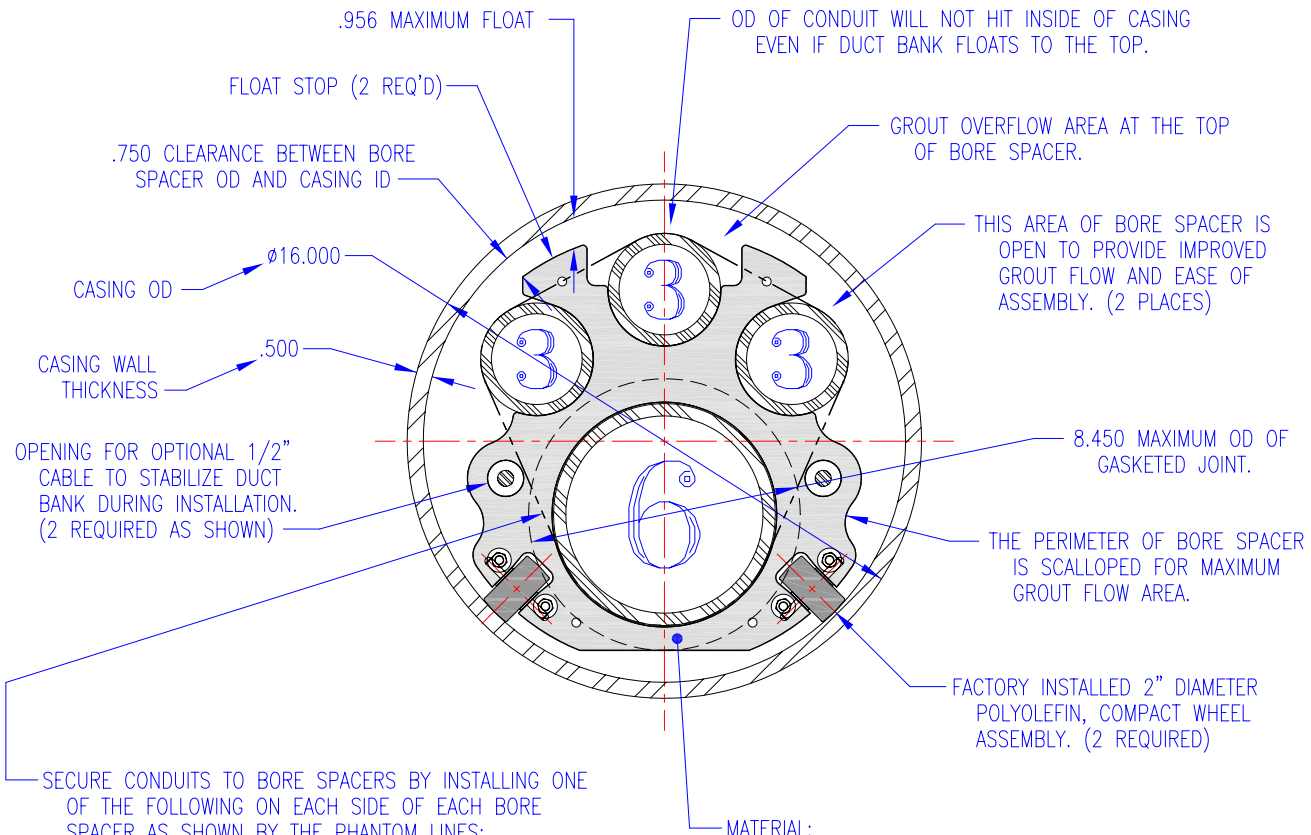


MINIMUM DISTANCE BETWEEN CONDUITS	
CONDUIT SIZE	MIN. DISTANCE
3 & 3	1.000
3 & 6	1.000



- NOTES:**
1. USE ONE BORE SPACER FOR EVERY 5 FEET OF DUCT BANK.
 2. THE CASING ID MUST BE SMOOTH AND FREE FROM RIDGES, PROJECTIONS AND SEAMS THAT MIGHT IMPEDE THE ROLLING OF WHEELS.
 3. INSTALL BORE SPACERS PERPENDICULAR TO CONDUITS TO REDUCE THE TENDENCY OF DUCT BANK TO CORKSCREW.
 4. A TROUGH OR FEEDER BRIDGE SHOULD BE CONSTRUCTED AT THE LEADING END OF THE CASING TO SUPPORT SECTIONS OF DUCT BANK AS THEY ARE ASSEMBLED AND PULLED INTO THE CASING.
 5. THIS BORE SPACER IS DESIGNED FOR A CASING THAT IS STRAIGHT AND TRUE.
 6. IT IS POSSIBLE THAT THE DUCT BANK WILL ROTATE (CORKSCREW) AS IT IS PULLED THRU THE CASING UNLESS AN "OFF CENTER WEIGHT TECHNIQUE" OR "STABILIZATION CABLES" ARE USED.
 7. THIS BORE SPACER WILL ACCOMMODATE THE "SINGLE-END" METHOD OF GROUT FILLING.
 8. IT IS ESSENTIAL THAT THE BORE SPACERS ARE HELD IN PLACE RELATIVE TO THE CONDUIT. REASON: AS THE GROUT IS PUMPED INTO THE CASING, THE COMPARTMENTS FORMED BETWEEN THE BORE SPACERS ARE MORE OR LESS FILLED SEQUENTIALLY, PLACING A TEMPORARY THRUST LOAD ON EACH BORE SPACER.
 9. THE DUCT BANK MUST BE HELD IN POSITION AT BOTH ENDS TO ACCOMMODATE POSSIBLE UNEVEN THRUST LOADS THAT MAY BE GENERATED DURING THE GROUTING OPERATION.
 10. WHEN FILLING THE AREA BETWEEN THE CONDUITS AND CASING WITH GROUT, TAKE CARE NOT TO EXCEED THE HYDRAULIC COLLAPSE PRESSURE OF THE CONDUITS.
 11. DEPENDING ON THE GROUT SPECIFIC GRAVITY AND GROUT FLOW, IT IS POSSIBLE THAT THE DUCT BANK WILL FLOAT TO THE TOP OF THE CASING.
 12. ACTUAL QUANTITY OF GROUT USED SHOULD BE MEASURED AND RECORDED.

- SECURE CONDUITS TO BORE SPACERS BY INSTALLING ONE OF THE FOLLOWING ON EACH SIDE OF EACH BORE SPACER AS SHOWN BY THE PHANTOM LINES:
- A. 5/8" WIDE X .030 THICK 201 STAINLESS STEEL BANDS & BUCKLES HAVING A MIN. BREAKING STRENGTH OF 1875 LBS.
 - B. 3/4" WIDE POLYPROPYLENE STRAPPING HAVING A 1400 LB BREAKING STRENGTH, 7% MAX. STRETCH, & STEEL SEALS.

MATERIAL:
 .750 ±.075 THICK HIGH DENSITY POLYETHYLENE (HDPE) SHEETS ARE STRESS RELIEVED
 COLOR: NATURAL WHITE
 TENSILE STRENGTH: 4600 PSI, ELONGATION: 900%
 COMPRESSIVE STRENGTH: 2700 TO 3600 PSI

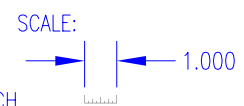
NOTE: ALL DIMENSION ARE IN INCHES.

THIS BORE SPACER DESIGN IS COVERED BY ONE OR MORE PENDING PATENT APPLICATIONS. FURTHER, THIS DRAWING AND PROPRIETARY DESIGN IS SOLELY THE PROPERTY OF UNDERGROUND DEVICES, INC. AND IS SUBMITTED WITH THE UNDERSTANDING THAT IT WILL BE KEPT IN STRICT CONFIDENCE.

THIS INFORMATION IS BASED ON OUR EXPERIENCE TO DATE AND WE BELIEVE IT TO BE RELIABLE. IT IS INTENDED ONLY AS A GUIDE FOR USE AT YOUR DISCRETION AND RISK. WE CANNOT GUARANTEE FAVORABLE RESULTS AND ASSUME NO LIABILITY IN CONNECTION WITH ITS USE OR USE OF THE PRODUCTS DESCRIBED.

**UNDERGROUND DEVICES
 CATALOG NUMBER:
 BS3412W2**

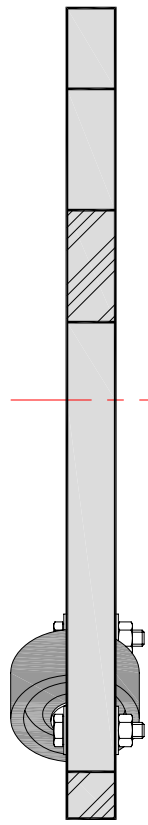
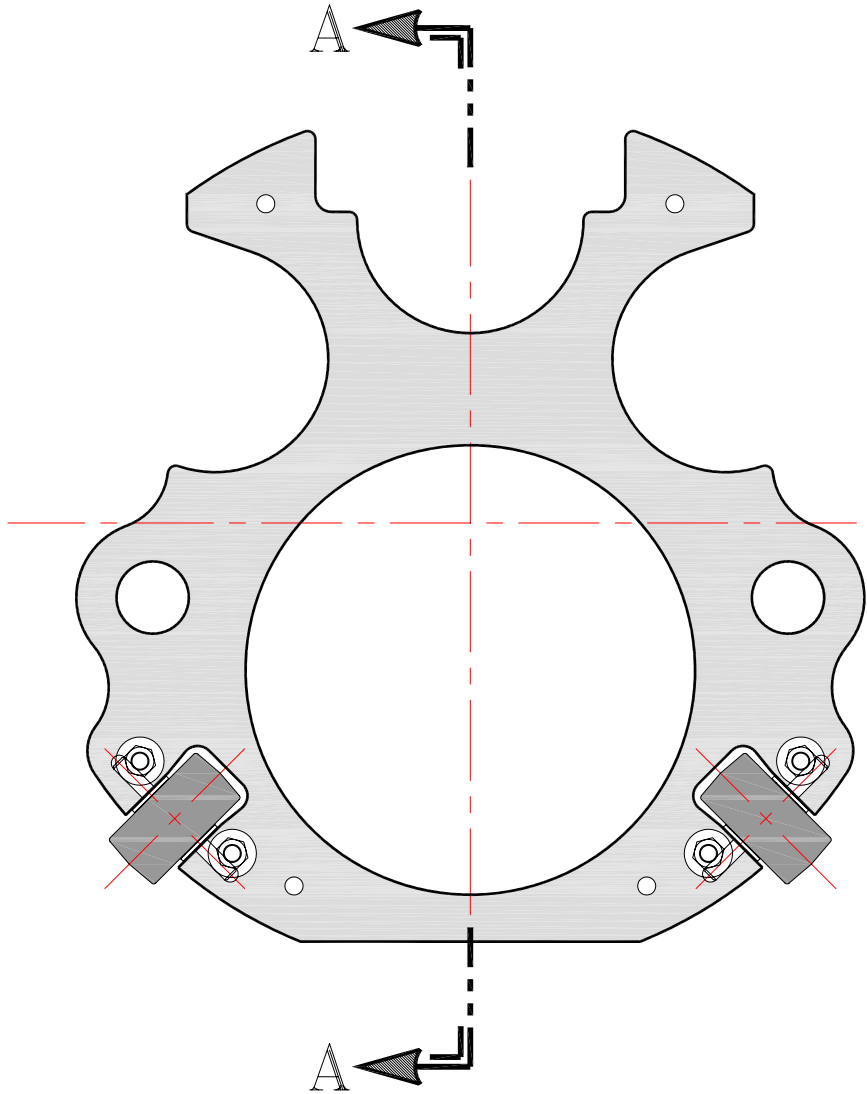
* PATENT PENDING *



1.74 LBS EACH

FULL COMPLEMENT BORE SPACER			
With 3 Ea. 3" (DR11) HDPE Conduits & 1 Ea. 6" DR18 CL150 PVC Pressure Pipe In A 16.000 OD X .500 Wall Steel Casing			
SCALE: See At Left	DESIGNED BY: Alan Armstrong	DETAINED BY: B.Muehlenbeck	CHECKED BY: Don McCoy
DATE: 8-12-04	APPROVED BY:	REVISION C 12-7-05	
DRAWING NUMBER: 90-3412			PAGE 1 OF 3
NORTHBROOK, ILLINOIS 60062 - PHONE: (847) 205-9000			

CONDUIT AND HOLE SIZES				
CONDUIT OD		FULL HOLE DIAMETER		PARTIAL HOLE DIAMETER
NOMINAL	ACTUAL	BANDED	NON-BANDED	
3"	3.500	----	----	3.520
6"	6.900	6.990	----	----



SECTION A-A

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UNDERGROUND DEVICES
CATALOG NUMBER:
BS3412W2

* PATENT PENDING *
 SCALE:



FULL COMPLEMENT BORE SPACER
 With 3 Ea. 3" (DR11) HDPE Conduits & 1 Ea. 6" DR18 CL150 PVC Pressure Pipe In A 16.000 OD X .500 Wall Steel Casing

SCALE: See At Left	DESIGNED BY: Alan Armstrong	DETAILED BY: B.Muehlenbeck	CHECKED BY: Don McCoy
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DRAWING NUMBER: **90-3412**
 PAGE 2 OF 3



PHOTOGRAPH OF ACTUAL PART



DATE: 8-12-04 | DESIGNED BY: Alan Armstrong | DRAWN BY: B. Muehlenbeck | CHECKED BY: [signature] | APPROVED BY: [signature]

UNDERGROUND DEVICES, INC. | DRAWING NUMBER: [blank]