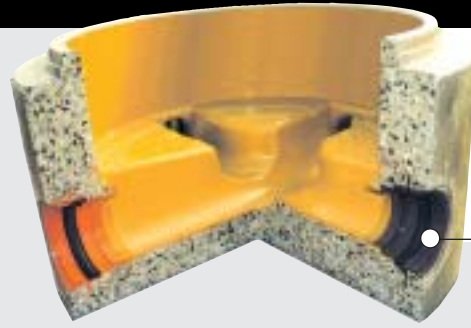




GU LINER SYSTEMS

THE ONLY SOLUTION

GUARANTEED QUALITY from base to cover!



FACTS

MICROBIAL INDUCED CONCRETE CORROSION (MICC)

has been apparent in concrete manholes and related sanitary sewer structures since the mid 1940's, and is on the increase.

MICC occurs when sulfuric acid, generated from raw sewage, reacts with cementitious material to diminish the integrity of concrete manhole bases and related structures. Hydrogen sulfide corrosion in anaerobic and aerobic forms has the capacity to severely damage concrete manhole structures. Utility operators, civil engineers and the precast concrete industry everywhere have accepted this as fact.

Two forms of **MICROBIAL SULFUR METABOLISM ATTACK (MSMA)** are responsible for the corrosive action and deterioration of the concrete structure.

One form of **MSMA** is a process by which hydrogen sulfide is produced by anaerobic bacteria occurring below the flow line. This reaction becomes increasingly prevalent in systems with flat sewer slopes producing oxygen deficient or septic sewage, long detention times in force mains, wet wells or surcharging gravity sewers.

The second form of **MSMA** is an aerobic process in which oxidized hydrogen sulfide produces sulfuric acid above the flow line. The rate of corrosion accelerates due to turbulence created by steep slopes, high flow velocities, drop connections, hydraulic jumps and poor channel design effecting riser sections, cones, flat slab tops and adjustment chimneys.

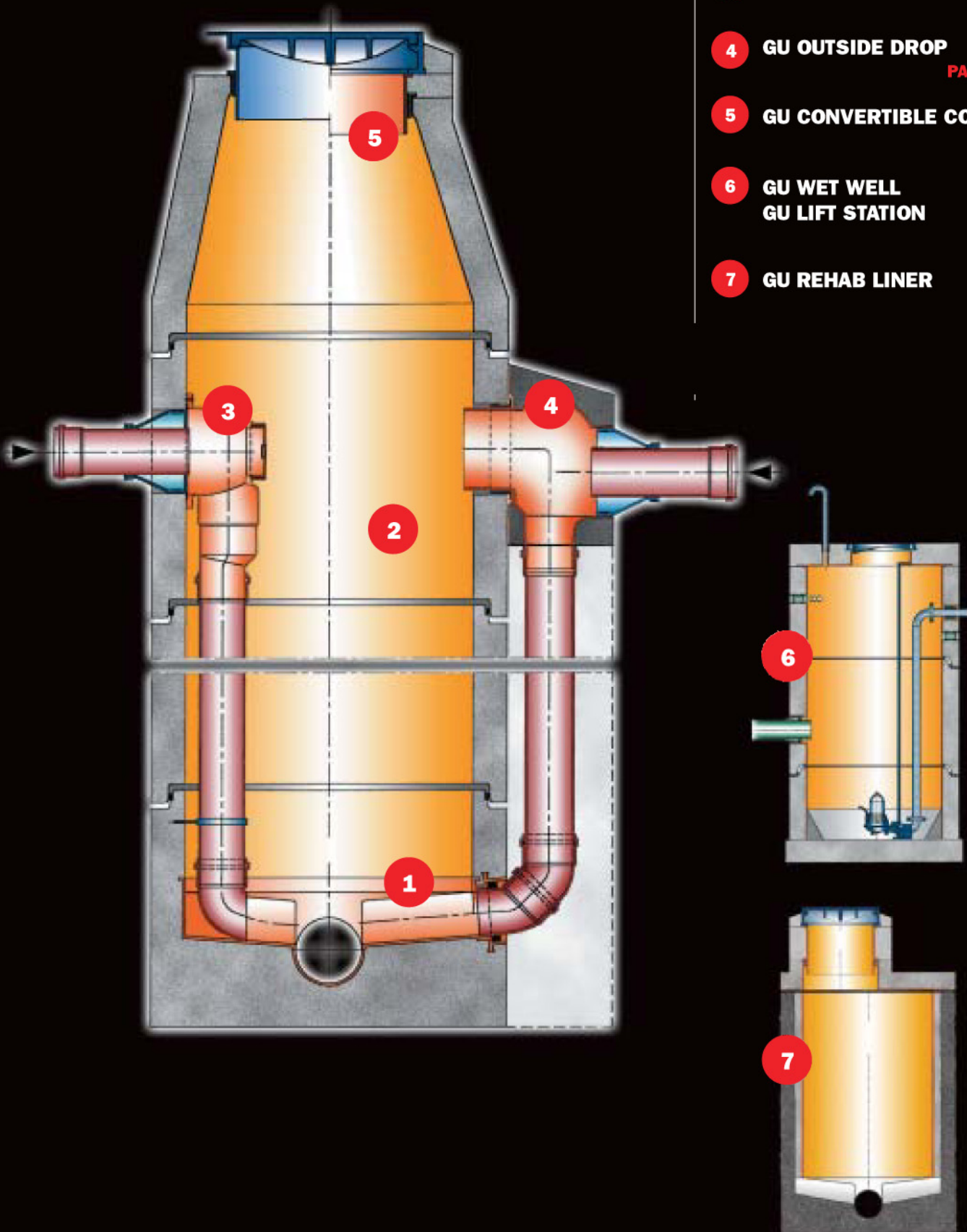
Engineers will specify corrosion resistant pipe or some form of pipe protection, but neglect to specify protection for the concrete structure in the sewer system.

The time is at hand to demand an all-encompassing state of the art lined manhole system.

SOLUTION

- Internationally proven, the **GU LINER SYSTEMS** offer the most complete, versatile design and manufacture of corrosion resistant, watertight and maintenance reducing, municipal sanitary sewer manholes.
- Utilities / Civil engineers like/prefer **GU LINER SYSTEMS** because of the unique protection against the corrosion and abrasion of wastewater while eliminating turbulence because of "factory precision", smooth, nonporous flow channels, and accurate pipe connection invert alignment.
- Precasters like/prefer **GU LINER SYSTEMS** because they can manufacture a manhole base efficiently - coring of holes and hiring someone to do old-fashioned brick and mortar benching is a thing of the past.
- Contractors like the ease of installation. No special welding or field applicator personnel to wait on. Once the **GU MANHOLE BASE** is set, it is ready to be put into service. GU Bells provide watertight connections with no need to supply anything else.

GU - PRODUCTS:



- 1** GU MANHOLE BASE LINER **PAGE 4/5**
- 2** GU RISER LINER **PAGE 6/7**
- 3** GU INSIDE DROP **PAGE 8/9**
- 4** GU OUTSIDE DROP **PAGE 10/11**
- 5** GU CONVERTIBLE COLLAR **PAGE 12**
- 6** GU WET WELL
GU LIFT STATION **PAGE 13**
- 7** GU REHAB LINER **PAGE 14**

The measure of all things...

Modern manhole production can not be accomplished without **GU MANHOLE BASE LINERS**. These liners are internationally recognized as state-of-art technology. An infrastructure project without the benefits of **GU MANHOLE BASE LINERS** will lag behind modern developements.

The **GU MANHOLE BASE** is not an alternative to conventional channel liners. It is the only solution that ensures perfect results - continuous system wide quality.

The **GU MANHOLE BASE** provides quality protection through the manhole base with the same design quality as modern sewer pipe materials



**non-
skid
surface**

**made of
wastewater
resistant plastic**

Unique protection against corrosion and abrasion of wastewater while eliminating turbulence because of "factory precision" - smooth, nonporous flow channels and accurate pipe connection invert alignment.

GU MANHOLE BASE

As evidenced by the anaerobic process the eventual disintegration of a concrete/mortar channeled manhole base is the result of hydrogen sulfide attack. More aggressive corrosion can be expected when septic conditions exist, which may result in leaking pipe connections. Other contributing factors such as drop connections or a large number of entry points introduced into the structure create more acid corrosion problems.

The GU MANHOLE BASE is the ONLY SOLUTION to provide complete corrosion protection for the entire manhole base.

The **GU MANHOLE BASE** is a molded, wastewater resistant plastic liner of reinforced polymer with a thickness range from .12" - .20" (3-5mm), mechanically bonded with the concrete base structure during the precast concrete process.

Encompassing the entire interior configuration and surface of the manhole base in one piece, the **GU BASE LINER** demonstrates design criteria essential for long term manhole protection and efficient wastewater transmission.

The ingeniously conceived design of the **GU MANHOLE BASE LINER** rules out several possible sources of errors in manhole base production insuring layout right from the start. The design makes manhole base production and installation easier than conventional products.

one...



Back side with exposed angular aggregate and wire coils for a strong mechanical bond to the concrete.

two...



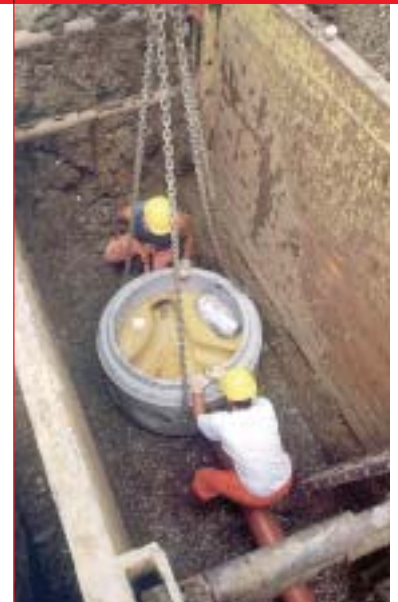
Cast "upside down" on a support cone with monolithically poured concrete around.

three...



The monolithically construction makes application easy & safe
(GU MANHOLE BASE shown with standard 3" skirt)

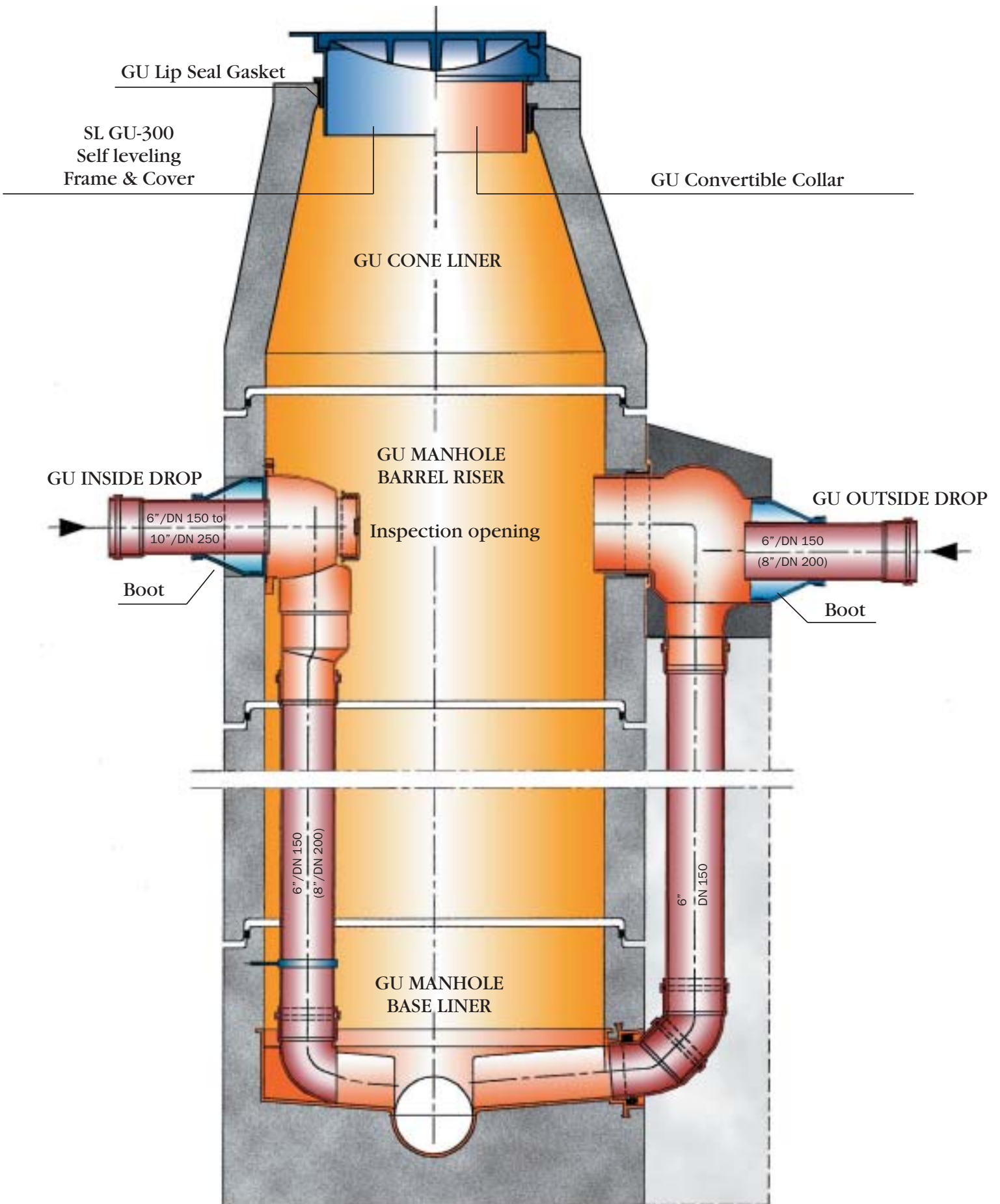
...and go!



The pipe-specific bell design ensures watertight connection between the **GU MANHOLE BASE** and the pipe system, regardless of changes in direction and gradient. The result is a perfect invert to the channel alignment - everytime! When pipe stubs are used, the compression seal gasket ensures an additional flexible connection with allowance for pipe transition and tension-free tolerance for various settlement phenomena.



Because the GU lined manhole is formed upside down, no reworking is required. This means quick and safe production with attractive cost savings. Conventional manhole bases, especially those with inferior mortar quality benching, are subject to attack from aggressive waste water and will require expensive repair work. With GU lined manhole bases such problems are a thing of the past.



Consequent results

The concept behind the **GU MANHOLE BASE LINER** has been developed in a consistent manner to guarantee successful results. The GU LINER SYSTEMS are the logical progression in the development of sanitary sewer systems.

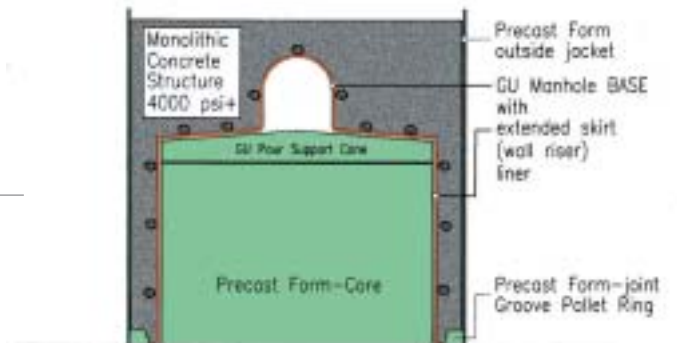
GU LINERS for **MANHOLE RISER SECTIONS** and **LIFT STATIONS** are manufactured with wastewater resistant plastic (FRP or HDPE) providing complete protection for precast concrete structures from the corrosive effects of oxidizing hydrogen sulfide.

While standard **GU BASE LINER** production allows for a three inch high vertical sidewall returning into the circumference of the manhole base, extensions of this "skirt" may be integrally molded with the base liner in lengths exceeding fifty-two inches. This permits the monolithic construction of a fully lined manhole without joints which require only "topping-off" the structure with **GU CONE** or **FLAT SLAB TOP LINER**.

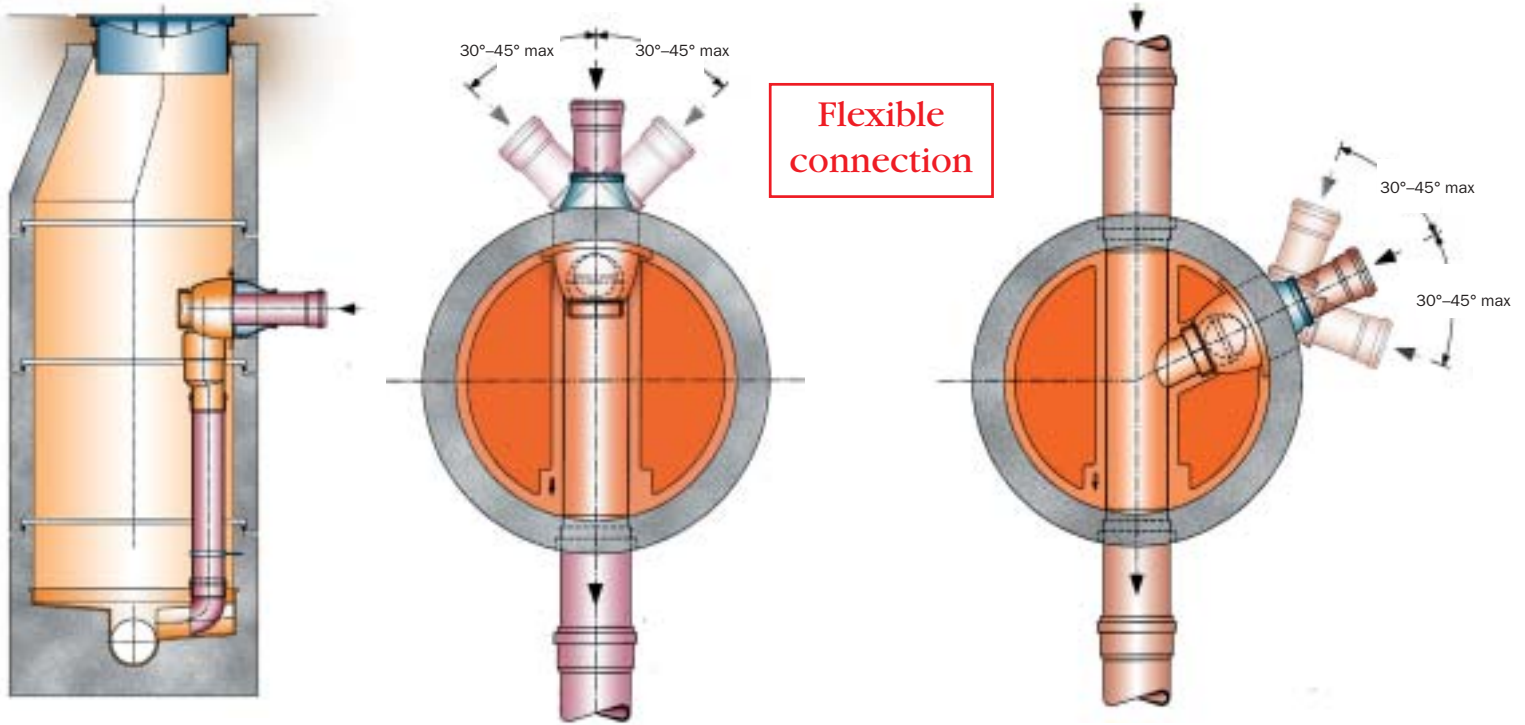
A high strength mechanical bond with concrete is achieved by using aggregate and steel lattice or similar anchoring systems. Pipe penetrations are molded at the appropriate location during manufacturing. This negates the need to field core and attach ancillary connections later, and at the same time reduces installation cost. Again, the system begins to operate sooner.

Concrete is monolithically poured around the liner while it is supported in an inverted position ensuring the utility of a minimum 4000 P.S.I. monolithic casting. A high strength mechanical bond between liner and concrete is achieved by way of a well proven interface, consisting of specifically sized clean aggregate and steel coil/lattice bonded to the back side of the liner. With vibrated concrete attaching itself to this continuous multi-faceted bonding medium, intruding forces of groundwater backpressure is not a concern.

As vacuum testing of manholes for watertight integrity becomes the method of choice by utility inspectors, the marriage between supporting precast concrete and **GU LINER SYSTEMS** is not in question. It works!



GU CONE and GU CONVERTIBLE COLLAR



Application: The GU INSIDE DROP INLET serves to overcome elevation differences between an incoming wastewater connection and the manhole base. This device reduces wastewater inflow energy and lessens turbulent entry into main channel flow, will reduce H2S emissions, odor and subsequent erosion / corrosion of manhole structure.

Design: Incorporates mounting flange and gasket to mount against the inside radius of the manhole riser. Available is an optional corrosion resistant FR.P. Adaptor used with Rubber Boot Seal mounting for cored hole in Lined Concrete Barrel Riser and PVC / FR.P. Pipe Riser Manhole. TYPE 370 - Suitable for mounting in manholes, 48", 54"* and 60" Dia.

Construction: Molded Polyethylene.

Gasket: "O" ring design of polyisoprene. 40-45 Durometer - approximately 1" diameter.

Mounting: **Precast Concrete / Masonry Manhole:** The GU INSIDE DROP INLET may be bolted to interior of manhole wall using four 3/8" dia. stainless steel wedge anchors or threaded stainless steel rod / epoxy bonded anchors.

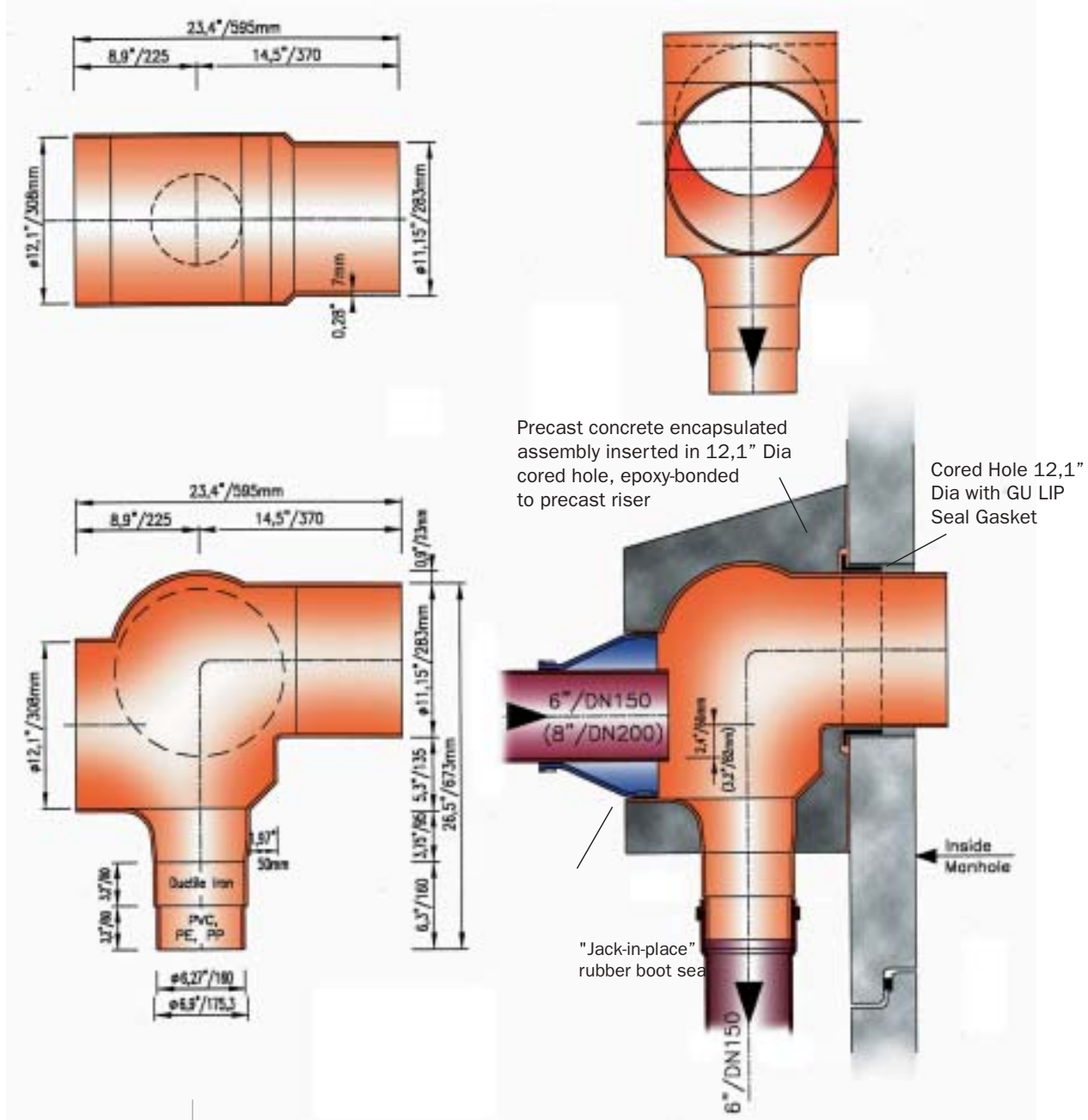
Important note for precast concrete structures with integral liners
All mechanical anchor attachments through liner surfaces
must be sealed with an elastomeric sealant approved by the "liner manufacturer".

Inlet Connection: Type 370 - Will accept 6", 8", or 10" incoming gravity line connected with flexible connectors (boot). Maximum diameter of cored hole is 14.5". It is recommended that a 10" or 12" cored hole be used "jack in place" flexible connectors (rubber boots) on 6" and 8" inlets and a 14" cored be used for "jack in place" flexible connectors (rubber boots) on 10" inlets.

Drop Pipe Connection: Will accept bell and gasket end of 6" or 8" PVC SDR26 / SDR35 gravity sewer pipe and elbow as the vertical conduit inside the manhole structure to direct flow into manhole base main channel.

Cleanout / Inspection Cap: Threaded type, which may be modified to serve as a half dam by cutting out a "half - moon" shaped opening in upper half of the cap center. Take care not to damage cap threads. A stainless steel cable or chain may also be attached to cap and to one of the threaded wedge anchors to prevent accidental loss after installation.

Note: Drop pipe, threaded wedge anchors, stainless steel cable / chain clamps/saddles, and elbows, supplied by others.



Application: The GU OUTSIDE DROP serves to overcome elevation and approach angle differences between an incoming wastewater connection and the manhole. Allows for flexible watertight connections with up to 45° deflection of inlet pipe. This device reduces wastewater inflow energy and lessens turbulent entry into main channel flow, will reduce H₂S emissions, odor and subsequent erosion / corrosion of manhole structure.

Design: Incorporates mounting flange and gasket to mount through the outside surface of the manhole riser.

Construction: Molded Polyethylene

Gasket: GU LIP SEAL design of polyisoprene, 40-45 durometer for approximately 0,5" annular space.

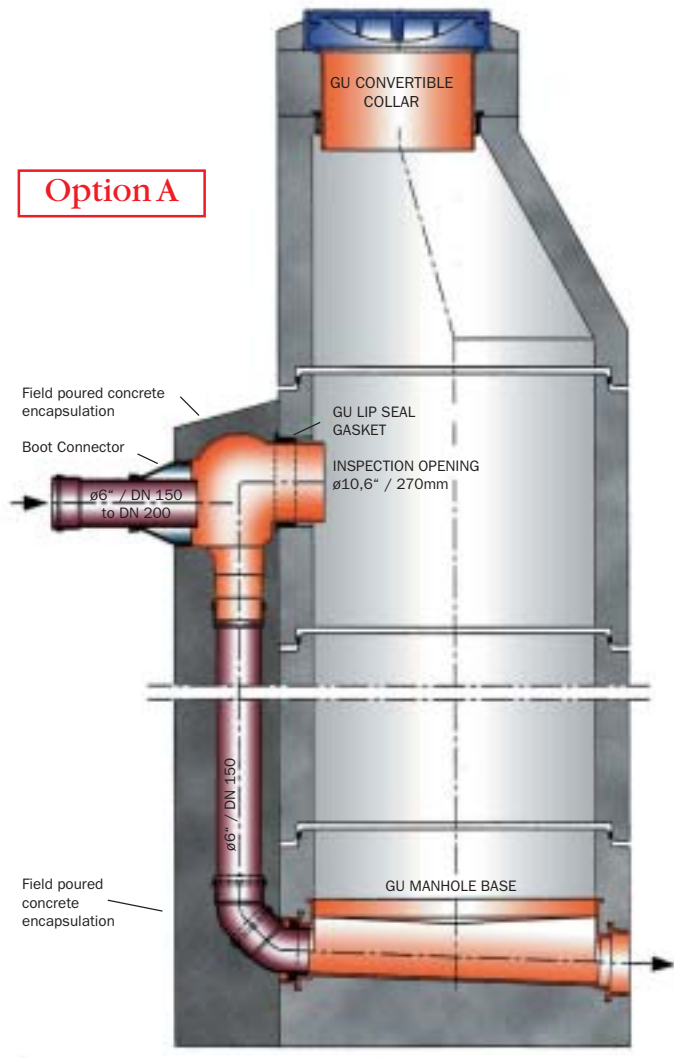
Installation: Precast Concrete / Masonry Manhole: The GU OUTSIDE DROP may be mounted on exterior of manhole through cored 12,1" Dia hole encapsulated in concrete either as a precast concrete assembly or as a field poured concrete construction.

Inlet Connection: Will accept 6" (DN 150) or 8" (DN 200) incoming gravity line connected with flexible Boot-Connectors with mounting acces of 12,1" Dia.

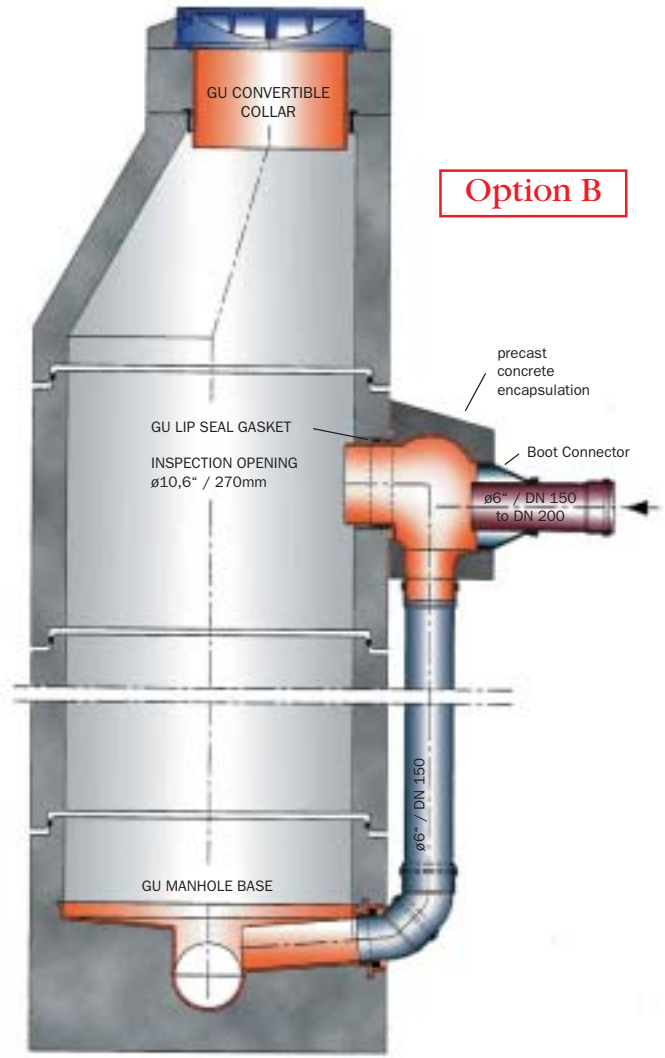
Drop Pipe Connection: Connects to 6" (DN 150) either PVC- or Ductile Iron Pipe.

Cleanout / Inspection Opening: Larger opening allows for thorough visual inspection and maintenance access.

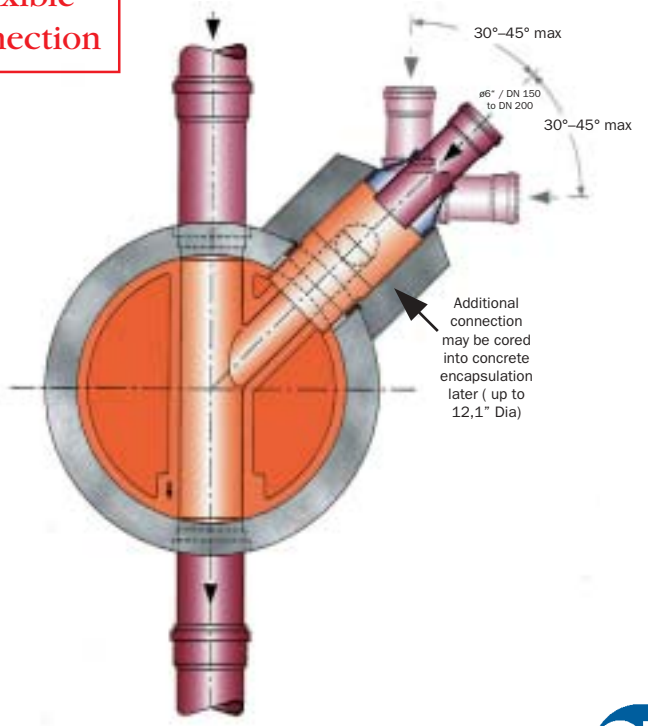
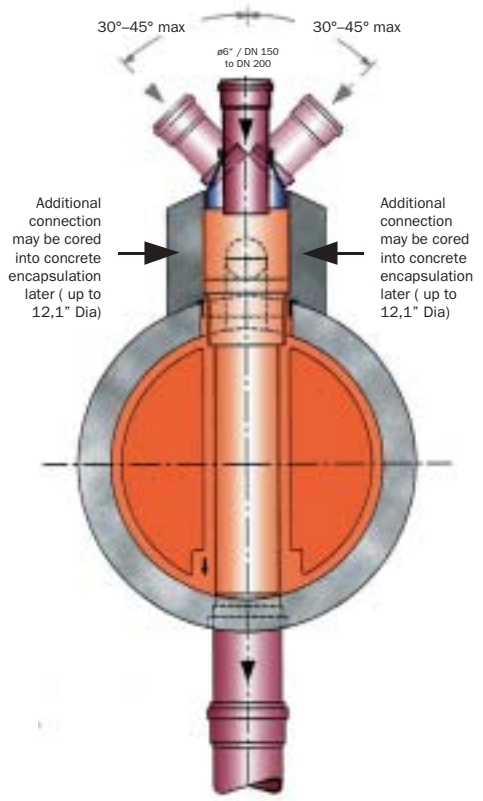
Option A



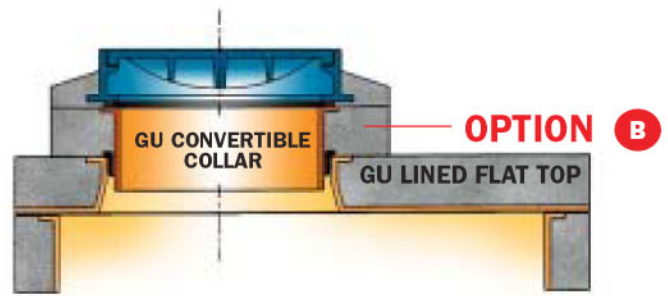
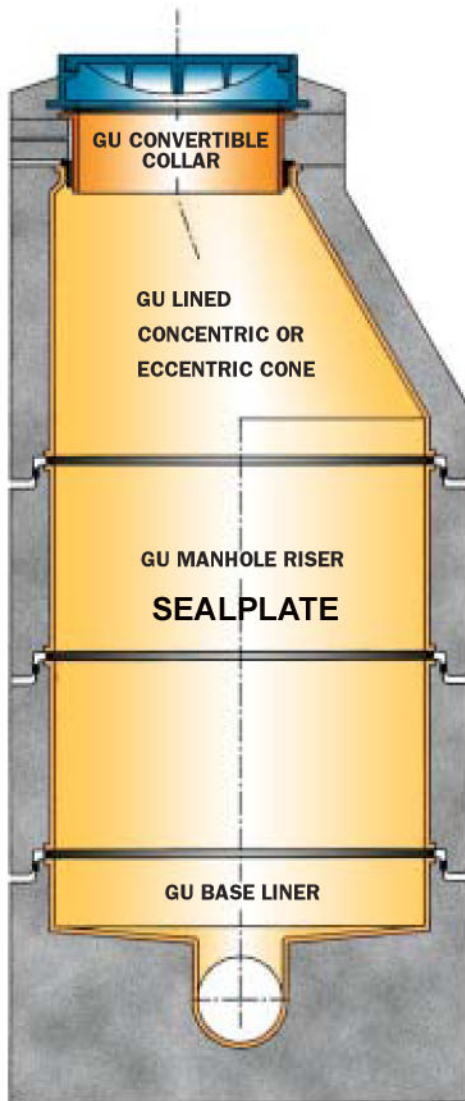
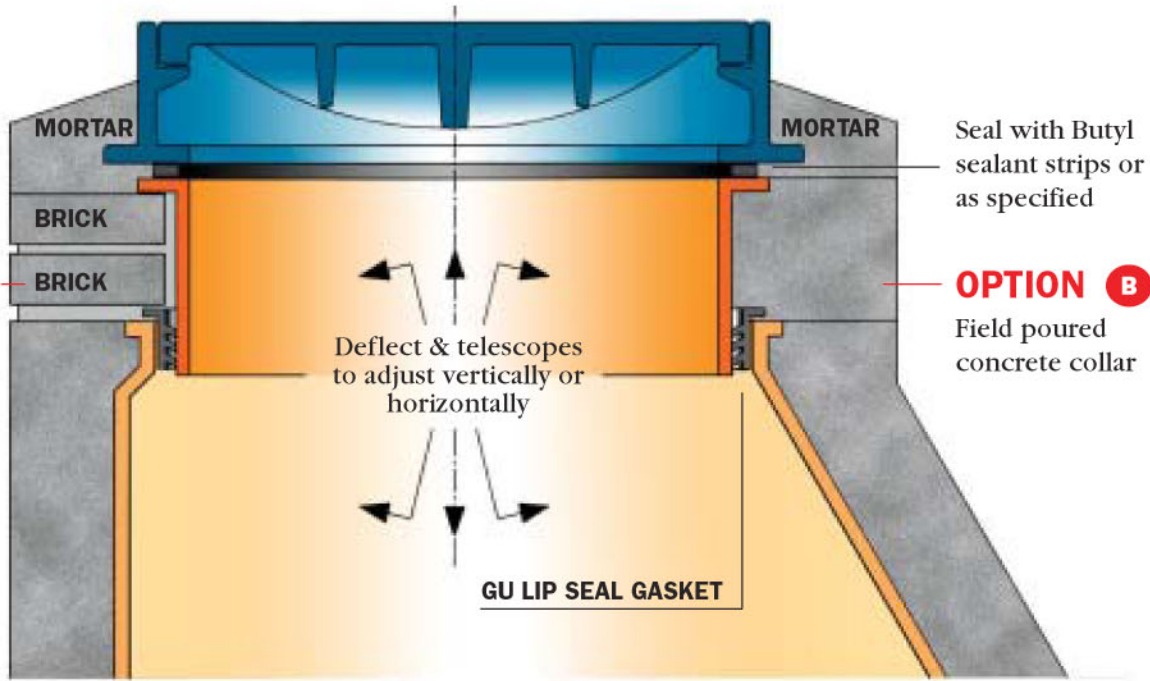
Option B



Flexible connection



OPTION A
Brick masonry or precast concrete grade rings @ 25" I.D.

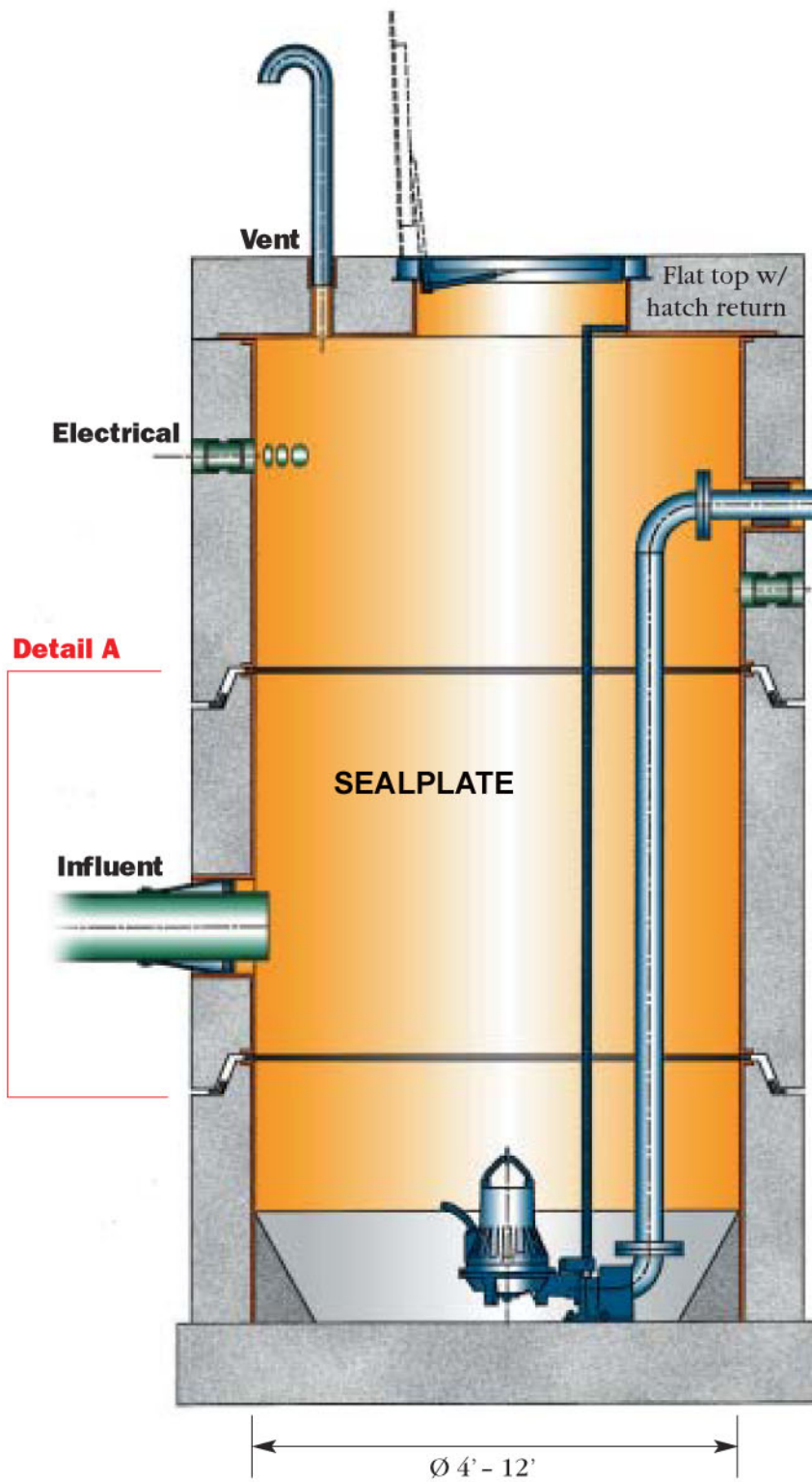


The advanced solution to Brick Adjustments.

- Fast and easy installation
- No grinding or cutting necessary
- Effortless incremental adjustments possible
- Water tight lip seal gasket

The flexible watertight compression seal gasket allows accurate manhole frame adjustments, in order to conform to pavement elevation and slope.





Detail A

Detail A



Vent (as specified)

GU Bell & Gasket for Dip or PVC coupler assembly

Electrical

PVC Sch 80

Influent

GU Liner Sleeve w/ Rubber boot

Discharge Outlet

GU Liner Sleeve w/ either Link seal or Rubber boot

Drain

PVC Sch 80

OPTION

1

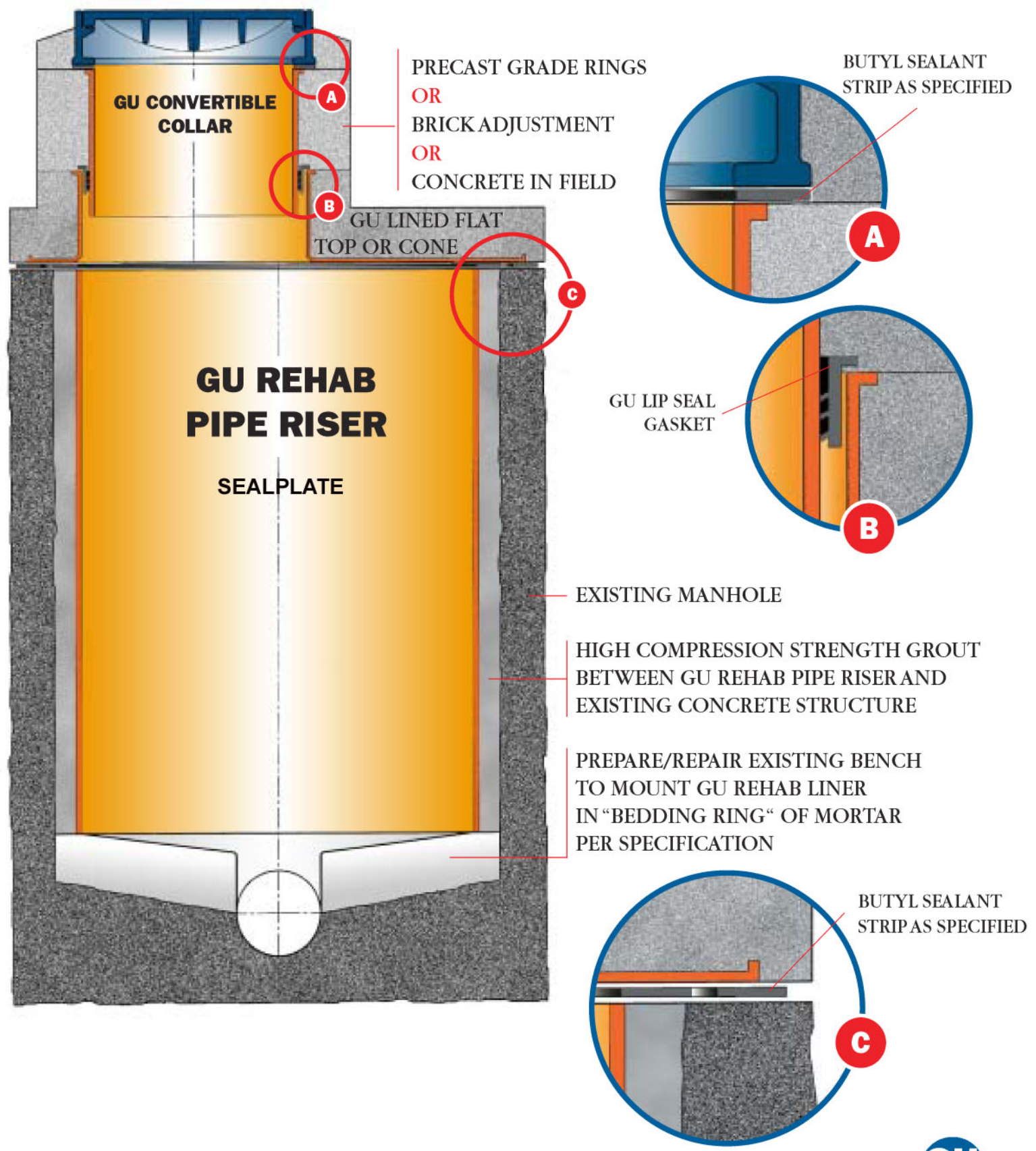
2



"Double" Butyl Sealant Joint

Mortar Type

WITH MORTAR CHANNEL/BENCH AND PIPE RISER WITH BUTYL STRIPS ON TOP



PRECAST GRADE RINGS
OR
BRICK ADJUSTMENT
OR
CONCRETE IN FIELD

BUTYL SEALANT
STRIP AS SPECIFIED

**GU REHAB
PIPE RISER**

SEALPLATE

GU LIP SEAL
GASKET

EXISTING MANHOLE

HIGH COMPRESSION STRENGTH GROUT
BETWEEN GU REHAB PIPE RISER AND
EXISTING CONCRETE STRUCTURE

PREPARE/REPAIR EXISTING BENCH
TO MOUNT GU REHAB LINER
IN "BEDDING RING" OF MORTAR
PER SPECIFICATION

BUTYL SEALANT
STRIP AS SPECIFIED



