-b**Figure 5 - Typical Duckfoot Support**

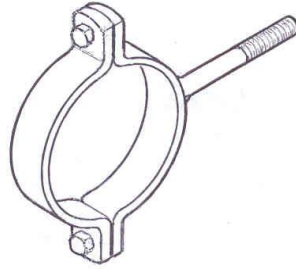
- A – Socket.
- B – Nipple.
- C – Steel Cap. The contact face between nipple and steel cap should be sealed for waterproof. HILTI CP 601S elastic firetop sealant is recommended (see Section a-a).
- D – Support Pipe. If the length of the support pipe is longer than 1000 mm, it is recommended to install at least one pipe clip.
- E – Steel Base. The gap between support pipe and steel base should be sealed for waterproof. HILTI CP 601S elastic firetop sealant is recommended (see Section b-b).
- F – Concrete Platform. It is recommended to build a concrete platform for uneven floor.

Socket, nipple and support pipe should be painted with anti-corrosion paints. The painting procedure should refer to HKCG/TI/G/04 CORROSION PROTECTION OF GAS PIPES

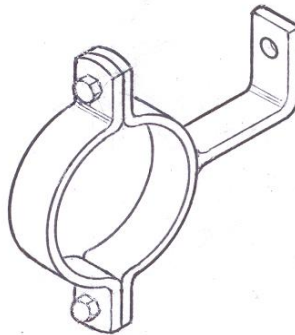


**Figure 6 - Typical Intermediate Load Bearing Support**

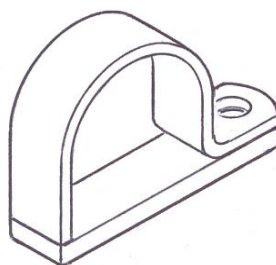
- A – Pipe Clip (Type ‘A’)
- B – Cross. Tee and socket are optional.
- C – Pipe Clip Support. Pipe Clip Support should be contacted with the bottom of the fitting by adjusting the M12 nut of Support Bar.
- D – Support Bar
- E – U-shaped Support
- F – Pipe Support



**Type 'A' Clip**



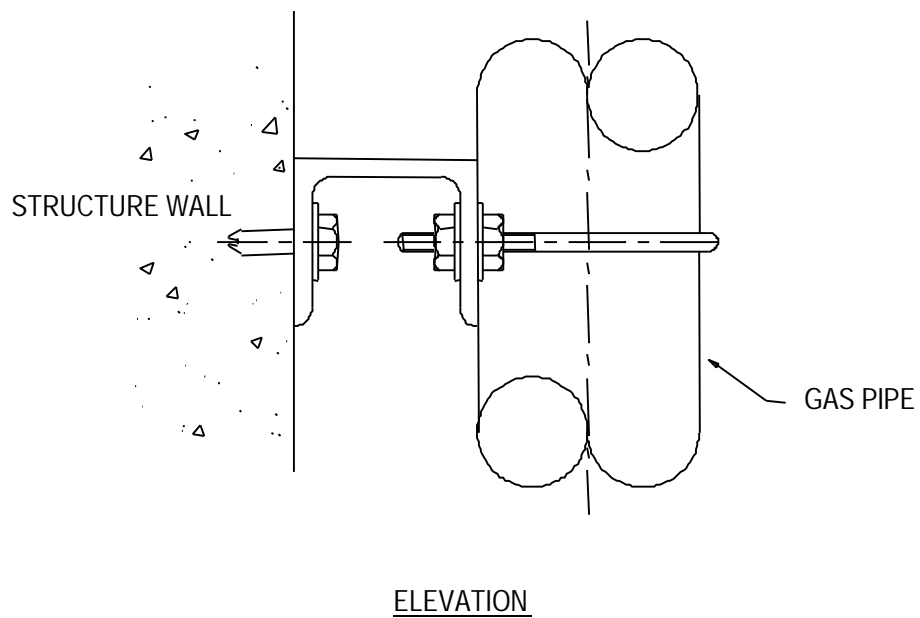
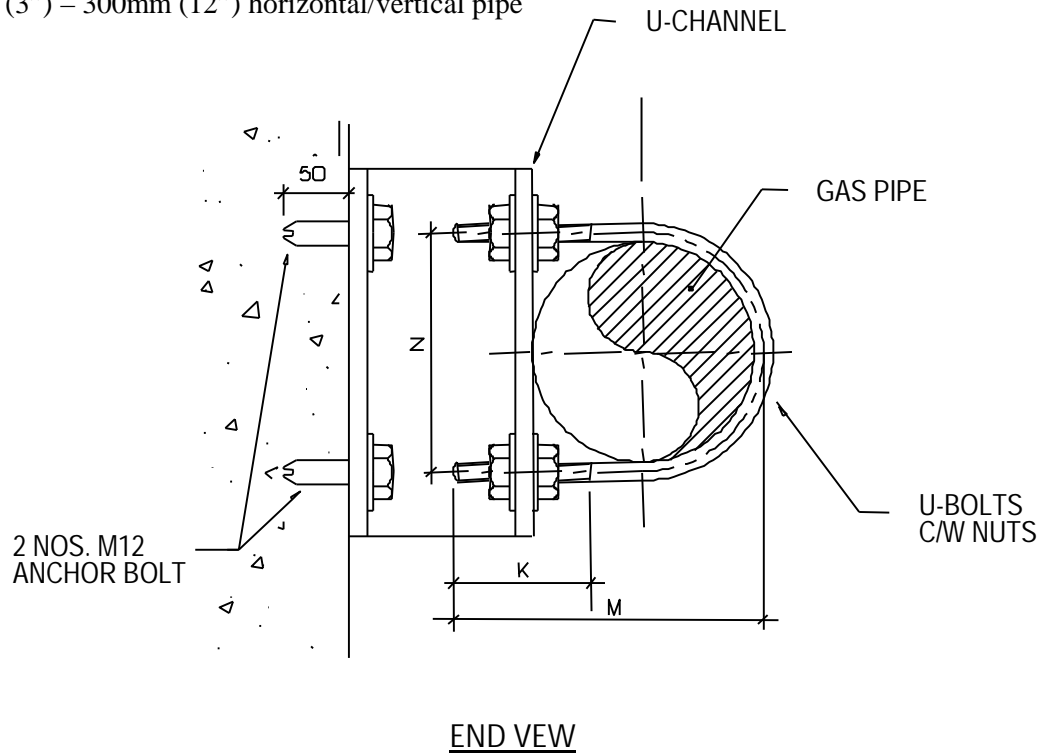
**Type 'B' Clip**



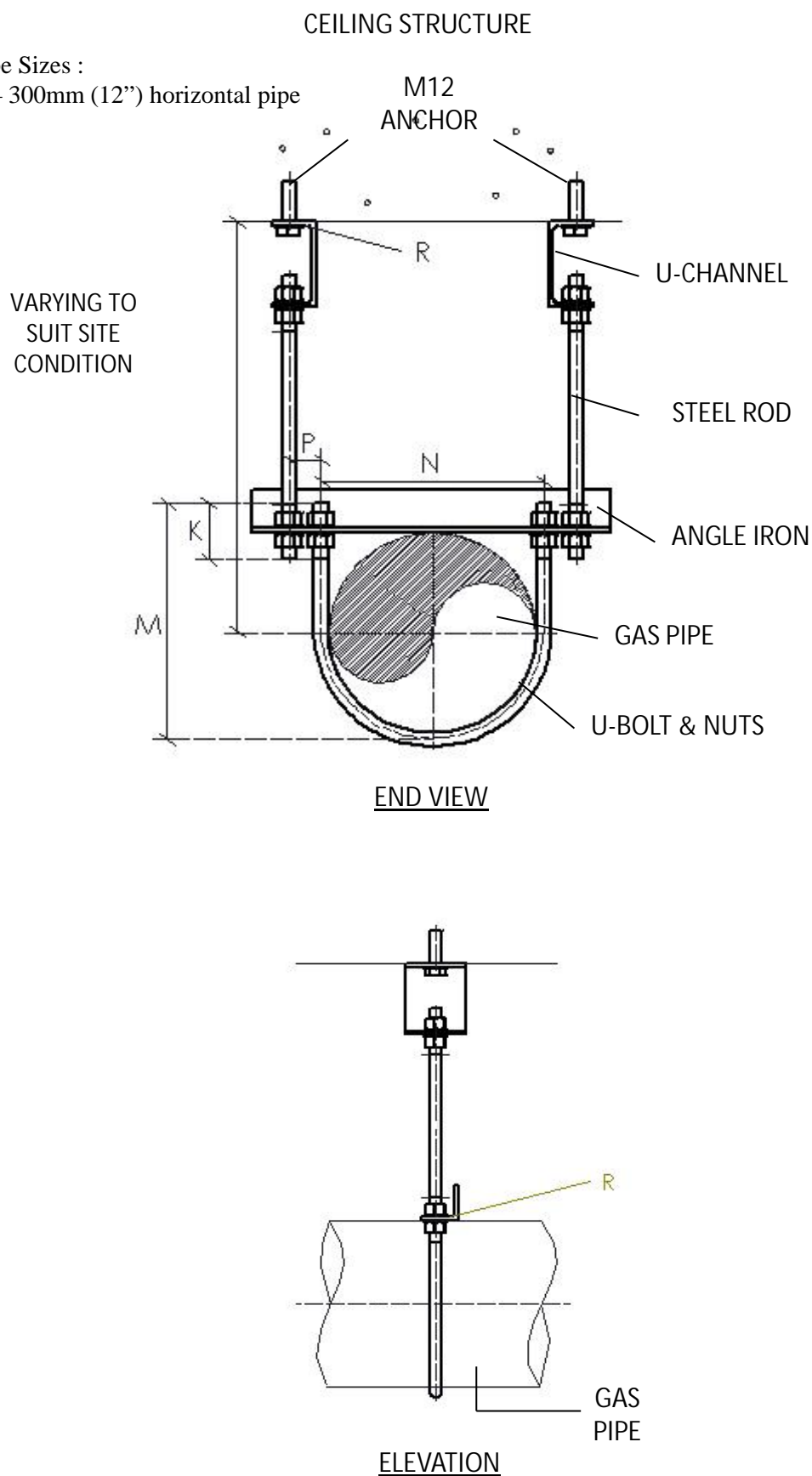
**Type 'C' Clip**

**Figure 7 - Pipe Clips**

Nominal Pipe Sizes :  
80mm (3") – 300mm (12") horizontal/vertical pipe



**Figure 8 - Typical Pipe Support for Gas Pipe (D)**

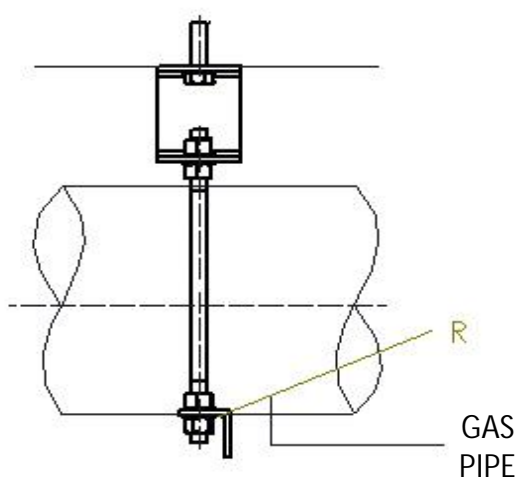
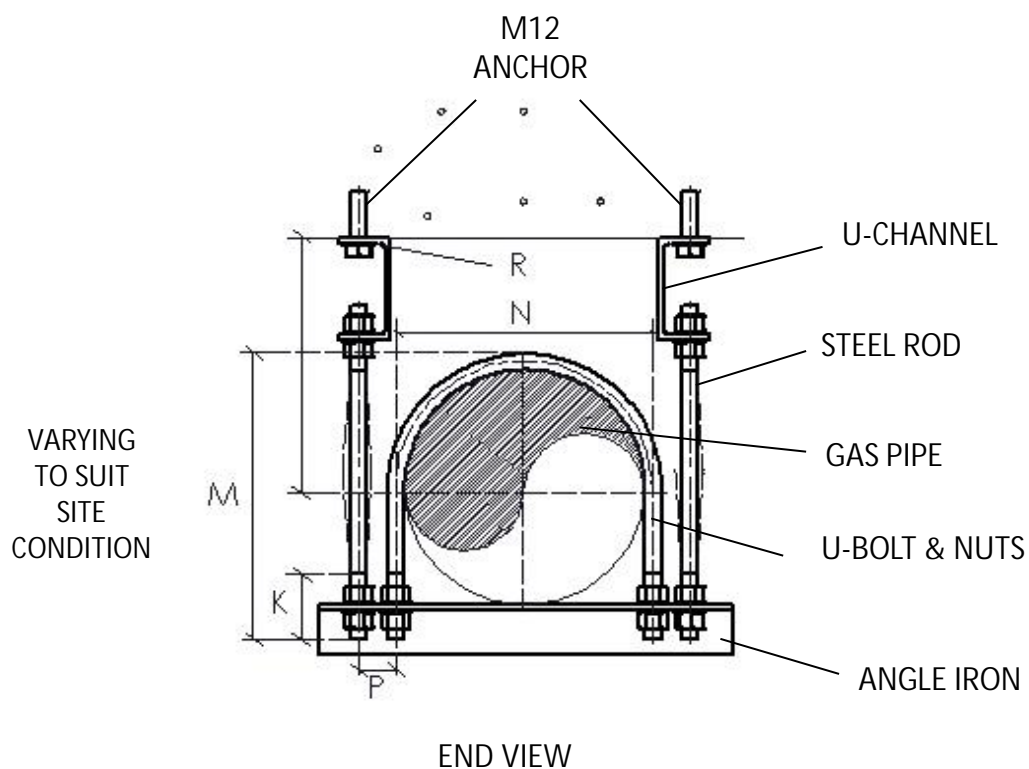


**Figure 9 – Typical Pipe Support for Horizontal Gas Pipe (E)**

Nominal Pipe Sizes :

80mm (3") – 300mm (12") horizontal pipe

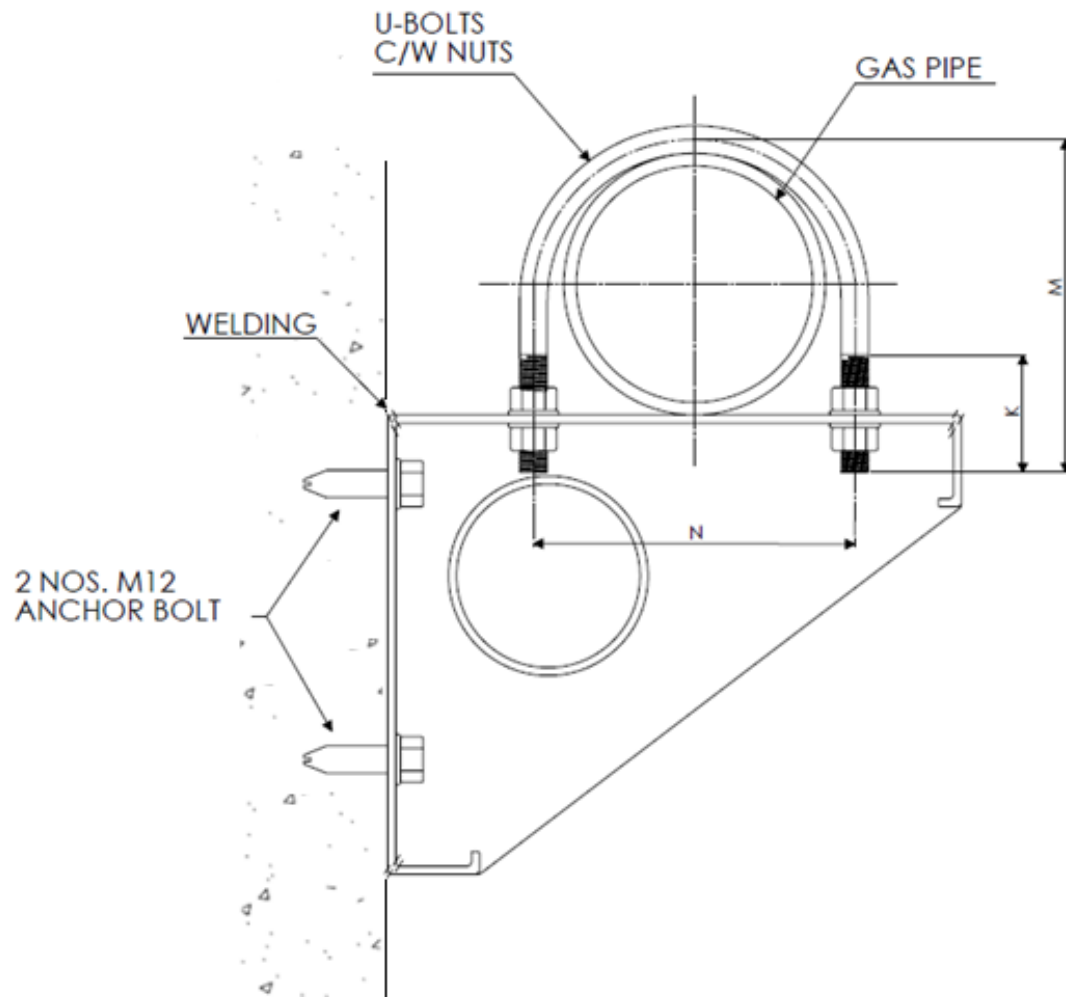
## CEILING STRUCTURE

**Figure 10 – Typical Pipe Support for Horizontal Gas Pipe (F)**



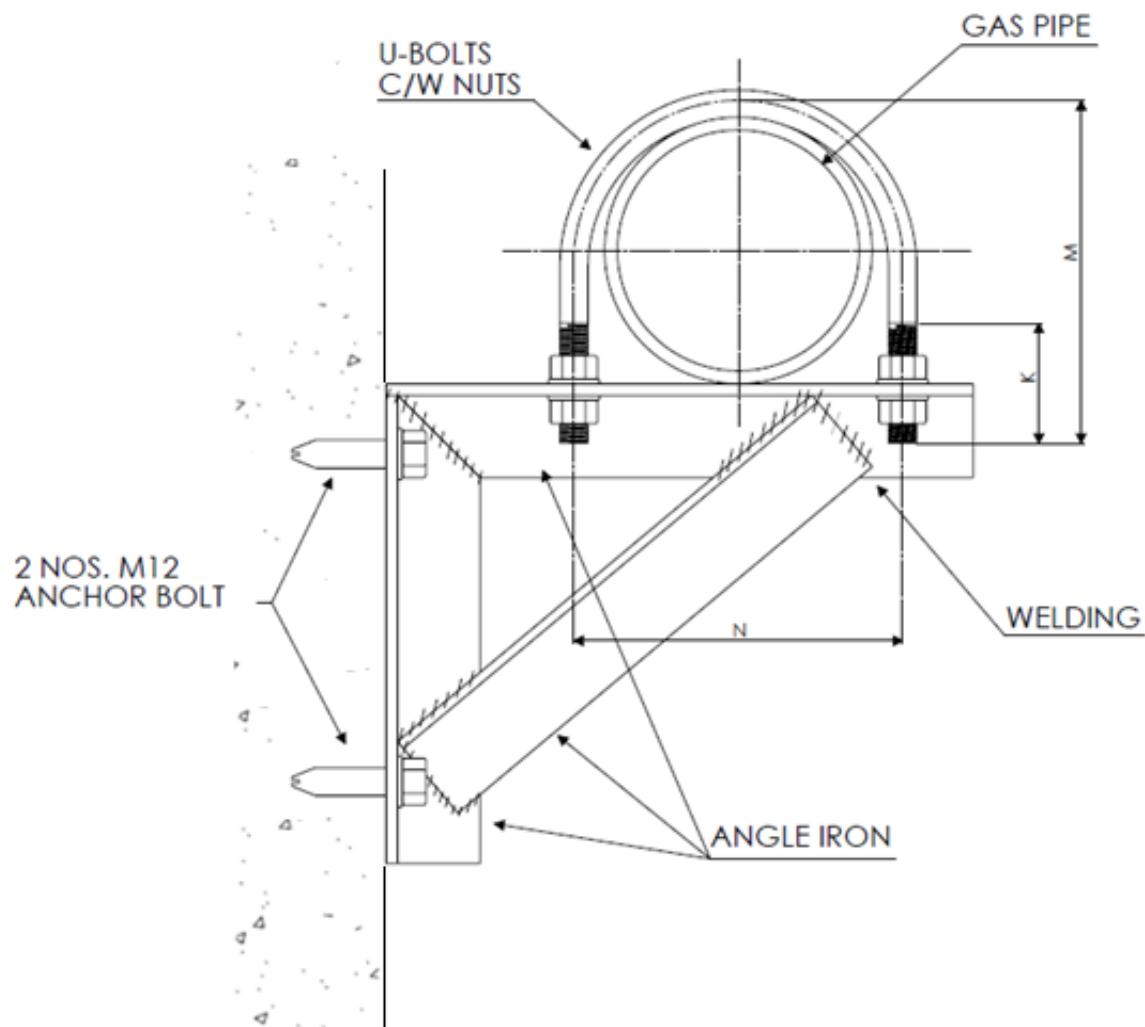
Nominal Pipe Sizes :

80mm (3") – 150mm (6") horizontal pipe



**Figure 11 – Typical Pipe Support for Horizontal Gas Pipe (G)**

Nominal Pipe Sizes :  
200mm (8") – 300mm (12") horizontal pipe

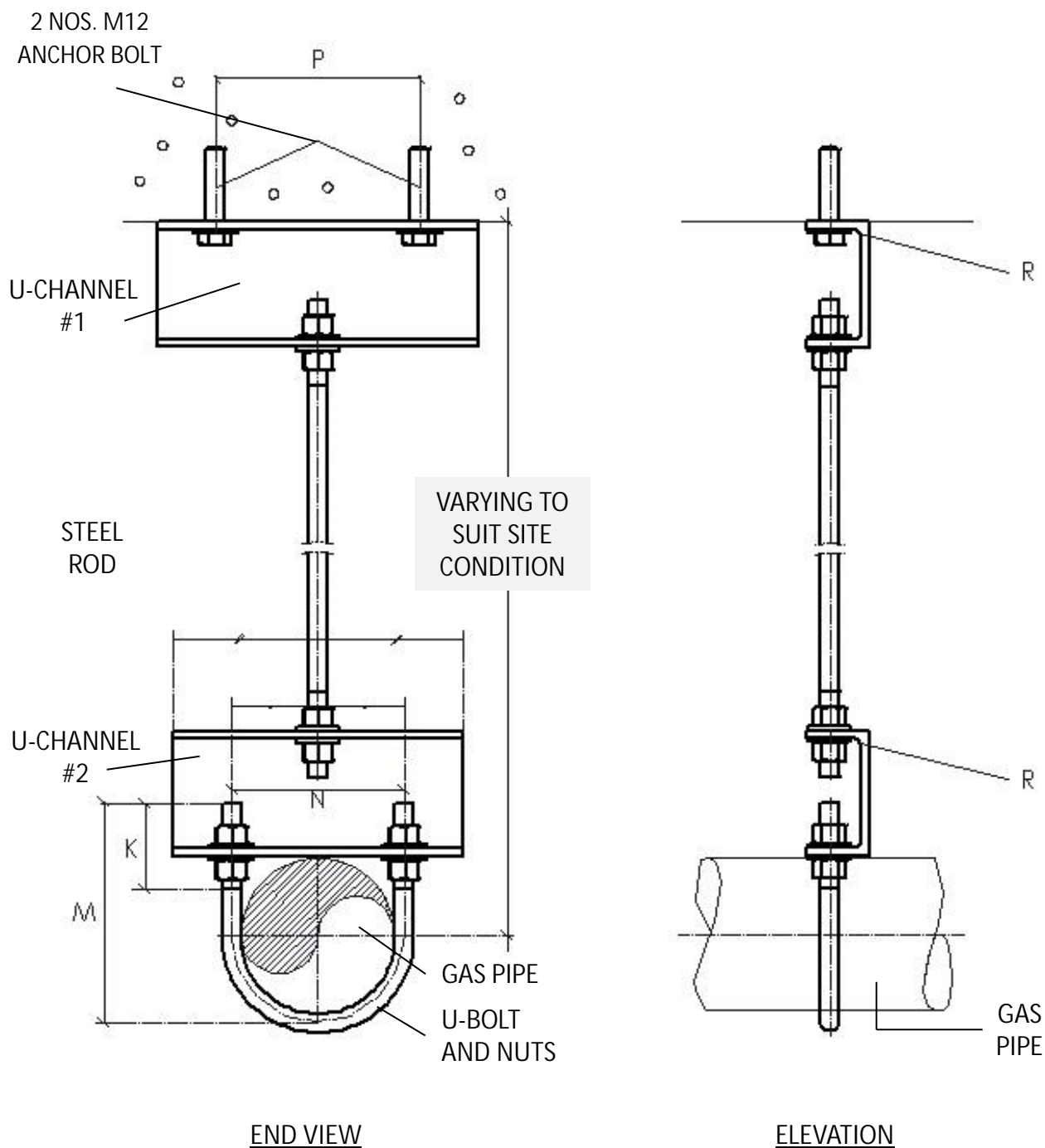


**Figure 12 – Typical Pipe Support for Horizontal Gas Pipe (H)**

## CEILING STRUCTURE

Nominal Pipe Sizes :

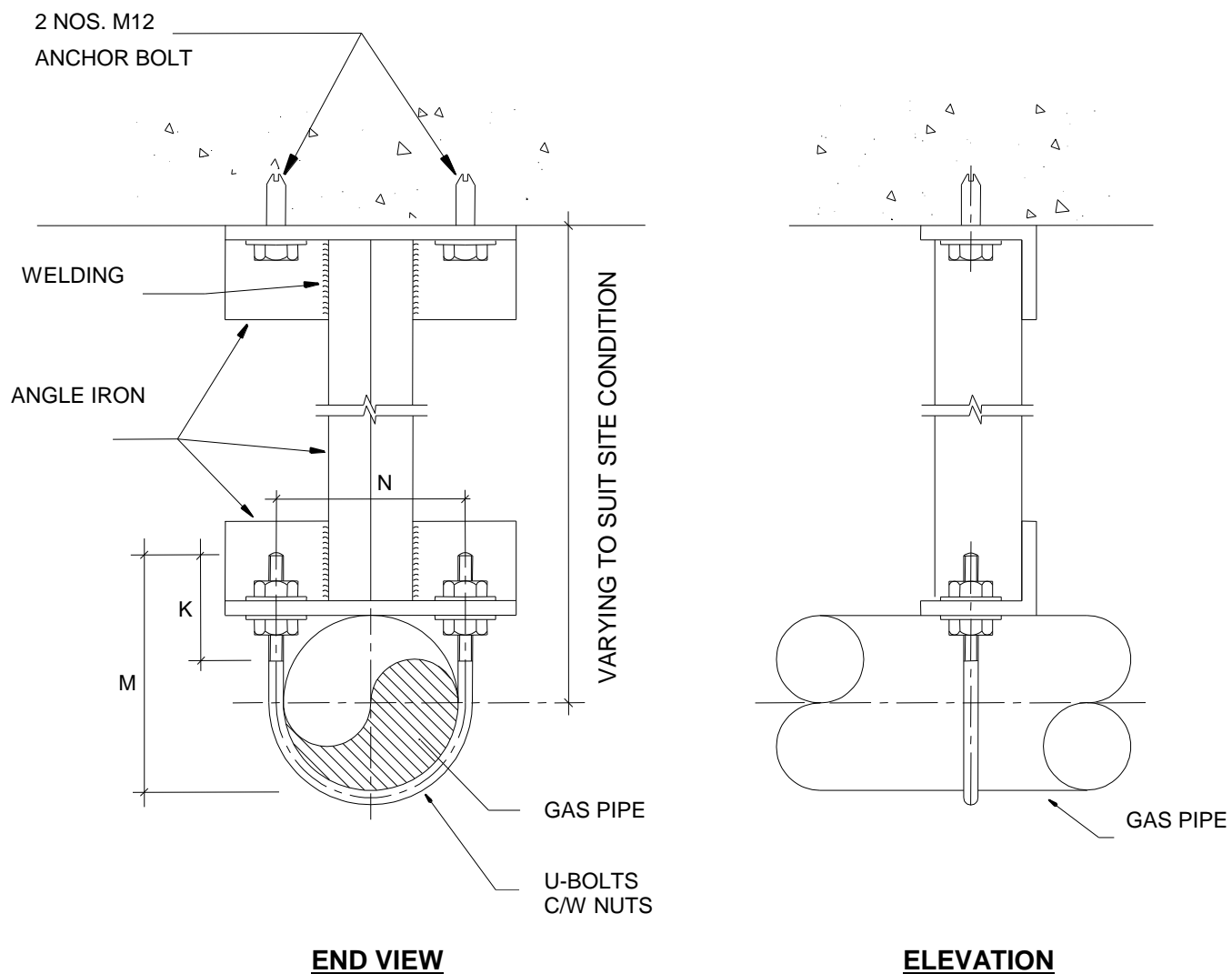
80mm (3") – 150mm (6") horizontal pipe

**Figure 13 - Typical Horizontal Pipe Support for Gas Pipe (I)**

Nominal Pipe Sizes :

80mm (3") – 150mm (6") horizontal pipe

80mm (3") – 300mm (12") vertical pipe

**Figure 14 - Typical Pipe Support for Gas Pipe (J)**

## 技術指引

# 煤氣管道/立管(上給供氣分喉)的支承

## 修正撮要

版本編號	日期	修正部份
1	二零零三年四月二十二日	第一版本
2	二零零三年九月一日	第 1 頁，項 2，配件例子，加入鋼枝 第 2 頁，表 2 及第 4 頁，表 4，鋼枝、U 槽及角鐵的尺寸的修改
3	二零零四年二月九日	第 9 頁，圖 5 修改，立管中間托架加上 U-型螺絲及絲母
4	二零一三年八月二十日	第 4 頁，項 5.8 修改，新設計的 3”，4” 及 6” 不銹鋼水平管道支承取代現時的不銹鋼角鐵設計 第 5 頁，表 4，添加新設計不銹鋼水平管道支承 IIa 的有關尺寸及表 5 修改，列出 IIa 以外其它中間支承的有關尺寸 第 13 頁，圖 8 修改，加入新設計不銹鋼水平管道支承 IIa (圖 8a)。圖 8a & 8b 取代圖 8
5	二零一六年九月十五日	第 1 頁，項 4.1，EN10255 及 EN10217 取代 BS1387 及 BS3601 第 2 頁，表 1，按 EN10255 修改 ½” to 6” 喉管重量及 EN10217 修改 8” to 12” 喉管重量 第 2 頁，項 4.2 修改，以新設計的底部托架取代現時的角鐵設計 第 2 頁，表 2 修改，變成新設計的底部托架的尺碼選擇表 第 3 頁，表 3，添加新設計的底部托架的尺碼表 第 3 頁，項 4.4 修改，以便符合新設計的需求 第 4 頁，項 5.8 - 簡化命名，管道支承(I)、(IIa)、(IIb)、(IV)及(III)改名為管道支承(D),(G),(H),(F)及(J)。 - 重整內容顯示各管道支承的應用範圍 - 添加新設計(E)及(I)令安裝更靈活適應工地條件。 第 5 頁，表 5，修改內容顯示管道支承 (D)、(E) 及(F) 的有關尺寸。 第 5 頁，表 6，添加管道支承 (G) 及(H)的有關尺寸。 第 6 頁，表 7，添加管道支承(I) 及(J)的有關尺寸。 第 9 頁，圖 3 修改，以新設計的底部托架取代典型立管底部托架 第 10 頁，圖 4，添加新設計的底部托架的尺碼圖 第 15 頁，圖 9，添加新設計管道支承(E)之結構 第 19 頁，圖 13，添加新設計管道支承(I)之結

		構
6	二零一八年十月八日	<p>第 1 頁, 項 3.3, 不允許之裝置加上內外絲接頭。</p> <p>第 2 頁, 項 4.2, 特別設計的底部托架改名為典型底部托架。</p> <p>第 2 頁, 表 1 修改, 刪除 2 ½” 鋼喉。</p> <p>第 3 頁</p> <ul style="list-style-type: none"> <li>- 項 4.4 及 4.5 修改, 重整內容顯示典型鴨足式支承及特別設計的底部托架的應用範圍。</li> <li>- 表 4, 添加典型鴨足式支承尺碼表。</li> </ul> <p>第 11 頁, 圖 3 修改, 以三通取代內絲彎頭。</p> <p>第 12 頁, 圖 5, 添加典型鴨足式支承之結構。</p> <p>第 15 頁至 21 頁, 圖 8 至圖 14 修改, 顯示可用的標定管徑。</p> <p>第 22 頁, 圖 14 修改, 刪除頂部標題。</p>
7	二零二一年五月十七日	<p>第 1 頁, 項 3.3, 修改橫喉長度應不少於 100 毫米(4吋)。</p> <p>第 4 頁, 項 5, 添加中間承重支承之應用。</p> <p>第 4 頁, 項 6, 修改標題為”管道支承”及刪除有關中間支承的項 5.4。</p> <p>第 5 頁, 項 6.8, 添加應用其他設計的管道支承。</p> <p>第 13 頁, 圖 6, 修改標題為”中間承重支承”及更新設計。</p>
8	二零二二年三月九日	<p>技術指引參考編號由 HKCG/TI/G/01 修改為 HKCG/AG/TI/06。</p> <p>刪除標題的「服務」。</p> <p>第 i 頁, 刪除封面頁的核准者。</p> <p>第 1 頁, 項 3.3, 添加不應將內外絲彎頭、內接頭或內外絲接頭安裝於橫向供氣分喉上。</p> <p>第 4 頁, 項 6.4, 添加位於用戶橫喉的支承應距離管道接駁處最少 100 毫米。</p> <p>第 9 頁, 修改圖 1 及圖 2。</p>

## 技術指引

### 煤氣管道/立管(上給供氣分喉)的支承

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此技術指引可在負責工程師之判斷下作適當之變更。

本公司之技術指引乃根據當時最充份之資料撰寫，但將會隨著本公司之物料供應及工作方法變動時作出適當之改進。



## 前言

此技術指引取代 HKCG/TI/G/01，第七版。此新版本因應實務及環境轉變而制訂，主要修訂為：

- a) 技術指引參考編號由 HKCG/TI/G/01 修改為 HKCG/AG/TI/06。
- b) 刪除封面頁的核准者。
- c) 添加不應將內外絲彎頭、內接頭或內外絲頭安裝於橫向供氣分喉上。
- d) 添加位於用戶橫喉的支承應距離管道接駁處最少 100 毫米之要求。

## 1. 範圍

此技術指引，闡述用以固定煤氣喉管在特定位置的支承之選擇及裝置。適用於所有在正常溫度範圍內操作的鋼喉，(管徑由15毫米至300毫米)。

技術指引包括管道托架/支承之設計考慮因素、安裝方法及典型托架/支承組合的說明。

此文件乃考慮一般情況和建議可行之方法而編制。

## 2. 材料

喉管的支承，包括其螺絲、絲母、介指、鋼枝及入牆螺栓等，應用 304 級的不銹鋼。

亦可用其他相同或較高質的材料。

所用物料的資料，應提供予煤氣公司及被認可。

## 3. 概述

3.1 管道支承設計的主要目的，是基於安全、有效及經濟的原則，防止管道及接駁件受超額應力的影響。在顧及經濟及方便施工的情況下，許多支承是加在現存的樓宇上。由於設計受環境規限，故不可能為每一實況而訂出不同的標準設計。

設計者須以專業知識、經驗及仔細的選擇設計出達到強度要求之管道支承，並以合理成本達致最佳效果。

3.2 裝置入牆螺栓及膠塞時，須按正確方法/程序進行，須用適當尺碼的鑽咀及螺絲及鑽至正確的深度。

3.3 除了有足夠的支承外，為防止用戶橫喉可能會受超額應力，橫喉長度應不少於100毫米(4吋)，(參看圖1)，及不應將內外絲彎頭、內接頭或內外絲彎頭安裝於橫向供氣分喉上(參看圖2)。

## 4. 立管底部托架

4.1 每柱立管應在其底部有適合的及安全的支承裝置。此支承裝置應能承擔直至改變方向為止的所有立管的重量。如立管底部無足夠位置配置托座作支承時，立管之配置設計可在底部作分支，以便有足夠空間容納此托架(參看附件1)。

立管之重量估計，可依『表1』所列之數據進行。150毫米以下的管道，是按 EN10255 "重身"鋼喉的重量。200毫米以上，是按 EN10217，6.3毫米壁厚鋼喉的重量。

管道大小		喉管重量	
吋	毫米	磅/呎	公斤/米
½	15	0.97	1.45
¾	20	1.26	1.88
1	25	1.98	2.95
1¼	32	2.57	3.82
1½	40	2.96	4.41
2	50	4.21	6.26
3	80	7.06	10.5
4	100	9.95	14.8
6	150	14.72	21.9
8	200	22.24	33.1
10	250	27.82	41.4
12	300	33.13	49.3

『表 1』 - 鋼喉之每米及每呎重量

- 4.2 圖3所示為一個典型底部托架。此托架需用適當的入牆螺杆式安卡錨栓及介指固定在牆身適當位置，並可安全有效地支承立管的重量。支承的結構可確保立管能夠平穩地安放在托架上，施工時，要相應地轉動內接頭(A)及內外接頭(B)，使立管底部與托架相合。選擇底部托架的尺碼時，須根據立管的管徑、垂直立管長度及立管中線與牆身的距離來決定。『表2』所列，可用於一般裝置。而『表 3』及圖 4 則顯示了細碼及大碼底部托架的尺寸。

標定管徑		垂直立管 長度 (R)	立管中線與 牆身的距離 (C)	推薦使用的 底部托架尺碼
吋	毫米	米	毫米	
2	50	$16 < R \leq 160$	$\leq 170$	細碼
			$170 < C \leq 270$	大碼
3	80	$9 < R \leq 97$	$\leq 160$	細碼
			$160 < C \leq 260$	大碼
4	100	$6 < R \leq 68$	$\leq 150$	細碼
			$150 < C \leq 240$	大碼
6	150	$4 < R \leq 45$	$\leq 230$	大碼

『表 2』 - 推薦底部托架尺碼

底部托架尺寸	細碼 (毫米)	大碼 (毫米)
長度(L)	200	300
高度(H)	200	300
闊度(W)	150	150
厚度(T)	4.5	4.5

『表 3』 - 底部托架尺寸(見圖 4)

- 4.3 如果立管的重量是不太沉重，例如小於100公斤，可以不需安裝底部支承，及立管可由地喉直上。
- 4.4 立管重量1,000公斤至 3,500 公斤內或尺寸不符合『表2』所列的數值時，應使用典型鴨足式支承(參見圖 5)。施工時，要相應地轉動內接頭(A)，使立管底部與內接頭互相接合。支承喉管(D)須插入鋼底盤(E)內。如立管管徑大於 150 毫米，內接頭須連接一個六角(B)並插入一個放置在支承喉管上的鋼頂蓋(C)。選擇典型鴨足式支承的尺寸時，須根據立管管徑來決定。『表 4』顯示了建議的尺寸。

標定管徑		典型鴨足式支承尺寸				
		內接頭 (A)	六角 (B)	鋼頂蓋 (C)	支承喉管 (D)	鋼底盤 (E)
吋	毫米	吋				
1	25	1	不適用	不適用	1	1
1¼	32	1¼			1¼	1¼
1½	40	1½			1½	1½
2	50	2			2	2
3	80	3			3	3
4	100	4			4	4
6	150	6			6	6
8	200	6	6	8	8	8
10	250			10	10	10
12	300			12	12	12

『表4』 - 推薦的典型鴨足式支承尺寸

- 4.5 如果立管重量大於 3,500 公斤，須採用其他設計的鴨足式支承 (參照 BS 3974 : 喉管的支承(Pipe Suport)) 或特別設計的底部托架。

## 5. 中間承重支承

當立管的安裝始於地面/樓面以上的高度，須提供中間承重支承於適當位置，以承托管道的重量。圖 6 顯示一典型之中間承重支承。如圖所示，中間承重承以入牆螺栓固定在牆上，立管經由四通安放在支承上，其大小應足以承托立管的重量。在某些情況下，應採用特別設計，以適應有限之空間，例如屋宇之窄身柱上。

## 6. 管道支承

- 6.1 喉管應在適當位置以中間管道支承或管托固定，以和牆身及其他表面保持距離，以防止有橫向移動。

不同口徑管道之支承或管托的最大距離，應符合『表 5』之規定。

管道大小		企身喉		橫身喉	
毫米	吋	米	呎	米	呎
15	½	3.0	10	2.5	8
20	¾	3.0	10	2.5	8
25	1	3.0	10	2.5	8
32	1¼	3.0	10	2.7	9
40	1½	3.5	12	3.0	10
50	2	3.5	12	3.0	10
80	3	4.5	15	3.0	10
100	4	4.5	15	3.0	10
150	6	5.5	18	5.5	18
200	8	5.5	18	5.5	18
250	10	6.5	21	6.5	21
300	12	7.0	23	7.0	23

『表 5』 - 管道支承的最大間距

- 6.2 在負荷集中及管道方向改變的位置，支承間距應比較小；此外，支承位置應盡量接近管道接駁處。
- 6.3 除『表 5』所列之水平管道支承間距要求外，管道方向由水平改為垂直，或由垂直轉向水平，都必須加裝支承。此支承位置應盡可能接近立管之中線，任何情況下，支承和立管中線距離不能大於200毫米，或4倍喉身的口徑(兩者以較小為準)。
- 6.4 支承15、20及25毫米(½、¾及1吋)的管道，可用'A'碼、'B'碼或'C'碼(參看圖7)。位於用戶橫喉的支承應距離管道接駁處最少 100 毫米。

- 6.5 支承32、40及50 毫米(1¼、1½及2吋)的管道，一般可用'A'碼。此外，裝置80及100 毫米(3及4 吋)管道，可用'A'碼以支承垂直管道，或作為吊架，或，如管道貼近牆壁，(管中心離牆小於100毫米)，承托橫身管道。
- 6.6 'A'碼是以螺紋旋入有內紋的入牆螺栓。'B'碼可用¼吋的外紋入牆螺栓裝置，而'C'碼可用7毫米(¼吋)膠塞及5毫米(3/16吋)螺絲固定。
- 6.7 支承80毫米(3吋)或更大的管道，應用特制的托架及吊架。可參照圖 8 至 14 的樣例。主要尺寸，列於『表 6』，『表 7』及『表 8』。
- 6.7.1 管道支承(D) 可用於 80mm (3") 至 300mm (12") 的垂直管道及水平管道。
- 6.7.2 水平管道支承 (E) 及(F) 用於 80mm (3") 至 300mm (12") 的水平管道。
- 6.7.3 水平管道支承(G) 用於 80mm (3") – 150mm (6") 的水平管道 300mm，而水平管道支承(H) 則用於 >150mm(6") 的水平管道。
- 6.7.4 水平管道支承 (I) 可用於 80mm (3") – 150mm (6") 的水平管道。
- 6.7.5 管道支承 (J) 可用於如下口徑的水平管道及垂直管道:  
- 80mm (3") – 150mm (6")的水平管道  
- 80mm (3") – 300mm (12")的垂直管道
- 6.7.6 水平管道支承 (E) 及 (F) 安裝容易，適用範圍廣，應給與優先採用。水平管道支承 (I) 及 (J) 只在工地環境不利於安裝支承 (E) 及 (F) 時考慮採用。
- 6.8 如因施工環境或其他限制而未能使用上述設計，須採用特別設計而有足夠承重能力的喉碼/管道支承。

管道支 承	管道大小		大小 (毫米)					
	吋	毫米	鋼枝/ U 型螺絲 直徑	N	M	K (最小)	U 槽大小 (毫米)	角鐵大小
D, E, F	3	80	12	110	140	55	80 x 40 x 4	40 x 40 x 4
	4	100	12	140	165	55		
	6	150	16	195	225	65		
	8	200	16	250	275	65	100 x 50 x 5	50 x 50 x 5
	10	250	16	305	335	75		
	12	300	20	355	385	75		

『表 6』 – 支承的尺寸 (見圖 8、9 及 10)

管道 支承	管道大小		尺寸 (毫米)						
	吋	毫米	鋼枝/ U 型螺絲 直徑	N	M	K (最小)	寬度 (毫米)	厚度 (毫米)	角鐵大小
G	3	80	12	110	115	55	40	3.5 or 4.0*	---
	4	100	12	140	140	55	40	3.5 or 4.0*	---
	6	150	16	195	200	65	45	4.0	---
H#	8	200	16	250	275	65	---	---	50 x 50 x 5
	10	250	16	305	335	75	---	---	
	12	300	20	355	385	75	---	---	

\* 適用於水平管軸心離牆  $\geq 260\text{mm}$  的安裝# 適用於水平管軸心離牆  $< 300\text{mm}$  的安裝

『表 7』 – 支承的尺寸 (見圖 11 及 12)

管道 支承	管道大小		大小 (毫米)					
	吋	毫米	鋼枝/ U 型螺絲 直徑	N	M	K (最小)	U 槽大小	角鐵大小
I	3	80	12	110	140	55	80 x 40 x 5	---
	4	100	12	140	165	55		---
	6	150	16	195	225	65		---
J	3	80	12	110	140	55	---	40 x 40 x 4
	4	100	12	140	165	55	---	
	6	150	16	195	225	65	---	
	*8	200	16	250	275	65	---	50 x 50 x 5
	*10	250	16	305	335	75	---	
	*12	300	20	355	385	75	---	

\*只適用於垂直管的安裝

『表 8』 – 支承的尺寸 (見圖 13 及 14)

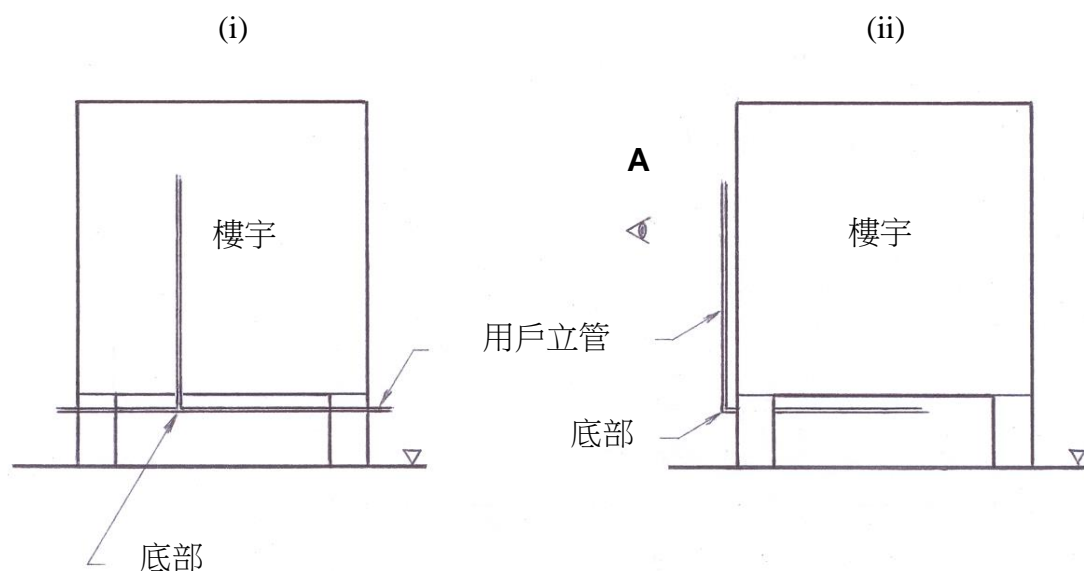
## 7. 參考

BS 3974 : 喉管的支承 (Pipe Supports)。



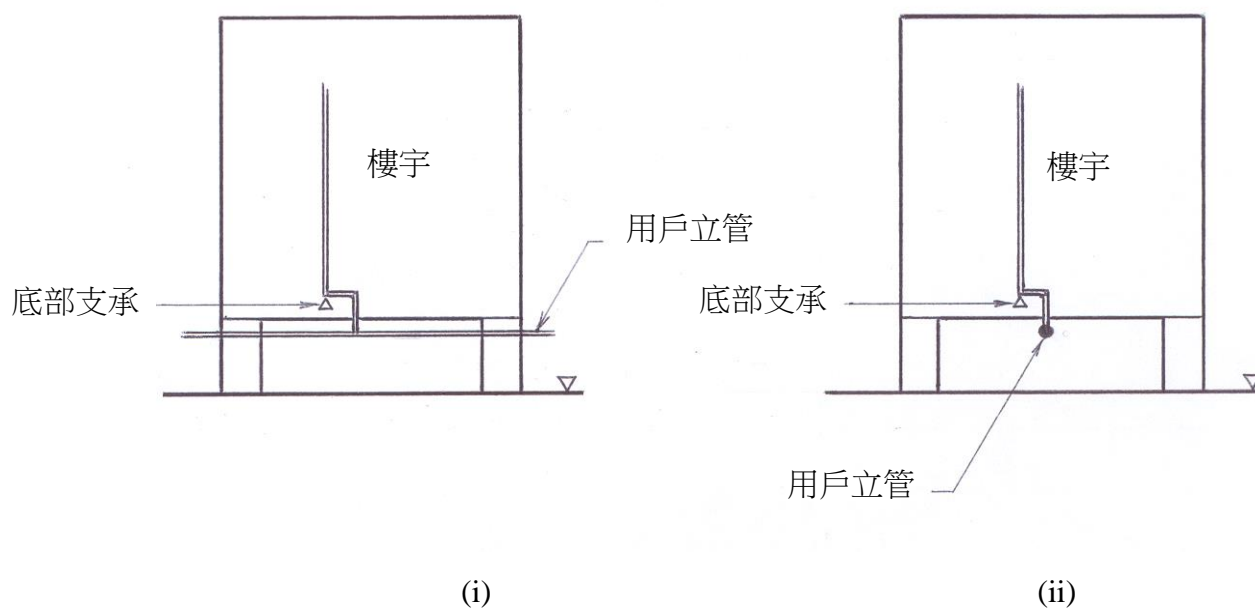
附件 1 - 立管底部位置改位法問題

下圖所示為某些難以在用戶立管底部附近牆上，加安喉碼或托架支承之安裝。

解決方法

將企身喉底部稍移高，以便有足夠空間容納及安裝帶入牆螺栓之托架。如下圖顯示：

由 A 視圖



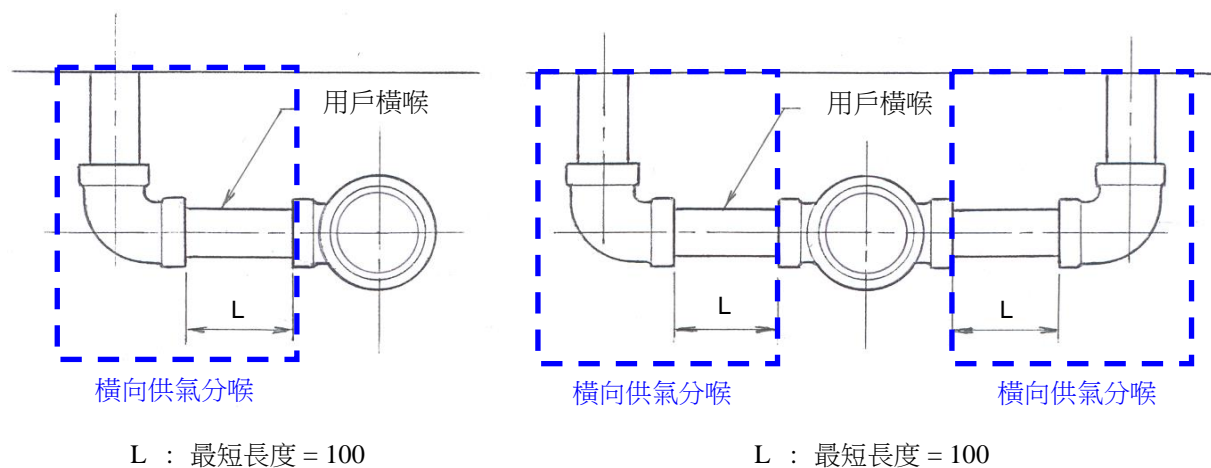


圖 1 - 用戶橫喉最短長度 (毫米)

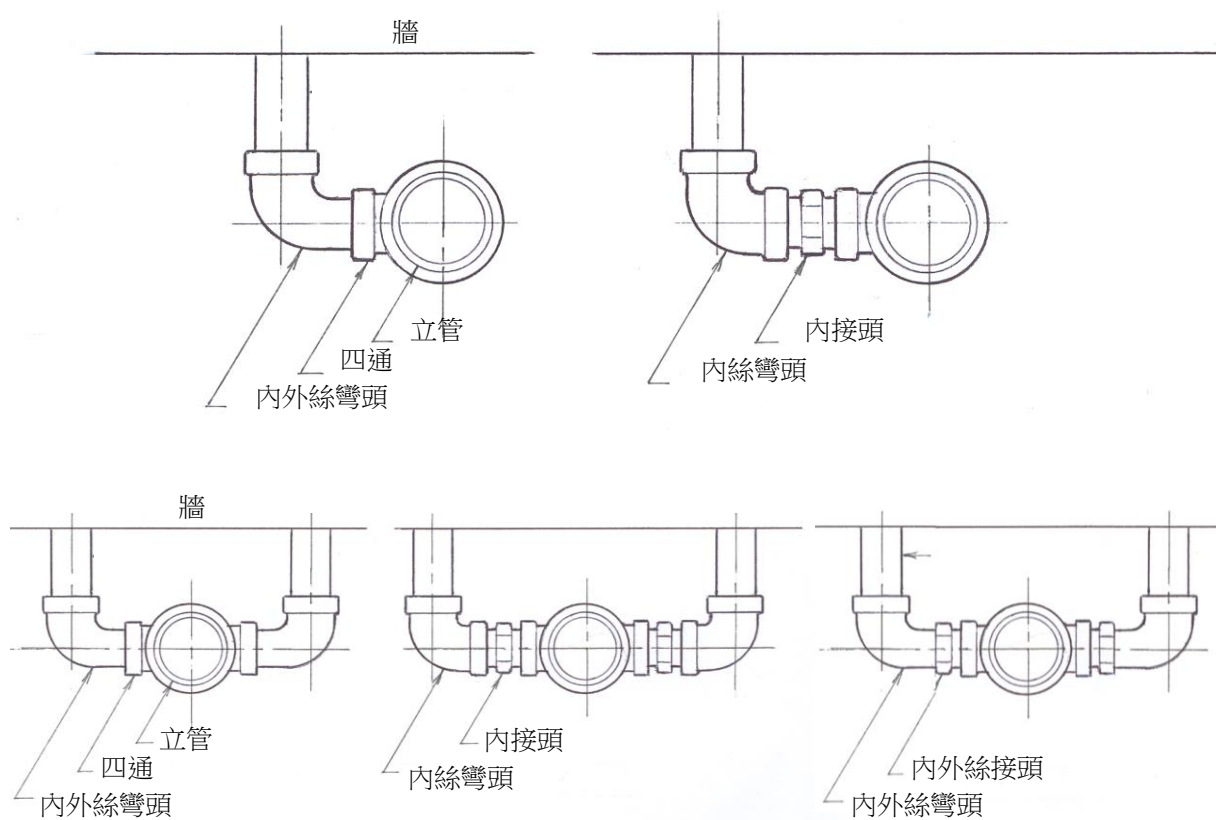


圖 2 - 不允許之裝置

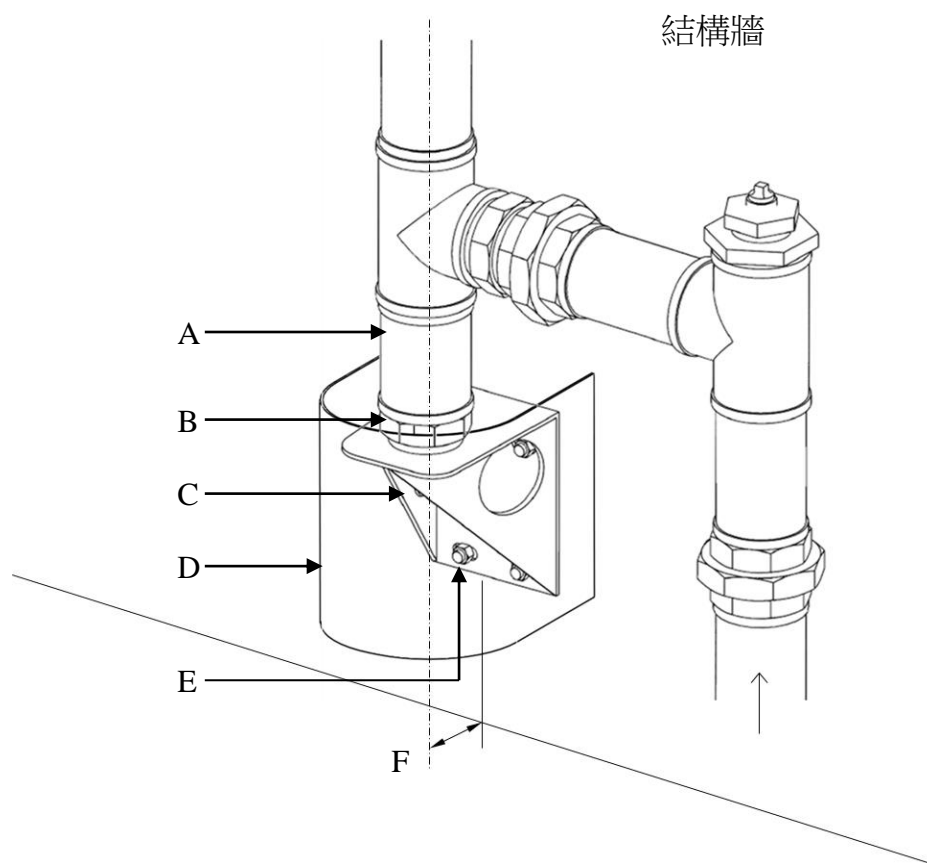


圖 3 - 典型底部托架

- A - 內接頭
- B - 內外接頭
- C - 托架
- D - 視需要加裝防傷害圍板。圍板材料，須可防侵蝕，如用 1 毫米厚 304 級的不銹鋼片及用不銹鋼螺絲裝置。
- E - M12 入牆螺杆式安卡錨栓及介指
- F - 立管中線與牆身的距離。

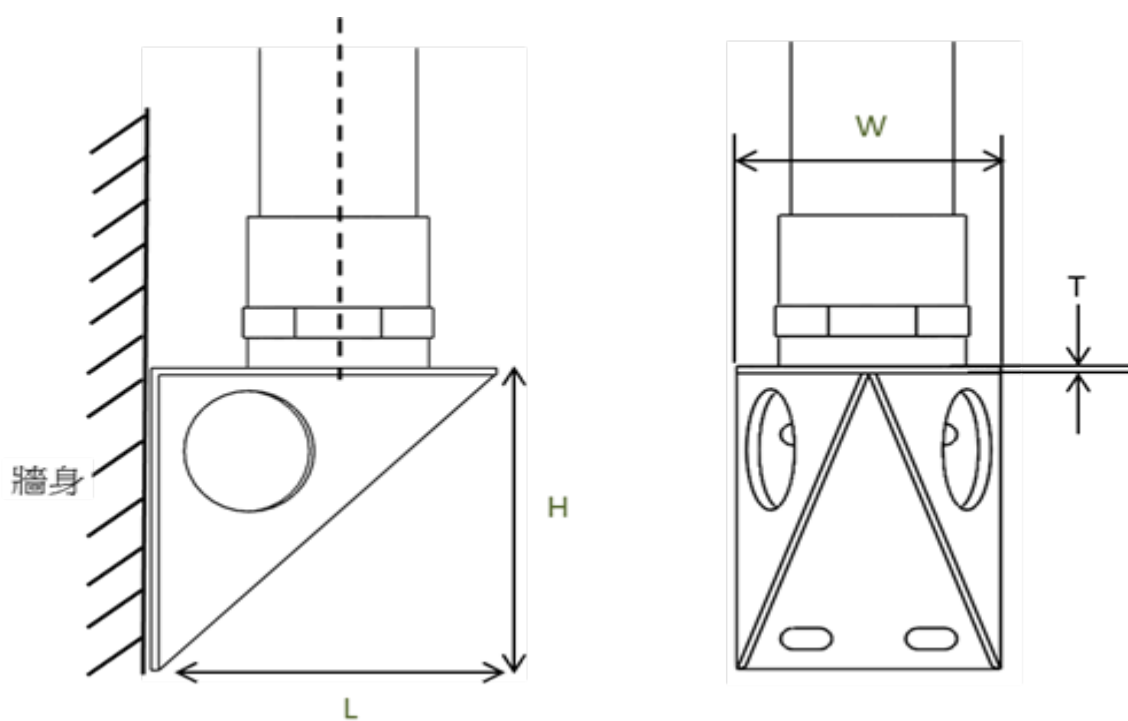
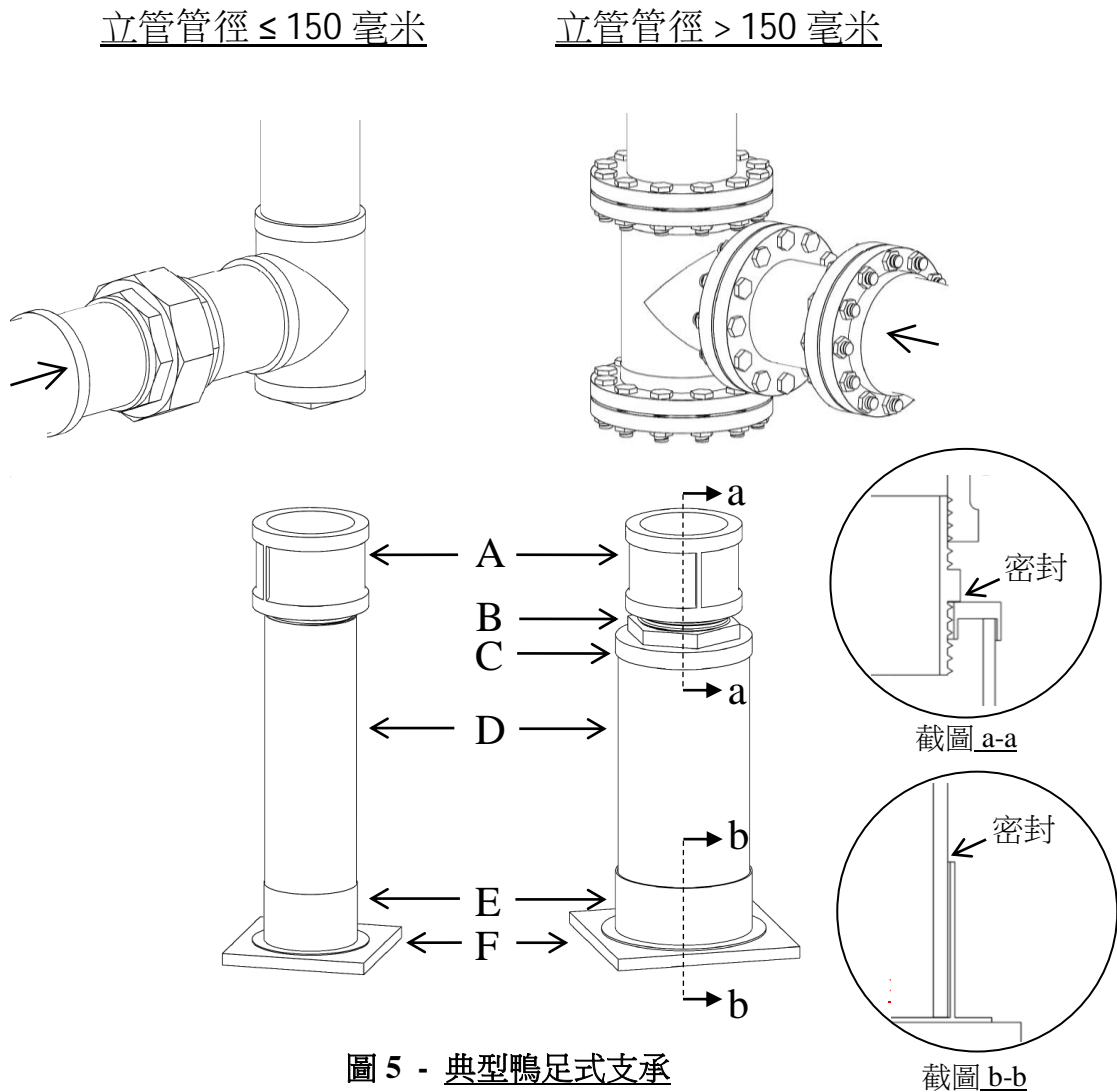


圖 4 - 底部托架的尺碼



- A — 內接頭。
- B — 六角。
- C — 鋼頂蓋。鋼頂蓋與六角之間間隙須使用防水密封膠填滿，建議使用 HILTI CP 601S 彈性矽封膠 (截圖 a-a)。
- D — 支承喉管。若支承喉管的長度大於 1000 毫米，建議加裝最少一個喉碼。
- E — 鋼底盤。鋼底盤與支承喉管之間間隙須使用防水密封膠填滿，建議使用 HILTI CP 601S 彈性矽封膠 (截圖 b-b)。
- F — 混凝土平台。若施工地面不平坦，建議搭建一個混凝土平台。

內接頭、六角及支承喉管須塗上防蝕漆，塗防蝕漆程序須參考 HKCG/TI/G/04 煤氣喉管之防侵蝕保護。

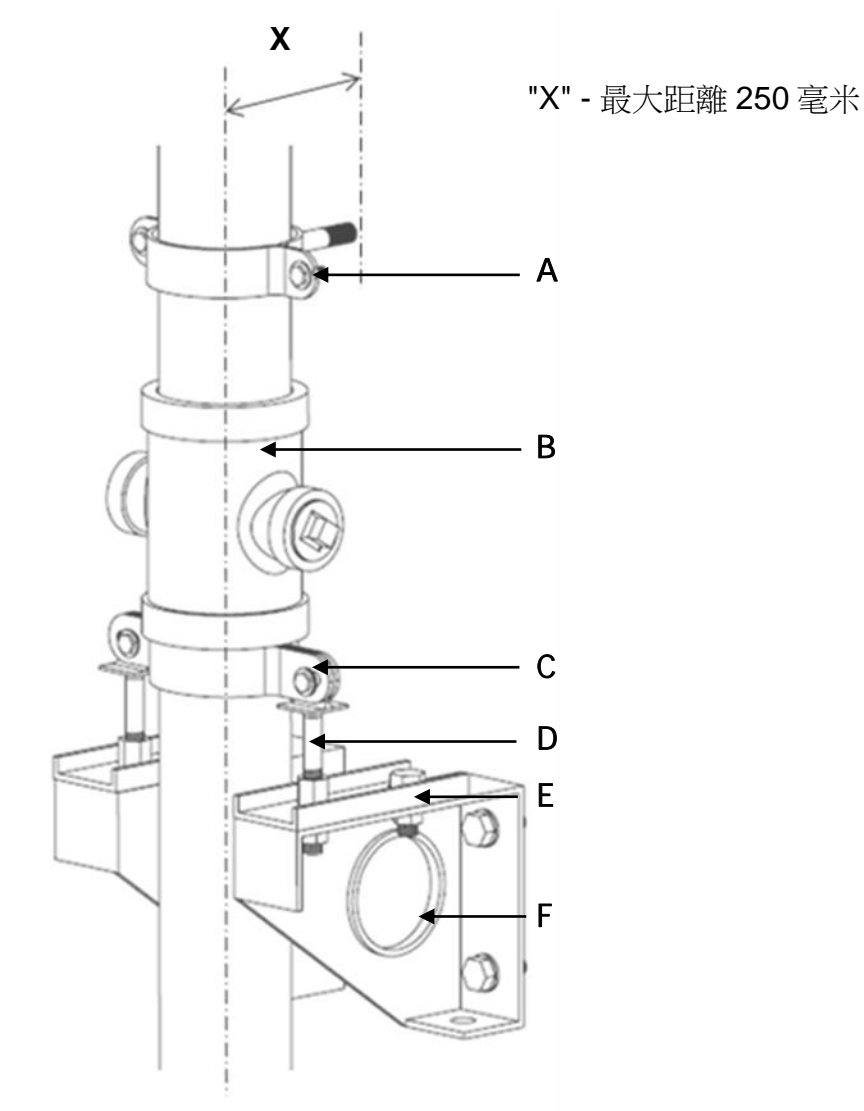
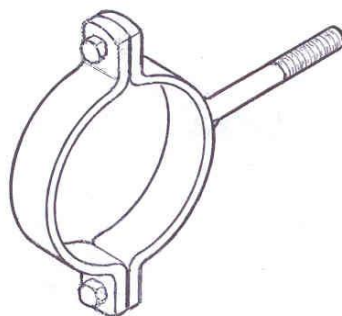
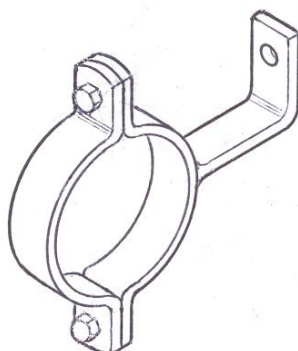


圖 6 - 典型中間承重支承

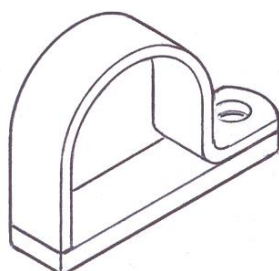
- A - 喉碼 ('A'碼)
- B - 四通。亦可選用三通及內接頭。
- C - 喉碼。須調校支承棒的 M12 螺母令喉碼能緊貼管件底部。
- D - 支承棒
- E - U 形支承
- F - 托架



A' 碼



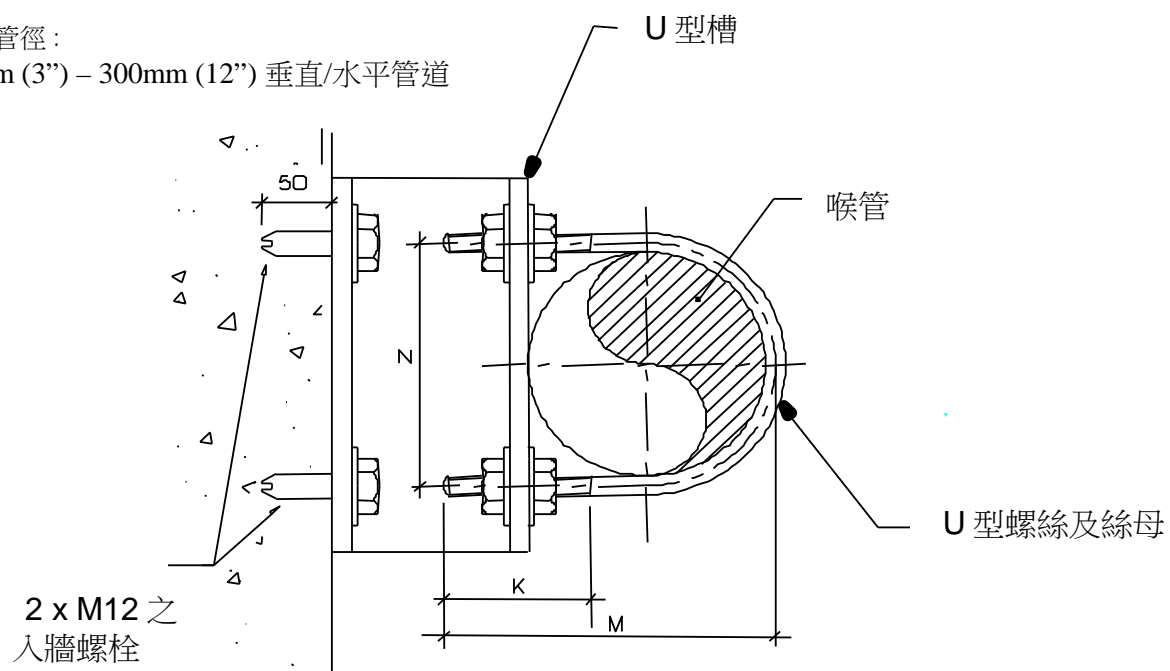
B' 碼



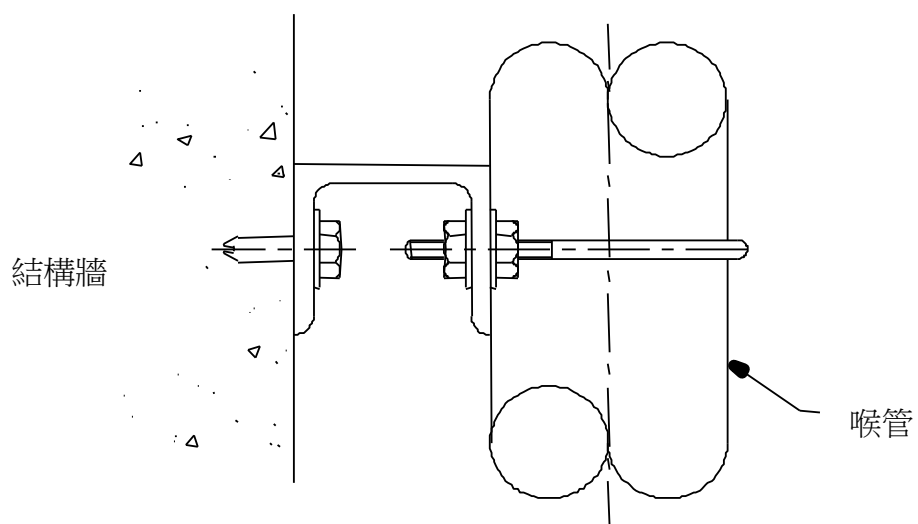
C' 碼

圖 7 - 喉碼

標定管徑：  
80mm (3") – 300mm (12") 垂直/水平管道



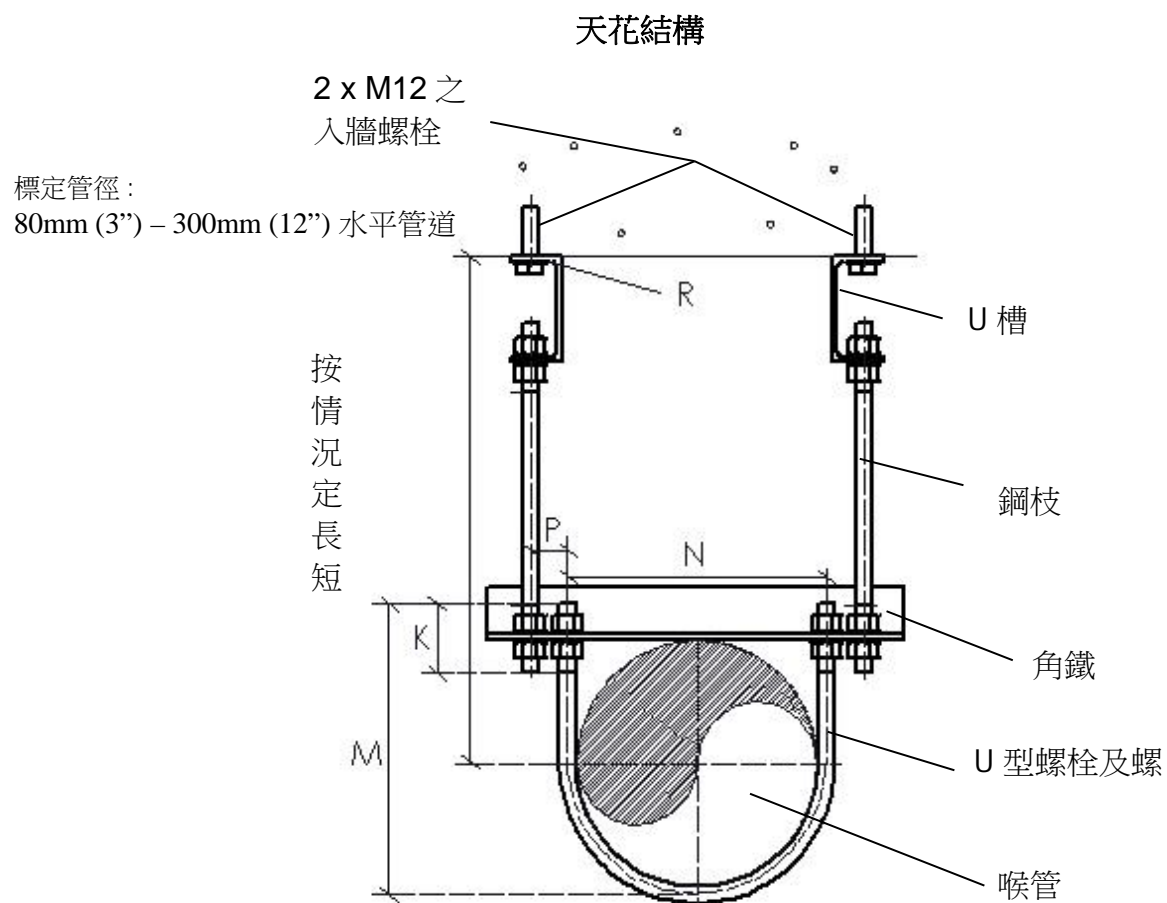
平面圖



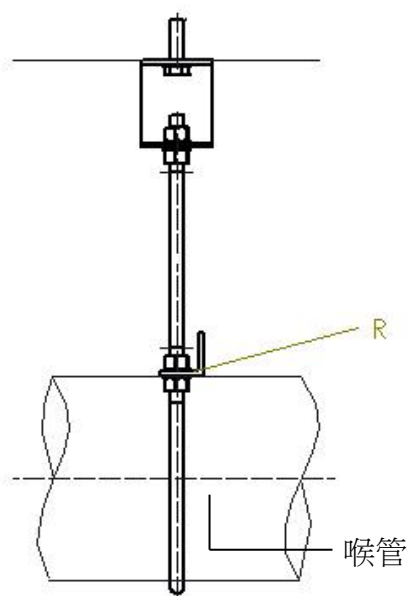
正面圖

圖 8 - 典型管道之支承 (D)





側面圖



正面圖

圖 9 - 典型水平煤氣管道之支承 (E)

### 天花結構

標定管徑：

80mm (3") – 300mm (12") 水平管道

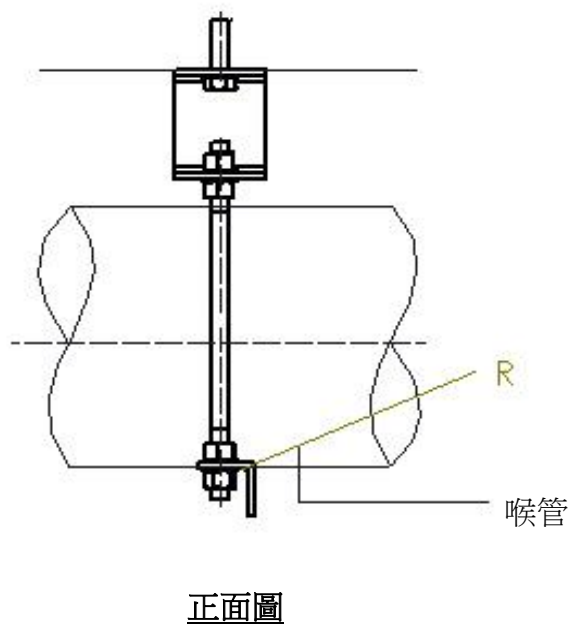
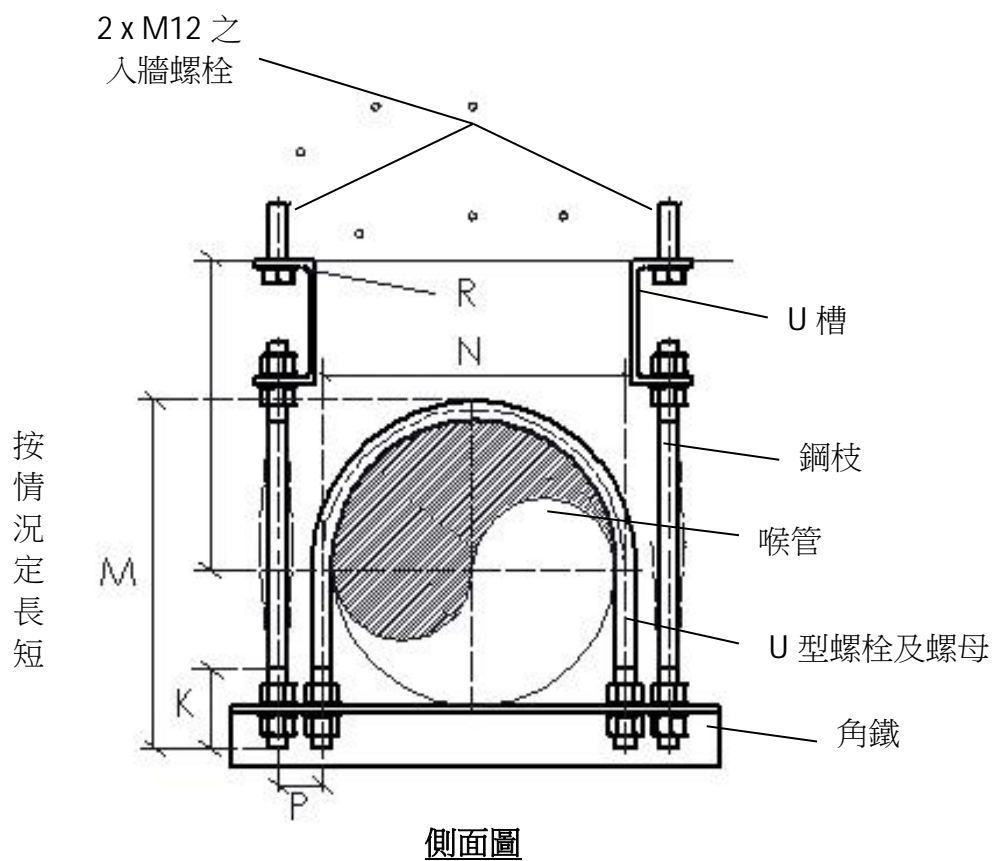


圖 10 - 典型水平煤氣管道之支承 (F)

標定管徑：  
80mm (3") – 150mm (6") 水平管道

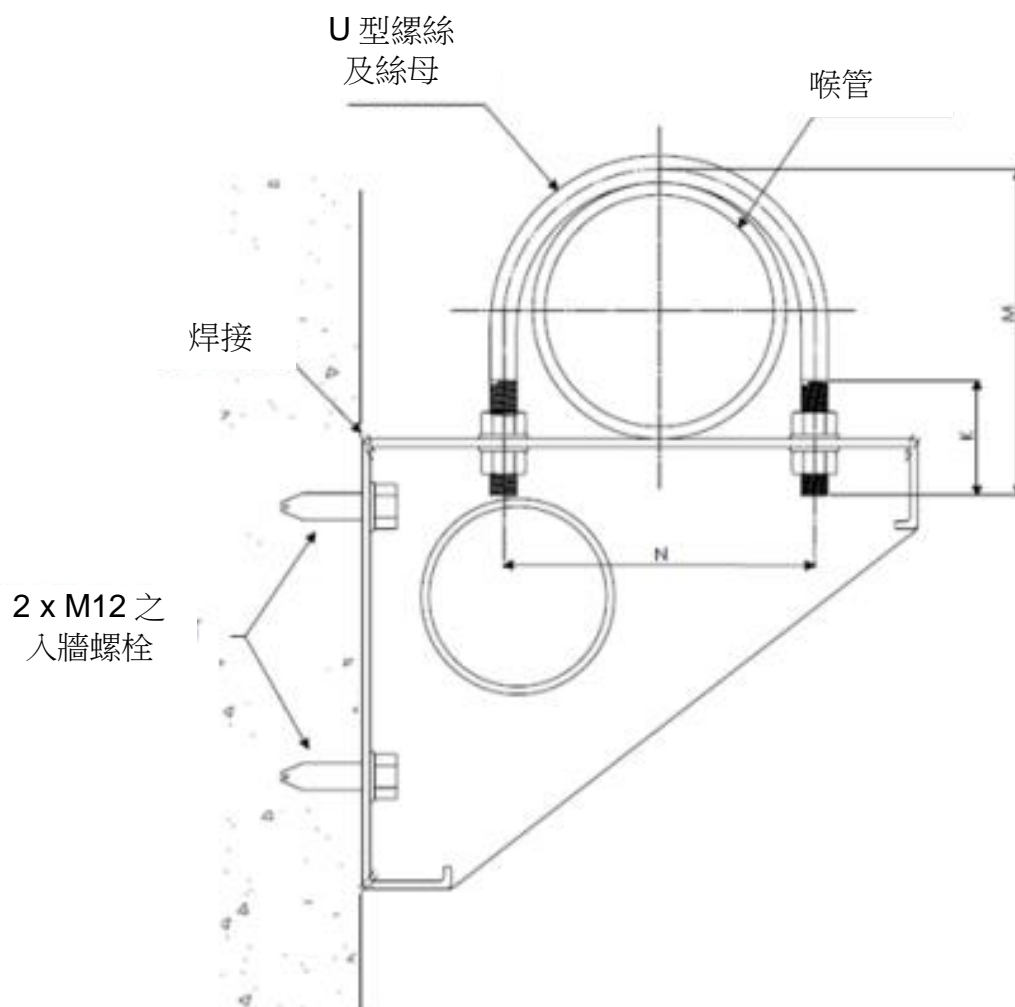


圖 11 – 典型水平煤氣管道之支承(G)

標定管徑：  
200mm (8") – 300mm (12") 水平管道

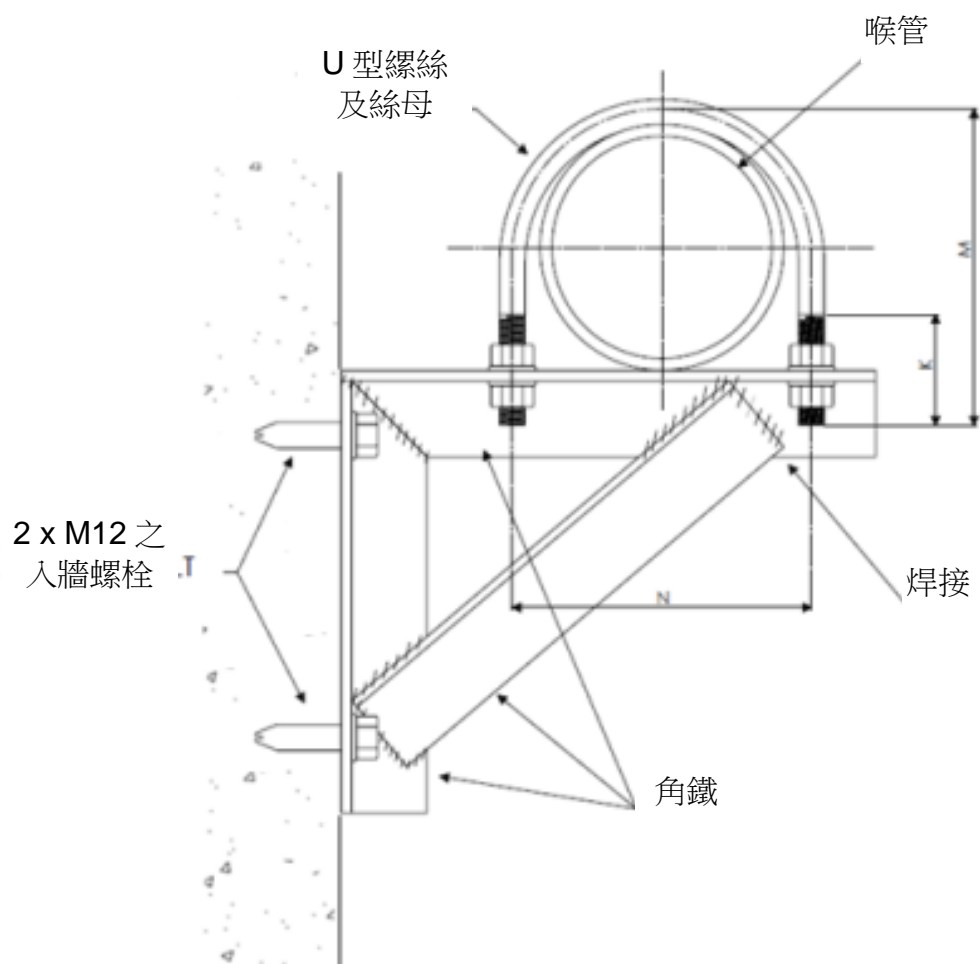


圖 12 – 典型水平煤氣管道之支承 (H)

## 天花結構

標定管徑：  
80mm (3") – 150mm (6") 水平管道

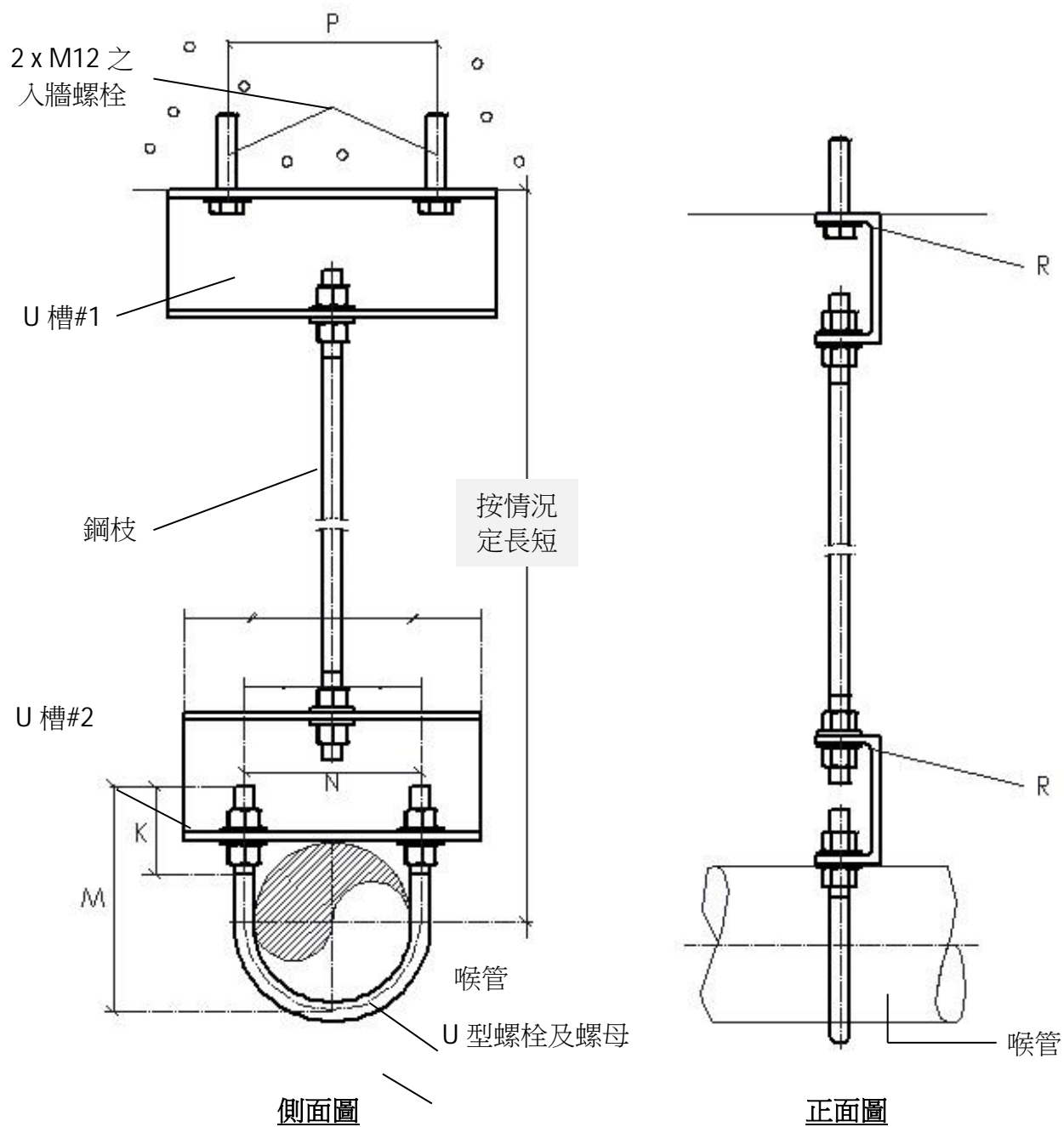


圖 13 - 典型水平煤氣管道之支承 (I)

標定管徑：

80mm (3") – 150mm (6") 水平管道

80mm (3") – 300mm (12") 垂直管道

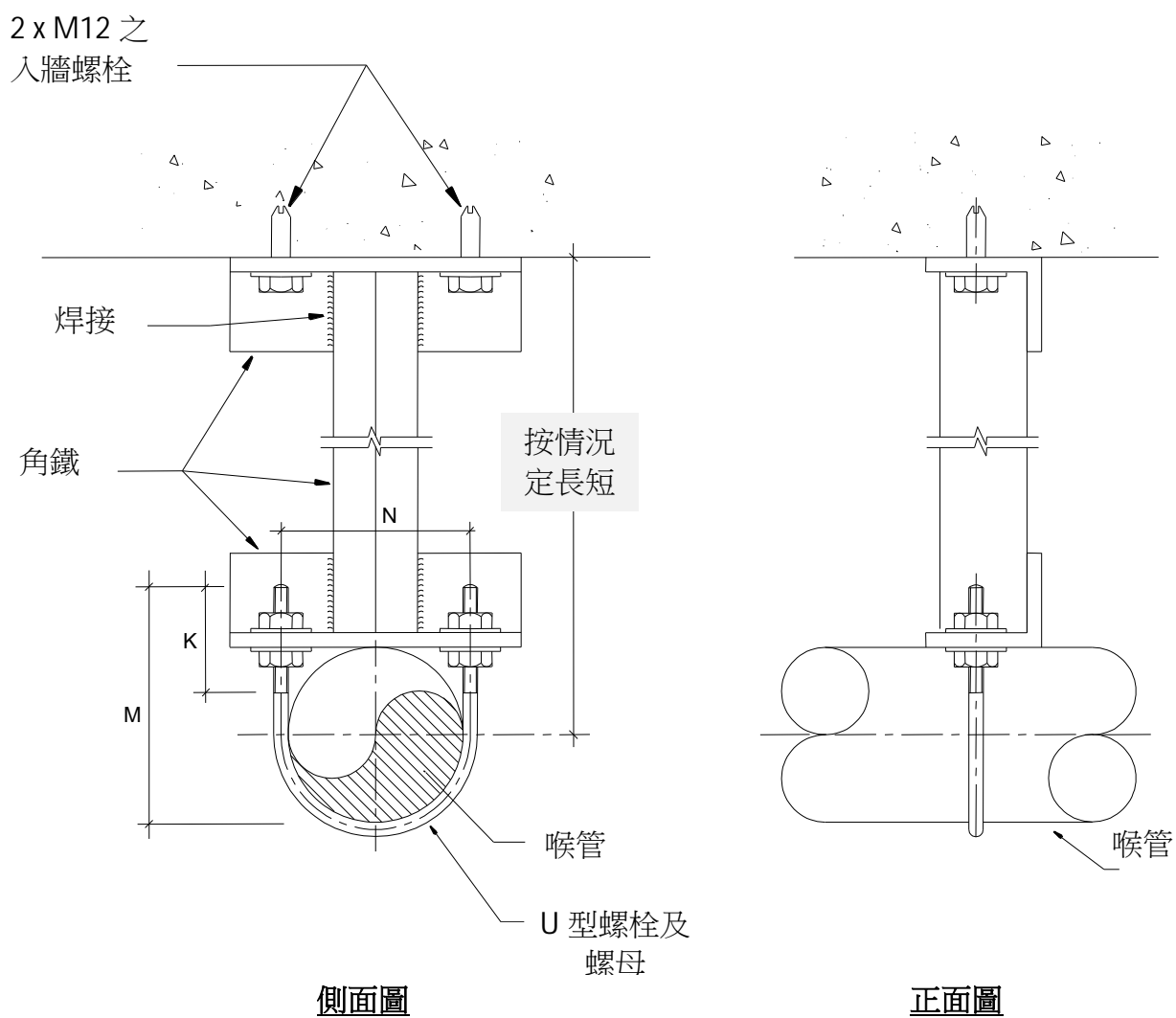


圖 14 - 典型煤氣管道之支承(J)