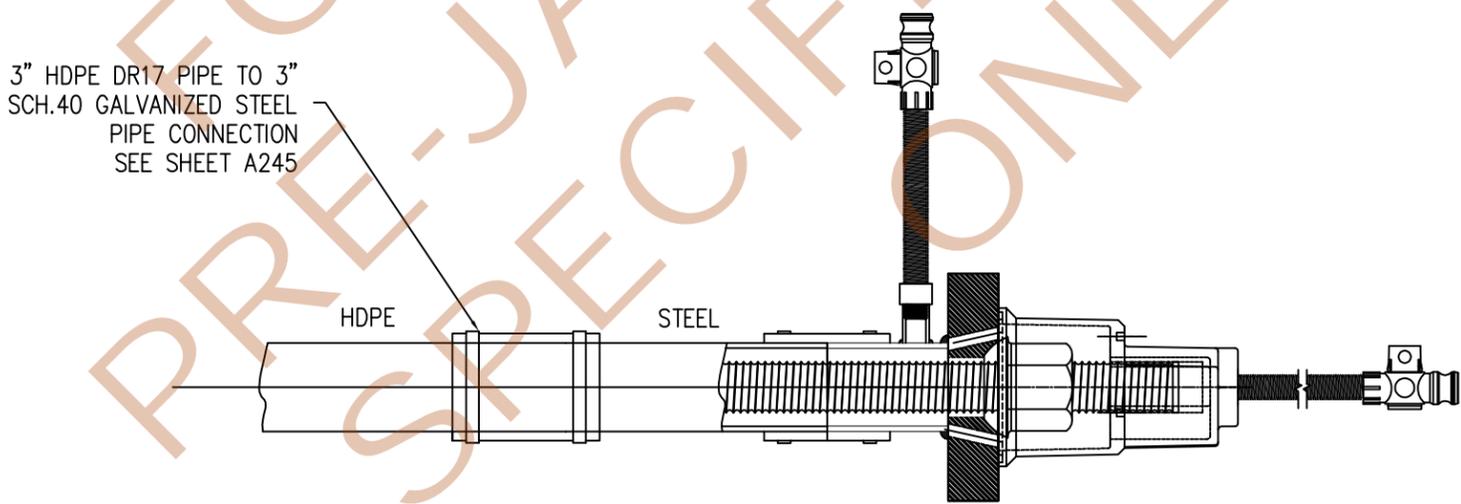


OVERALL ASSEMBLY

* NO PT BAR COUPLER TO BE USED INSIDE THE 3" DUCT OR 3" PIPE



ALTERNATE ASSEMBLY

REV.	DATE	APPROVED FOR CONSTRUCTION	BY	CHK
0	10/17/11			

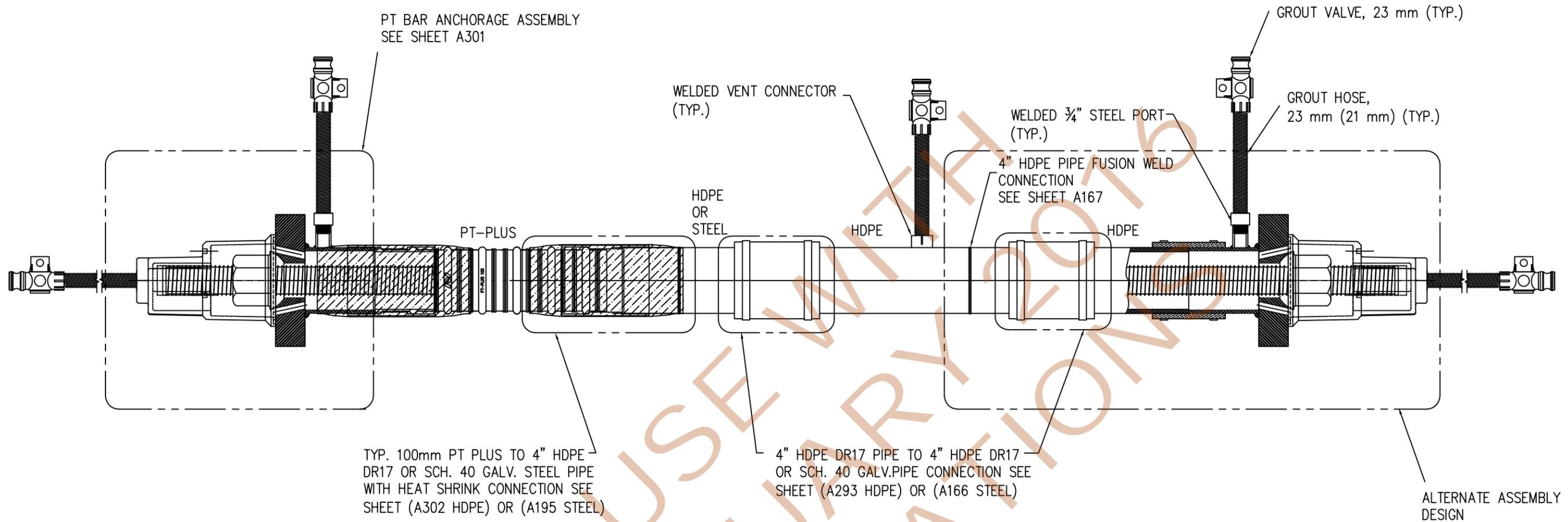
WILLIAMS
FORM ENGINEERING CORP.
280 ANNISTON BLVD, GARDEN HARBOR, NY 11735
PH: 616.868.6620 - FX: 616.868.6668

VSL
7455 NEW RIDGE RD.
HANOVER, MD. 21076
WWW.VSL.NET

DWG. TITLE: 1-3/4" PT BAR ASSEMBLY WITH 3" PIPE
PROJECT: VSL-WILLIAMS FORM ENGINEERING SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

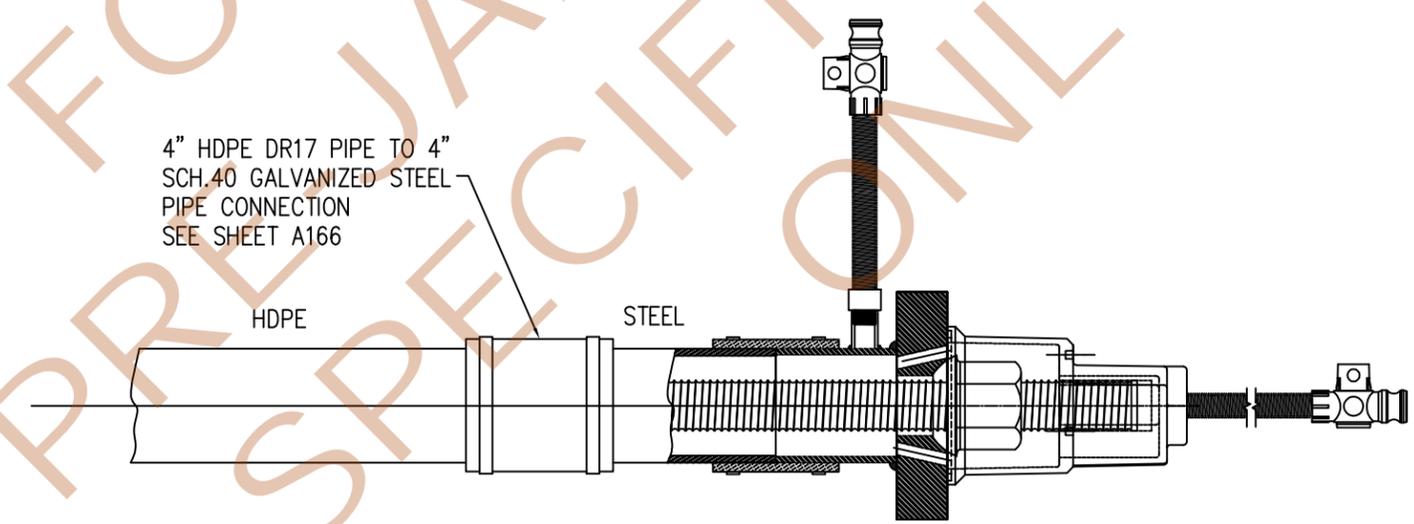
SCALE: NONE
VSL JOB NO.
VSL DWG. NO. A298



TYP. 100mm PT PLUS TO 4" HDPE DR17 OR SCH. 40 GALV. STEEL PIPE WITH HEAT SHRINK CONNECTION SEE SHEET (A302 HDPE) OR (A195 STEEL)

4" HDPE DR17 PIPE TO 4" HDPE DR17 OR SCH. 40 GALV. PIPE CONNECTION SEE SHEET (A293 HDPE) OR (A166 STEEL)

OVERALL ASSEMBLY



ALTERNATE ASSEMBLY

REV.	DATE	BY	CHK
1	01/30/12	TB	DTS
0	01/20/12	TB	DTS

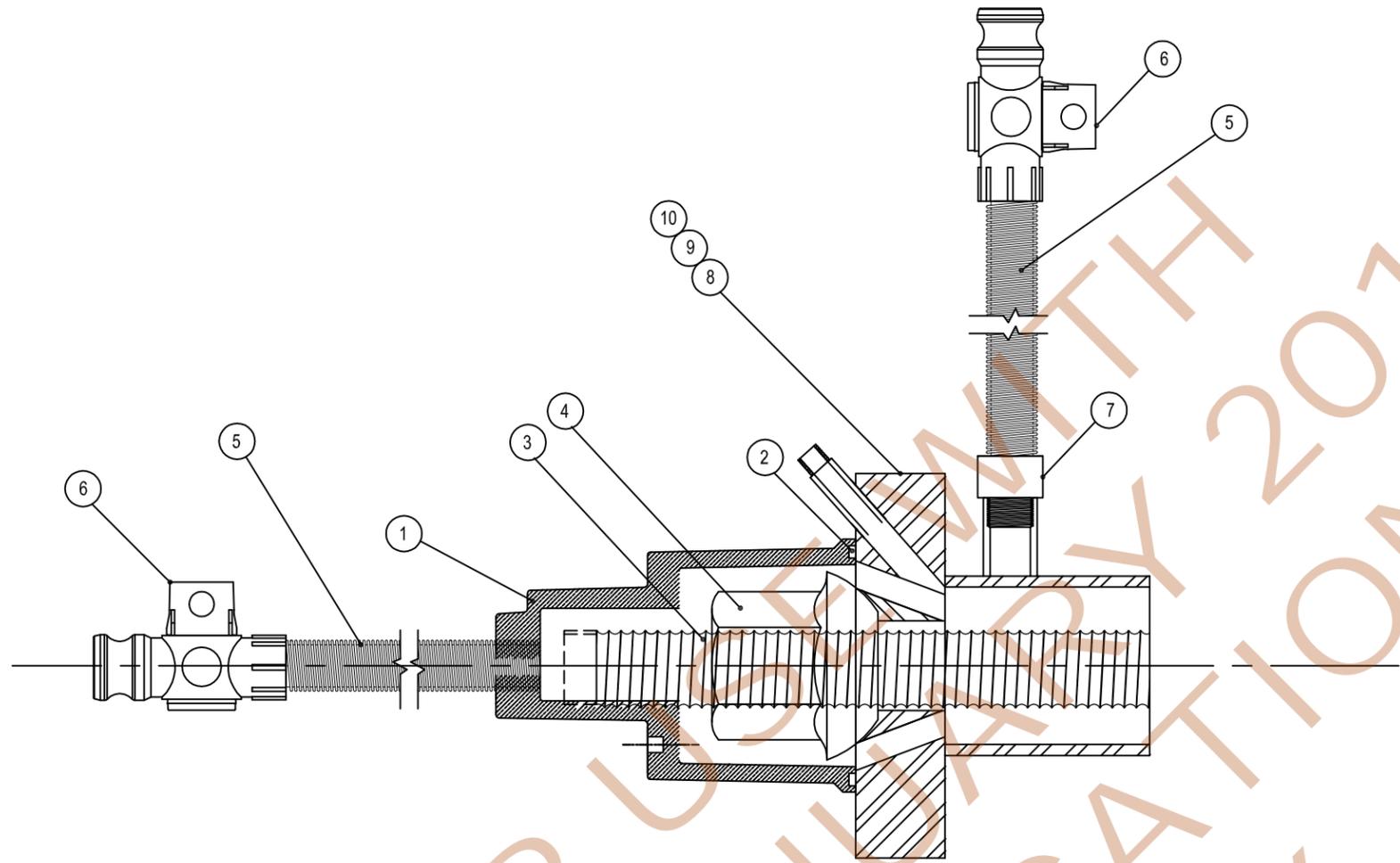
WILLIAMS
FORM ENGINEERING CORP.
280 ANNISTON BLVD. GARDEN HARBOR, NY 11735
PH: 616.652.6220 • FX: 616.652.6266

VSL
7455 NEW RIDGE RD.
HANOVER, MD. 21076
WWW.VSL.NET

DWG. TITLE: 1-3/4" PT BAR ASSEMBLY WITH 4" PIPE
PROJECT: VSL-WILLIAMS FORM ENGINEERING SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO.
VSL DWG. NO. A299



ELEVATION VIEW
ANCHORAGE ASSEMBLY

ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING REFERENCE	INVENTORY NUMBER
10	1	STEEL BEARING PLATE W/ FRONT INSPECTION PORT, GROUT HOLES & 4" SCH. 40 TRUMPET GALV.	ASTM A-36-01, AASHTO M183, ASTM A-53, ASTM A-512, ASTM A-123	JOB SPECIFIC	
9	1	STEEL BEARING PLATE W/ TRUMPET INSPECTION PORT, GROUT HOLES & 3.5" SCH. 10 TRUMPET GALV.	ASTM A-36-01, AASHTO M183, ASTM A-53, ASTM A-512, ASTM A-123	JOB SPECIFIC	
8	1	STEEL BEARING PLATE W/ FRONT INSPECTION PORT, GROUT HOLES & 3" SCH. 40 TRUMPET GALV.	ASTM A-36-01, AASHTO M183, ASTM A-53, ASTM A-512, ASTM A-123	JOB SPECIFIC	
7	1	BEARING PLATE BUSHING 3/4" NPT, 23 mm	P.P.	C675	02DT0316
6	1	GROUT VALVE, 23 mm	P.S.	C589 & C590	02DT0330
5	AR	GROUT HOSE, 23 mm	P.P.	C587	02DT0310
4	1	WMS. 45mm (1 3/4") SPHERICAL HEX NUT	ASTM A-536, 100-70-03, DUCTILE IRON	1B-R7P-003-2	R88-14
3	1	WMS. 45mm (1 3/4") GRADE 150 TYPE II, KSI A.T.B.	ASTM A-722-97,M275	1B-R7P-003-6	R71-14-03600
2	1	WMS NYLON REINFORCED END CAP O-RING	BUNA-N 70 D.	-	-
1	1	WMS NYLON REINFORCED END CAP	ASTM D-4066, S PA-0221/ASTM D5989	1B-R7P-003-7	R78-K1440095

- NOTES: 1) BEARING PLATE DIMENSIONS TO BE DETERMINED BASED ON JOB SPECIFIC CONDITIONS.
 2) BEARING PLATE TRUMPET 3" SCH. 40 TO BE USED WITH 76MM DUCT OR 3" DR17 HDPE PIPE
 3) BEARING PLATE TRUMPET 3.5" SCH. 10 TO BE USED WITH 76MM DUCT
 3) BEARING PLATE TRUMPET 4" SCH. 40 TO BE USED WITH 100MM DUCT OR 4" DR17 HDPE PIPE

REV.	DATE	BY	CHK
0	01/20/12		
		APPROVED FOR CONSTRUCTION	SAN MM
		REVISION	



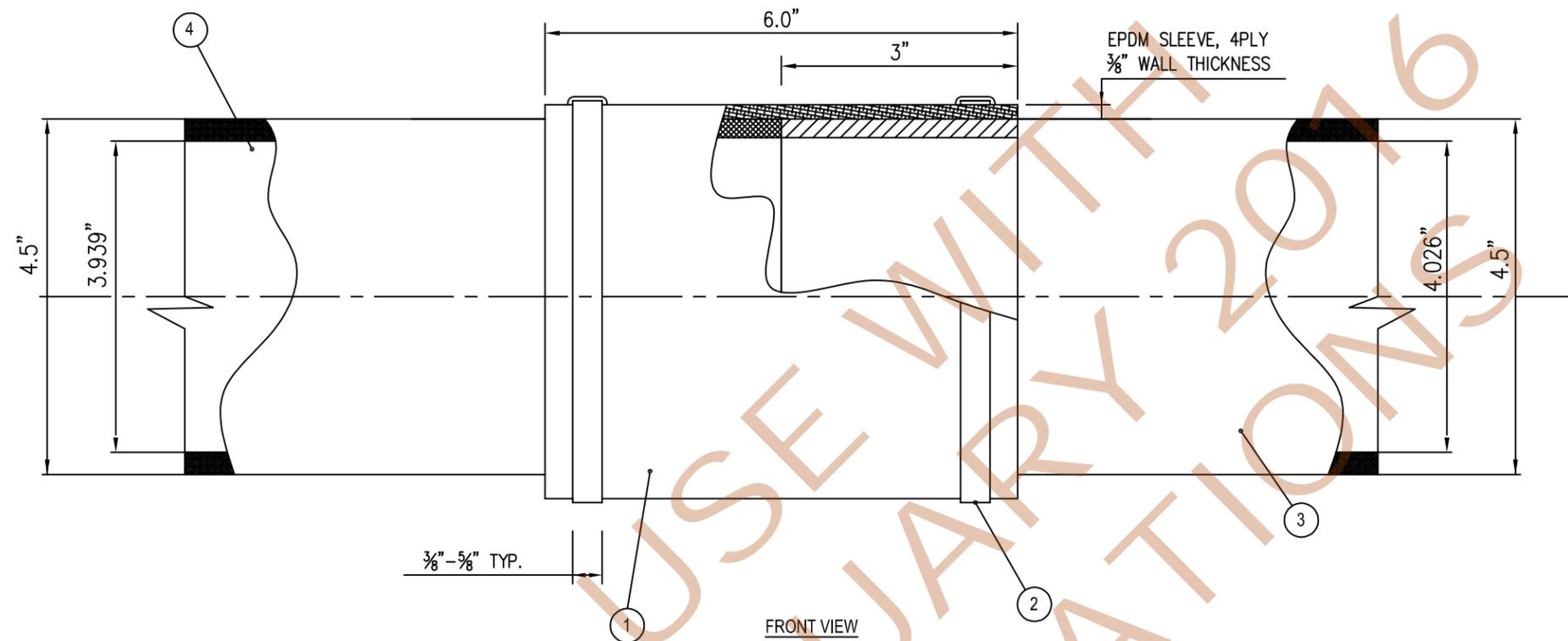
VSL
7455 NEW RIDGE RD.
HANOVER, MD. 21076
WWW.VSL.NET



DWG. TITLE: 1-3/4" PT BAR ANCHORAGE ASSEMBLY
 PROJECT: VSL-WILLIAMS FORM ENGINEERING SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO:
VSL DWG. NO. A301



ITEM	QTY	DESCRIPTION	MATERIAL
4	1	4" HDPE PIPE DR-17	ASTM D3350
3	1	4" SCH. 40 PIPE GALVANIZED	ASTM A53
2	2	STAINLESS STEEL PUNCH LOCK BANDS	ASTM A240 316L
1	1	EPDM SLEEVE	EPDM ASTM D 1171

NOTE:

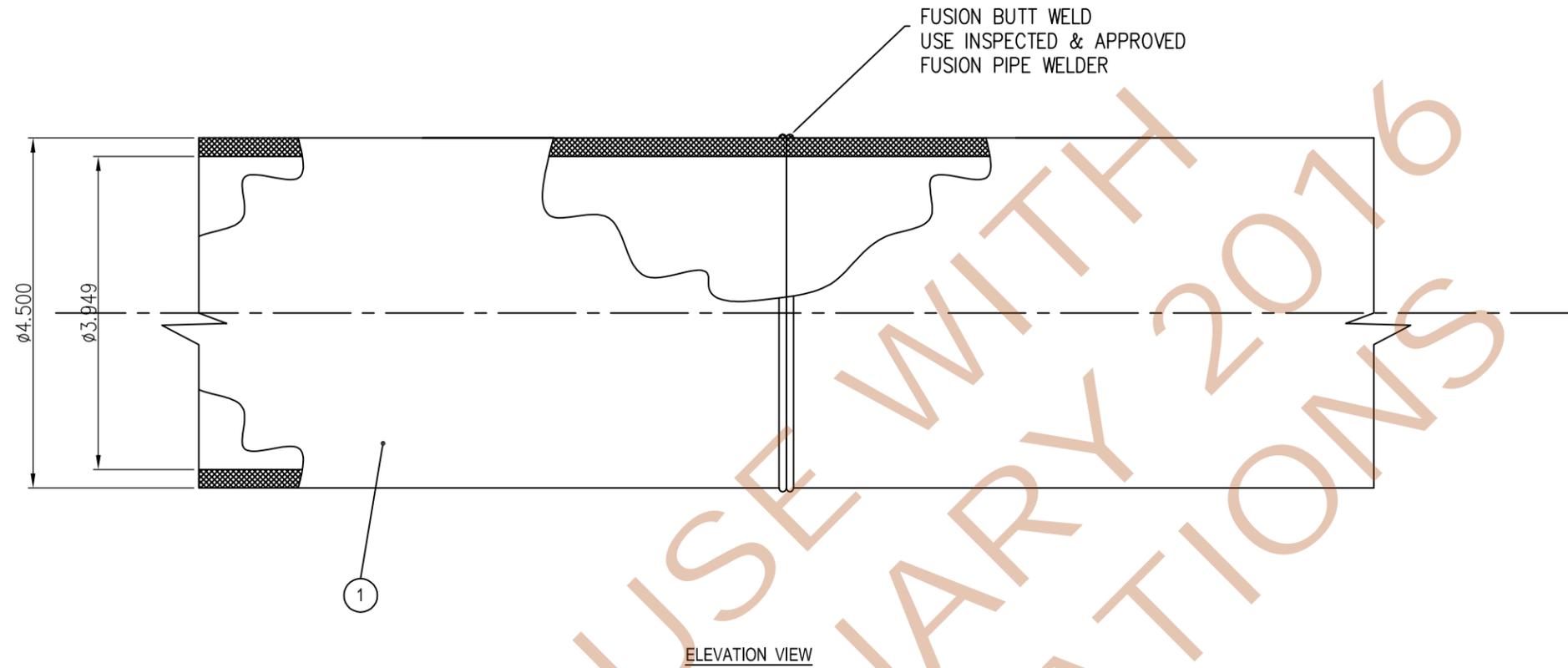
- 1) INSTALL 6" EPDM SLEEVE
- 2) INSTALL 2 SS BAND CLAMPS
- 3) CENTER EPDM SLEEVE OVER THE JOINT
- 4) APPLY 80 TO 120 LBS SEATING FORCE PER PUNCH LOCK.
- 5) EPDM SLEEVE HAS NO TEXT OR MARKINGS. EPDM IS BLACK IN COLOR.
- 6) HDPE PIPE RUNNING LABEL READS: 4" IPS/DR17/DRISCOPEX 4100/PE4710/PE3408.
- 7) DIMENSIONS IN INCHES.

REV.	DATE	BY	CHK
3	10/27/10		
2	5/8/06		
1	5/11/04		

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

DWG. TITLE:	ECI 6-19 EXTERNAL TENDON W/ BONDED ANCHORAGE
PROJECT:	4" HDPE TO 4" SCH.40 PIPE CONNECTION
	VSL SYSTEMS DRAWING
SCALE:	NONE
VSL JOB NO.:	
VSL DWG. NO.:	A166

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.



ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING REFERENCE	INVENTORY NUMBER
1	2	4" PLASTIC HDPE PIPE DR-17	HDPE ASTM D 3350	-	-

NOTES:

- 1) SEE VSL BUTT-WELDING PROCEDURE
- 2) MINIMUM CELL CLASS = 344464C (ASTM D 3350)
- 3) MINIMUM OIT = 40 MINUTES (ASTM D 3895)
- 4) HDPE PIPE RUNNING LABEL READS: 4" IPS / DR17 / DRISCOPEX 4100 / PE4710/PE3408
- 5) DIMENSIONS IN INCHES

REV.	DATE	BY	CHK
2	5/8/06	GDH	ZX
1	5/11/04	GDH	NDS

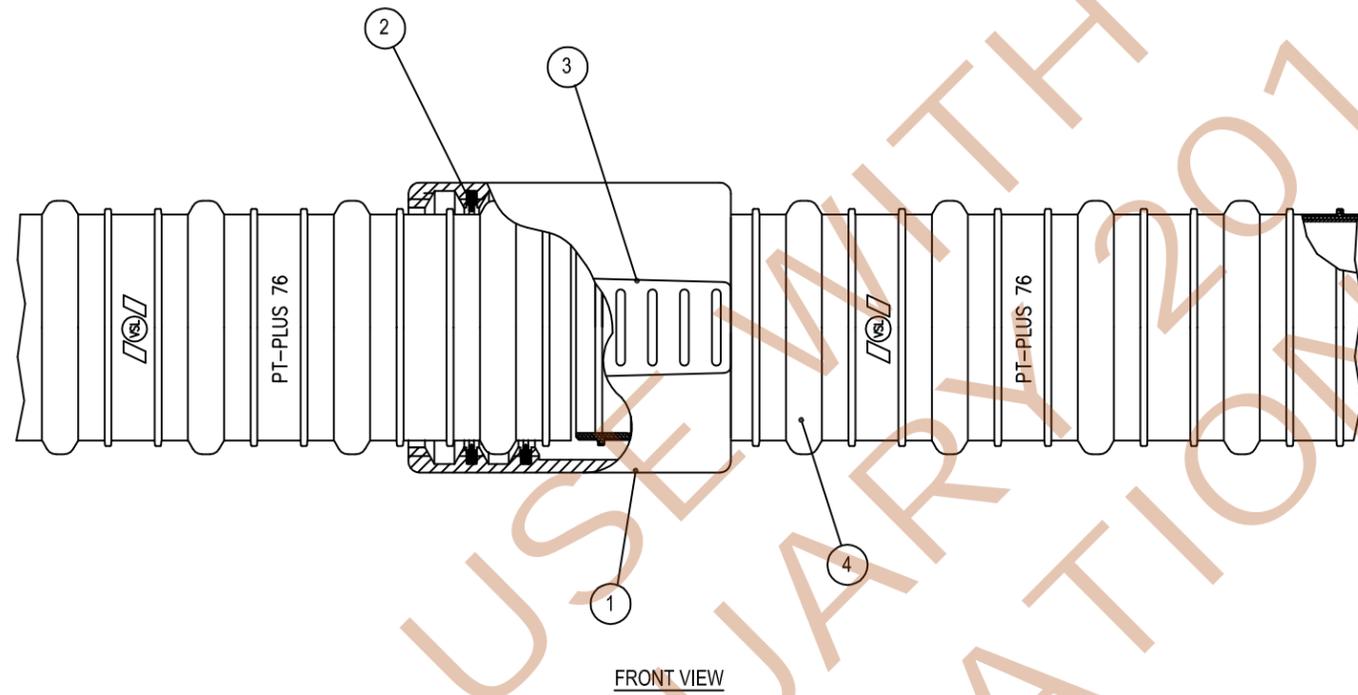
VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

DWG. TITLE: ECI 6-19 EXTERNAL TENDON W/ BONDED ANCHORAGE
HDPE PIPE TO HDPE PIPE FUSION WELDED

PROJECT: VSL
SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO:
VSL DWG. NO. A167



FRONT VIEW

ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING NUMBER	INVENTORY NUMBER
4		DUCT, WHT PP, 76 MM PT-PLUS	ASTM D4101	E0937-4	02DT0426
3	2	COUPLER CLAMP, 76 MM PT-PLUS	ASTM D4101	C628	02DT0029
2	2	SEAL (INCLUDED IN COUPLER HALF)			
1	2	COUPLER HALF, 76 MM PT-PLUS *	ASTM D4101	C626	02DT0027

* SUBSTITUTE COUPLER HALF WITH VENT, 76mm PT-PLUS,
INVENTORY NUMBER: 02DT0028, AS NEEDED PER GROUTING PLAN

FOR US SPECIFIC ONLY

PRE-JANUARY 2016

REV.	DATE	BY	CHK
2	02/06/12	TB	DD
1	01/20/12	VEN	ZX

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

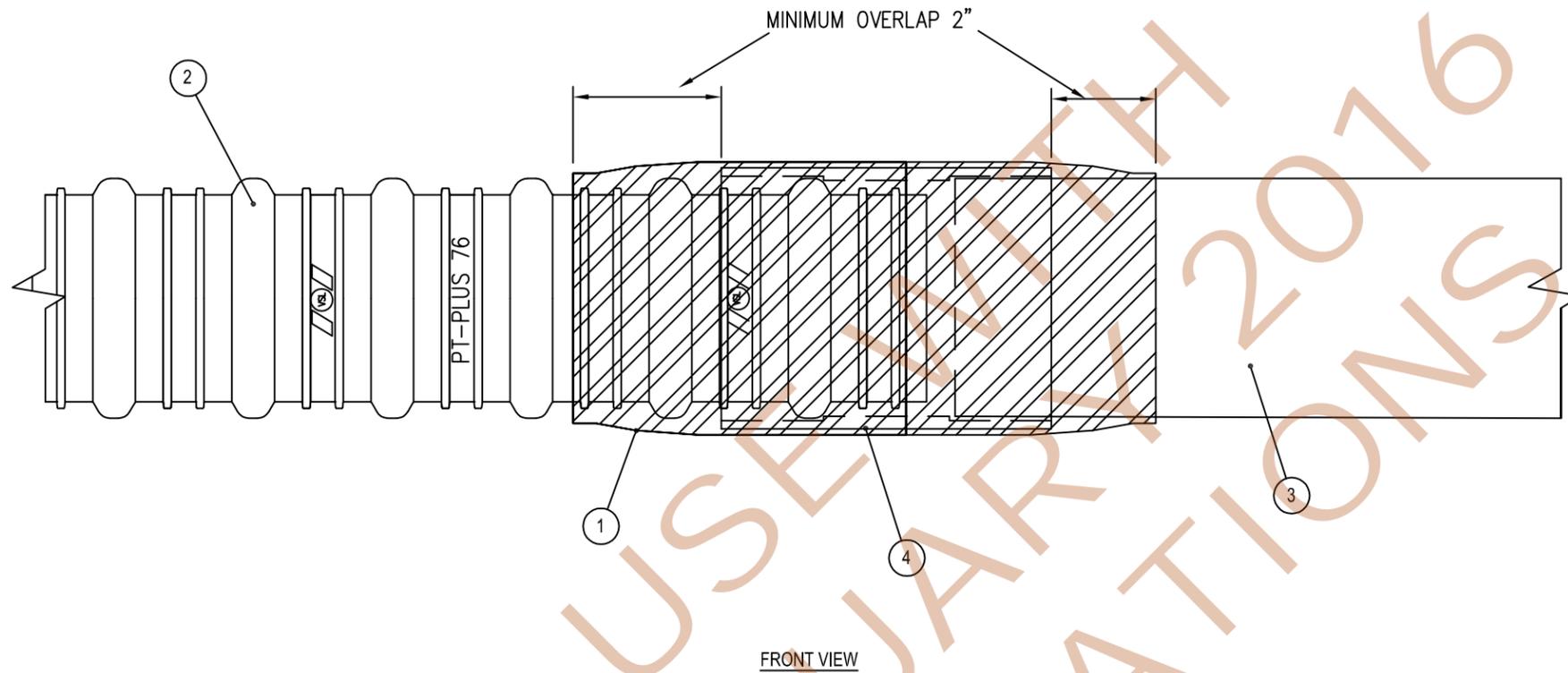


DWG. TITLE: TYPICAL ECI 6-12
76 MM PT-PLUS DUCT TO DUCT CONNECTION

PROJECT: VSL
SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: 1:2
VSL JOB NO:
VSL DWG. NO: A190



ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING NUMBER	INVENTORY NUMBER
4	1	SLIP ON COUPLER	HDPE	(GTI 220305)	(GTI 220305)
3		GALVANIZED 3" SCHEDULE 40 PIPE	ASTM A53		
2		DUCT, WHT PP, 76 MM PT-PLUS	ASTM D4101	E0937-3	02DT0426
1	1	HEAT SHRINK SLEEVE (12" LONG)	POLYOLEFIN		(CANUSA) PLA-90-YE

REV.	DATE	BY	CHK
1	01/20/12	GDH	ZX
APPROVED FOR CONSTRUCTION			REVISION

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

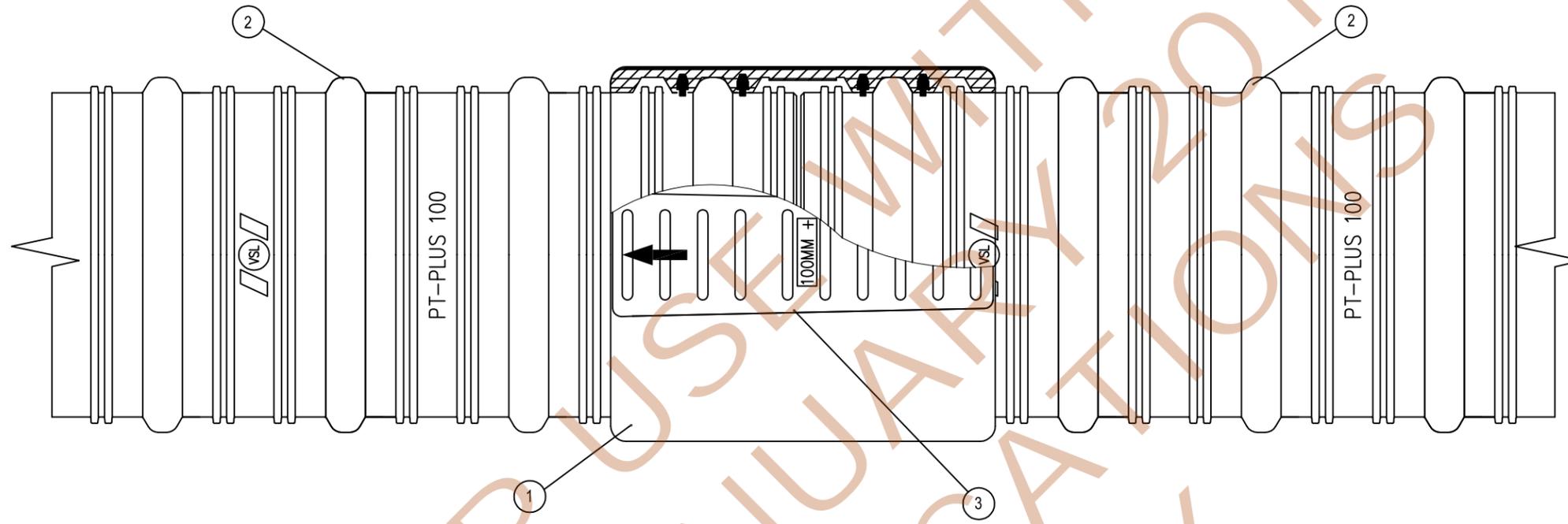


TYPICAL ECI 6-12
76 MM PT-PLUS DUCT TO PIPE CONNECTION

VSL
SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

DWG. TITLE:	SCALE: 1:2
PROJECT:	VSL JOB NO.:
	VSL DWG. NO.:
	A192



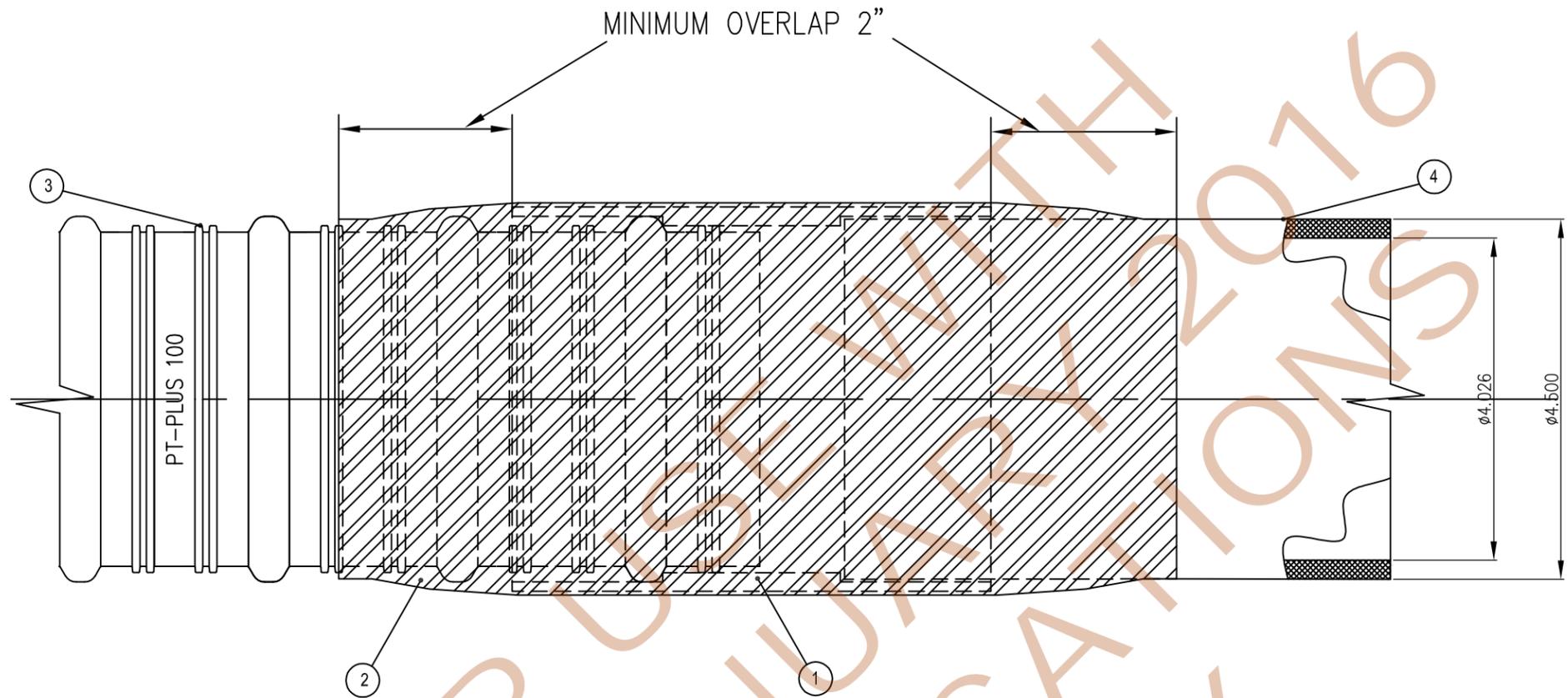
ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING REFERENCE	INVENTORY NUMBER
3	2	COUPLER CLAMP, 100/130 mm PT-PLUS	PP	C625	02DT0046
2	1	DUCT, WHT PP, 100 mm PT-PLUS	ASTM D4101	C622	02DT0443
1	1	COUPLER HALF, 100 mm PT-PLUS *	HDPE	C623	02DT0044

* SUBSTITUTE COUPLER HALF WITH VENT, 100mm PT-PLUS,
INVENTORY NUMBER: 02DT0045, AS NEEDED PER GROUTING PLAN

FOR VIEWS ONLY
SPECIFICALLY
JANUARY 2016

	APPROVED FOR PRODUCTION	APPROVED FOR PRODUCTION	APPROVED FOR PRODUCTION	APPROVED FOR PRODUCTION	REVISION
4	02/06/12	01/20/12	6/06/10	4/5/06	DATE
REV.	BY	VEN ZX	VEN ZX	VEN ZX	BY
DD	TB	TB	VEN ZX	VEN ZX	CHK
 VSL 7455 NEW RIDGE RD. HANOVER, MD. 21076 WWW.VSL.NET					
TYPICAL EC16-19 100 mm PT-PLUS DUCT TO DUCT CONNECTION					
VSL SYSTEMS DRAWING					
<small>DWG. TITLE:</small>					
<small>PROJECT:</small>					
<small>SCALE: NONE</small>					
<small>VSL JOB NO:</small>					
<small>VSL DWG. NO.</small>					
A193					

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.



ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING NUMBER	INVENTORY NUMBER
4		GALVANIZED 4" SCHEDULE 40 PIPE	ASTM A53		
3		DUCT, WHT PP, 100 mm PT-PLUS	ASTM D4101	C622	02DT0443
2	1	HEAT SHRINK SLEEVE (12" LONG)	POLYOLEFIN		(CANUSA) PLA-115-YE
1	1	SLIP-ON COUPLER	HDPE	(GTI) C220415	(GTI) C220415

DIMENSIONS IN INCHES

REV.	DATE	BY	CHK
3	01/31/12	TB	DD
2	01/20/12	TB	DD
1	4/5/06	VEN	ZX

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

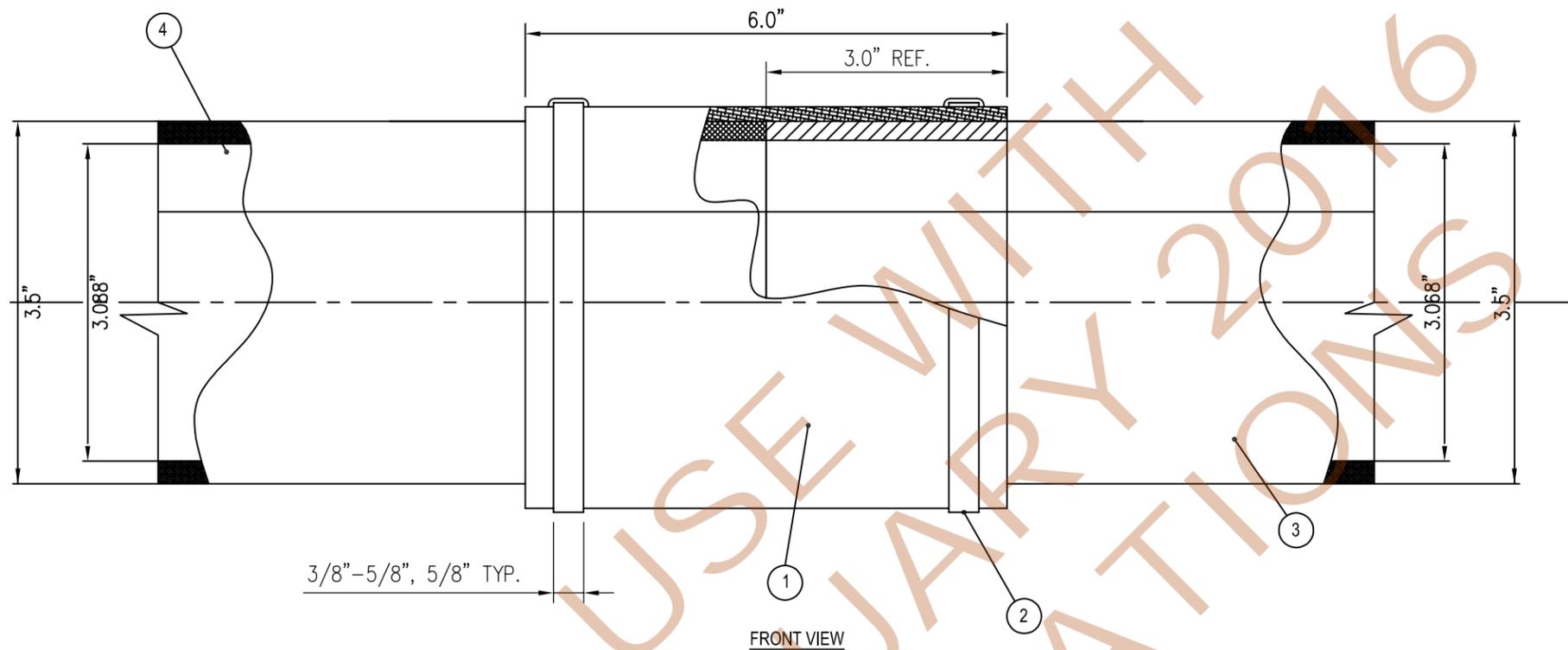


DWG. TITLE: TYPICAL ECI 6-19
100 mm PT-PLUS DUCT TO PIPE CONNECTION

PROJECT: VSL
SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO:
VSL DWG. NO. A195



ITEM	QTY	DESCRIPTION	MATERIAL
4	1	3" HDPE PIPE DR-17	ASTM D3350
3	1	3" SCH. 40 GALVANIZED STEEL PIPE	ASTM A53
2	2	316 STAINLESS STEEL BAND CLAMP	ASTM A240 316L
1	1	EPDM SLEEVE	EPDM ASTM D 1171

NOTE:

- 1) INSTALL 6" LG. EPDM SLEEVE
- 2) INSTALL 2 SS BAND CLAMPS
- 3) CENTER EPDM SLEEVE OVER THE JOINT
- 4) APPLY 80 TO 120 LBS SEATING FORCE TO BAND CLAMPS
- 5) NO TEXT OR MARKINGS ON SCHEDULE 40 GALVANIZED STEEL PIPE
- 6) HDPE PIPE RUNNING LABEL READS: 3" IPS / DR17 / DRISCOPEX 4100 / PE4710/PE3408
- 7) NO TEXT OR MARKINGS ON EPDM SLEEVE, BLACK IN COLOR
- 8) DIMENSIONS IN INCHES

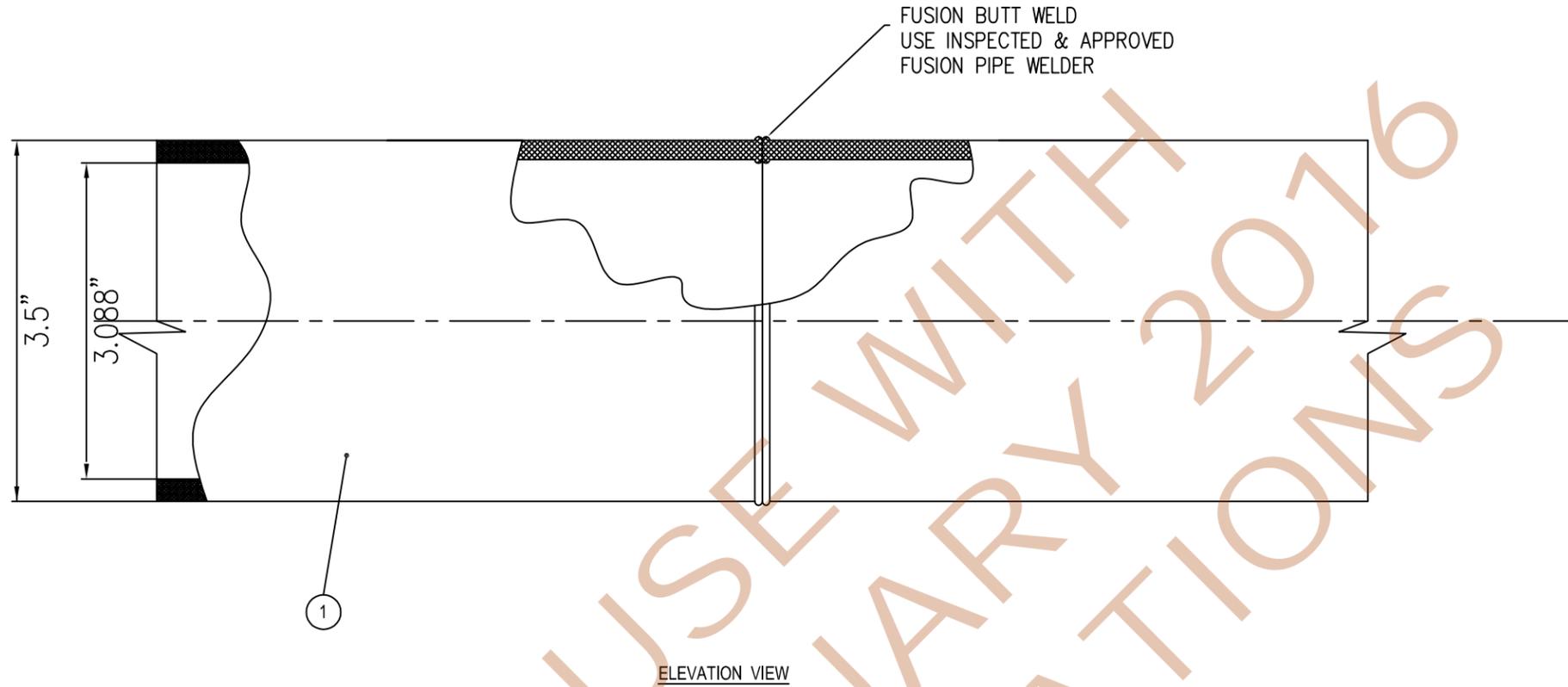
REV.	DATE	BY	CHK
2	5/8/06	GDH	ZX
1	5/11/04	GDH	INDS

VSL
 7455 NEW RIDGE RD.
 HANOVER, MD, 21076
 WWW.VSL.NET

DWG. TITLE: ECI 6-12 EXTERNAL TENDON W/ BONDED ANCHORAGE
 3" HDPE TO 3" STEEL PIPE CONNECTION W/ EPDM SLEEVE
 PROJECT: VSL
 SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
 The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO:
VSL DWG. NO. A245



ELEVATION VIEW

ITEM	QTY	DESCRIPTION	MATERIAL
1	2	3" PLASTIC HDPE PIPE DR-17	HDPE ASTM D 3350

NOTES:

- 1) SEE VSL BUTT-WELDING PROCEDURE
- 2) MINIMUM CELL CLASS = 344464C (ASTM D 3350)
- 3) MINIMUM OIT = 40 MINUTES (ASTM D 3895)
- 4) HDPE PIPE RUNNING LABEL READS: 3" IPS / DR17 / DRISCOPEX 4100 / PE4710/PE3408
- 5) DIMENSIONS IN INCHES

REV.	DATE	BY	CHK
2	5/8/06	GDH	ZX
1	5/11/04	GDH	NDS

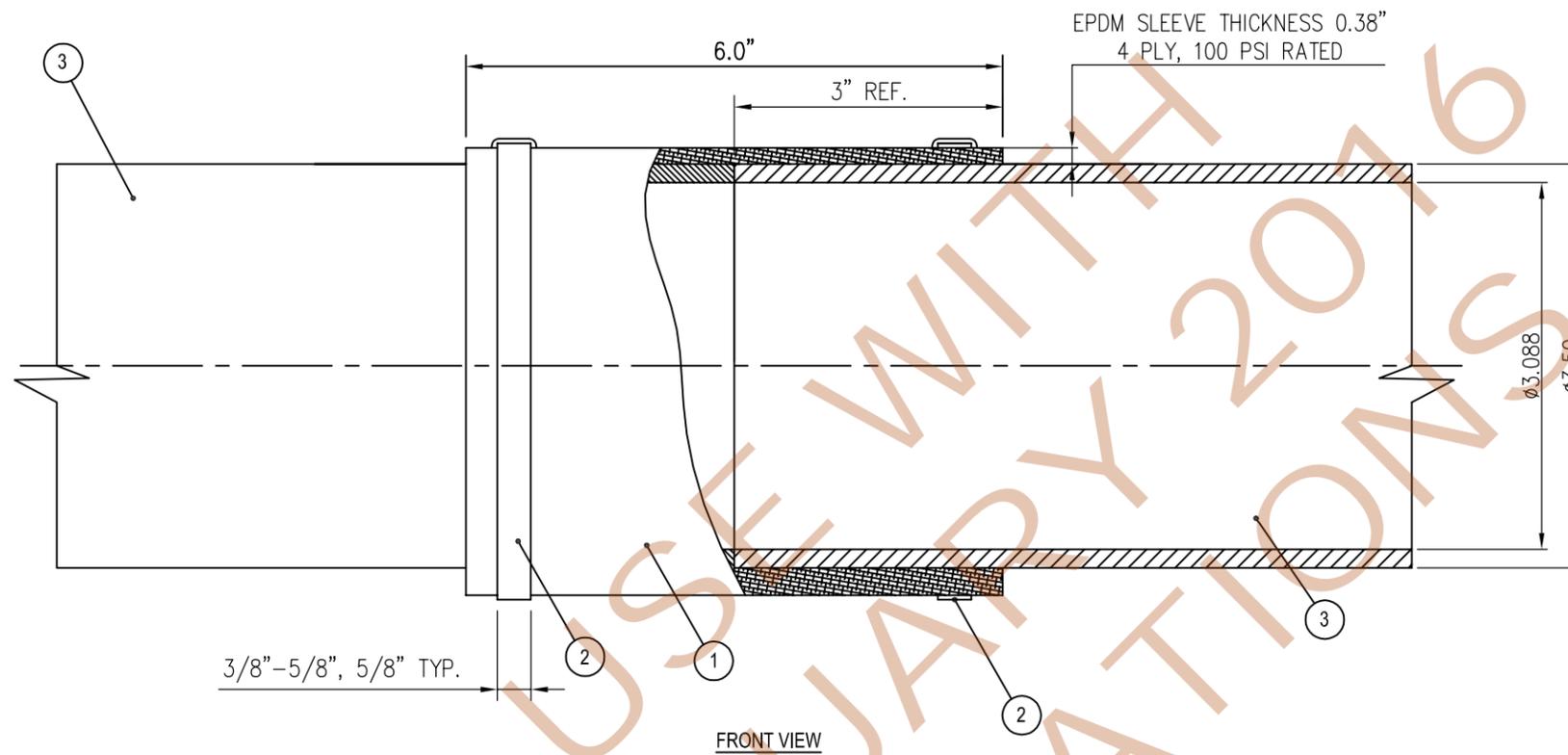
VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

DWG. TITLE: ECI 6-12 EXTERNAL TENDON W/ BONDED ANCHORAGE
HDPE PIPE TO HDPE PIPE FUSION WELDED

PROJECT: VSL
SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO:
VSL DWG. NO. A246



ITEM	QTY	DESCRIPTION	MATERIAL
3	1	3" HDPE PIPE DR-17	ASTM D3350
2	2	316 STAINLESS STEEL BAND CLAMPS	ASTM A240 316L
1	1	EPDM SLEEVE 6" LG.	EPDM ASTM D 1171

NOTES:

- 1) INSTALL 6" LG. EPDM SLEEVE
- 2) INSTALL 2 SS BAND CLAMPS
- 3) CENTER EPDM SLEEVE OVER THE JOINT
- 4) APPLY 80 TO 120 LBS SEATING FORCE TO BAND CLAMPS
- 5) HDPE PIPE RUNNING LABEL READS: 3" IPS / DR17 / DRISCOPLEX 4100 / PE4710/PE3408
- 6) NO TEXT OR MARKINGS ON EPDM SLEEVE, BLACK IN COLOR
- 7) DIMENSIONS IN INCHES

REV.	DATE	BY	CHK
0	3/4/2010		

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

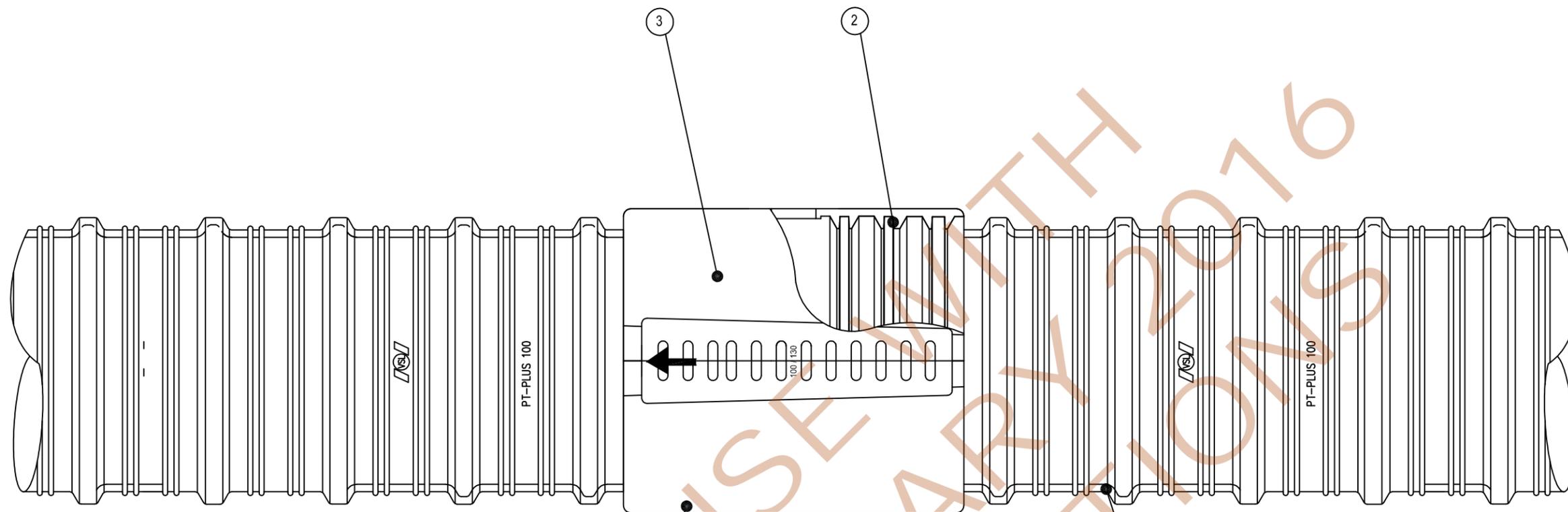


DWG. TITLE: ECI 6-12 EXTERNAL TENDON W/ BONDED ANCHORAGE
3" HDPE TO 3" CONNECTION W/ EPDM SLEEVE

PROJECT: VSL SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE:	NONE
VSL JOB NO.:	
VSL DWG. NO.:	A247



FRONT VIEW

INSTALLATION PROCEDURES

- 1) CUT DUCT HALF WAY BETWEEN 2 MAJOR RIBS SEE DETAIL A
- 2) INSTALL DUCT INTO COUPLER HALF. PLACE COUPLER HALF OVER MAJOR RIB. SEE DETAIL B
- 3) PLACE SECOND COUPLER HALF OVER DUCT, USING INTERLOCKING PINS TO CENTER SECOND COUPLER HALF
- 4) PARTIALLY INSTALL COUPLER CLIPS IN DIRECTION INDICATED BY ARROWS SHOWN ON COUPLER HALF.
- 5) INSURE BOTH DUCTS ARE SECURED IN COUPLER.
- 6) FINISH INSTALLATION OF CLIPS.

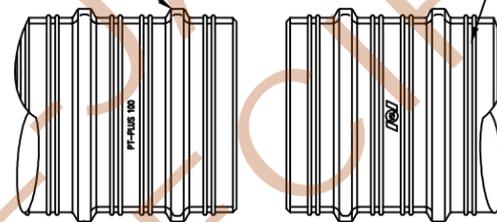
DUCT COUPLER HALF

MAJOR RIB (TYP)

DUCT

DUCT

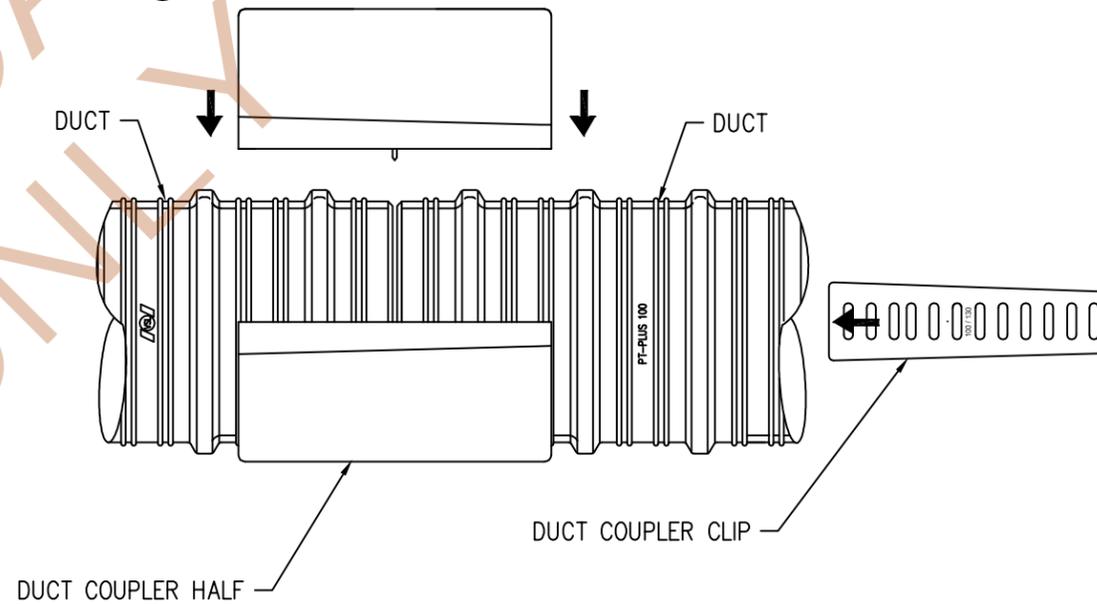
DUCT



MAJOR RIB (TYP)

DUCT COUPLER HALF

DETAIL A



DUCT COUPLER HALF

DUCT COUPLER CLIP

DETAIL B

ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING NUMBER	INVENTORY NUMBER
4		DUCT, WHT PP, 100 MM PT-PLUS	ASTM D4101	C622	02DT0443
3	2	COUPLER CLAMP, 100 MM PT-PLUS	ASTM D4101	C625	02DT0046
2	2	SEAL (INCLUDED IN COUPLER HALF)			INCLUDED W/ 02DT0044
*1	2	COUPLER HALF, 100 MM PT-PLUS	ASTM D4101	C623	02DT0044

* SEE SHEET C623 FOR COUPLER HALF, 100 MM PT-PLUS VENTED

REV.	DATE	REVISION	BY	CHK
3	01/31/12	ISSUED FOR CONSTRUCTION	SAN MM	
2	6/06/10	ISSUED FOR CONSTRUCTION	SAN MM	
1	5/27/10	ISSUED FOR CONSTRUCTION	SAN MM	

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

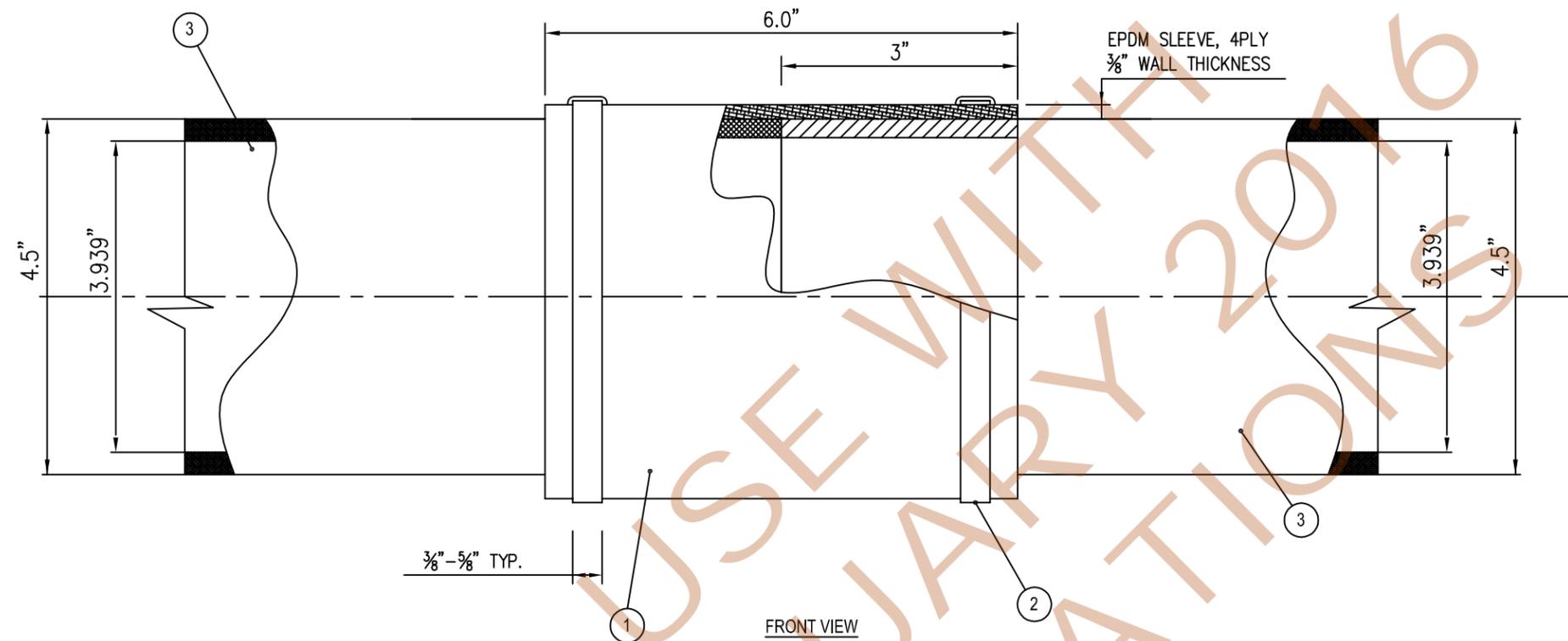


TYPICAL 100 MM PT-PLUS
DUCT TO DUCT CONNECTION

VSL
SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

DWG. TITLE:	SCALE: NTS
PROJECT:	VSL JOB NO:
	VSL DWG. NO. A275



ITEM	QTY	DESCRIPTION	MATERIAL
3	1	4" HDPE PIPE DR-17	ASTM D3350
2	2	STAINLESS STEEL PUNCH LOCK BANDS	ASTM A240 316L
1	1	EPDM SLEEVE	EPDM ASTM D 1171

NOTE:

- 1) INSTALL 6" EPDM SLEEVE
- 2) INSTALL 2 SS BAND CLAMPS
- 3) CENTER EPDM SLEEVE OVER THE JOINT
- 4) APPLY 80 TO 120 LBS SEATING FORCE PER PUNCH LOCK.
- 5) EPDM SLEEVE HAS NO TEXT OR MARKINGS. EPDM IS BLACK IN COLOR.
- 6) HDPE PIPE RUNNING LABEL READS: 4" IPS/DR17/DRISCOPEX 4100/PE4710/PE3408.
- 7) DIMENSIONS IN INCHES.

REV.	DATE	BY	CHK
2	01/31/12	TB	DD
1	10/28/11	SAN	DS

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

DWG. TITLE: TYPICAL 4" DR17 HDPE TO 4" DR17 HDPE PIPE WITH EPDM SLEEVE CONNECTION

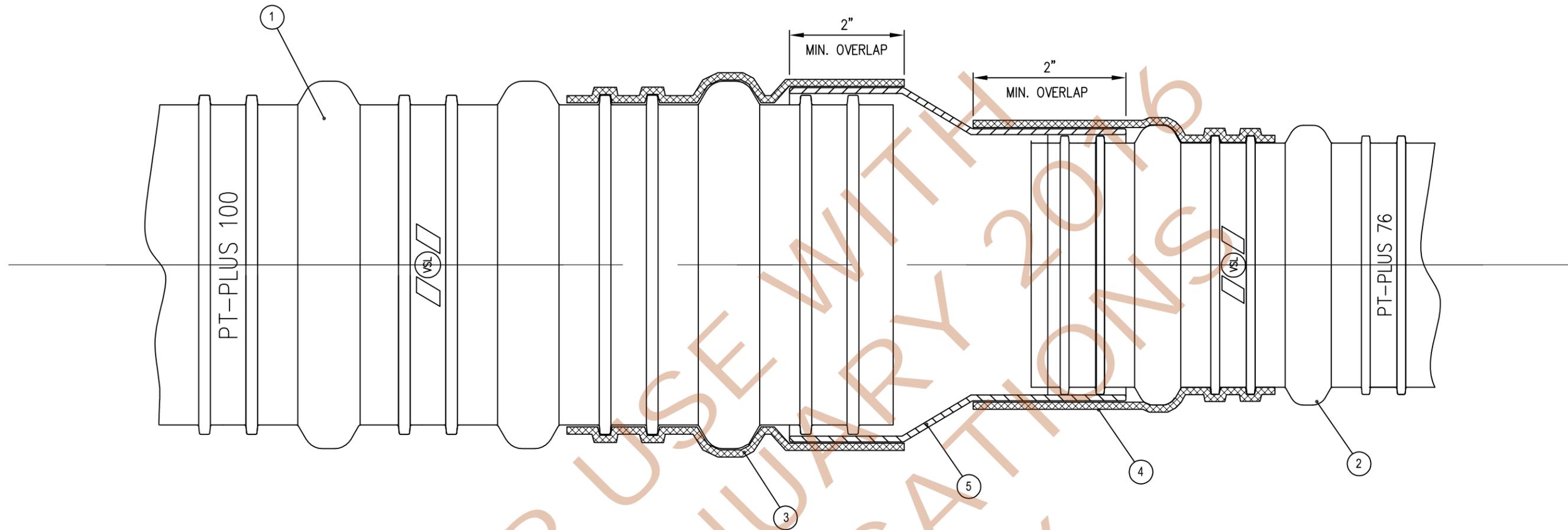
PROJECT: VSL SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE

VSL JOB NO.

VSL DWG. NO. A293



FRONT VIEW

ITEM	QTY	DESCRIPTION	MATERIAL	INVENTORY NUMBER
5	1	REDUCER 4" X 3" WHT PP	ASTM D4101	02DT0235
4	1	HEATSHRINK SLEEVE 90mm (6" LG.)	(CANUSA) PLA-90-YE	02DT0505
3	1	HEATSHRINK SLEEVE 115mm (6" LG.)	(CANUSA) PLA-115-YE	02DT0507
2	1	DUCT, WHT PP, 76mm PT-PLUS	ASTM D4101	02DT0426
1	1	DUCT, WHT PP, 100mm PT-PLUS	ASTM D4101	02DT0443

DIMENSIONS IN INCHES

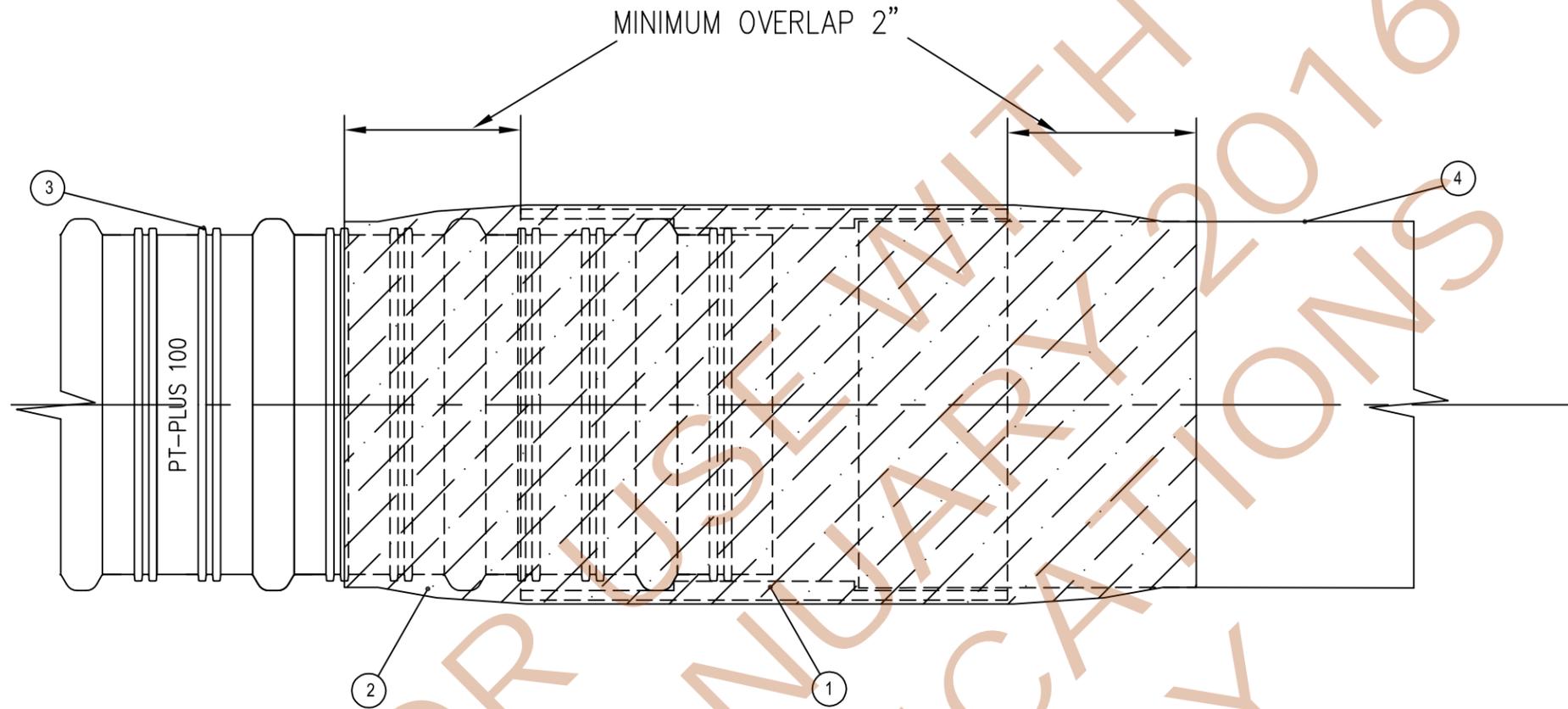
REV.	DATE	BY	CHK
1	01/20/12	TB	DD
0	10/27/11	TB	DTS

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

DWG. TITLE: TYPICAL 76mm PT PLUS DUCT TO 100mm PT PLUS DUCT - HEATSHRINK CONNECTION
PROJECT: VSL SYSTEMS DRAWING

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO.
VSL DWG. NO. A297



ITEM	QTY	DESCRIPTION	MATERIAL	DRAWING NUMBER	INVENTORY NUMBER
4		4" HDPE PIPE DR-17	ASTM D3350		
3		DUCT, WHT PP, 100 mm PT-PLUS	ASTM D4101	C622	02DT0443
2	1	HEAT SHRINK SLEEVE (12" LONG)	(CANUSA) PLA-115-YE		02DT0508
1	1	SLIP-ON COUPLER	HDPE	(GTI) C220415	(GTI) C220415

DIMENSIONS IN INCHES

REV.	DATE	BY	CHK
1	01/20/12	TB	DD
1	10/28/11	SAN	DS
			REVISION

VSL
7455 NEW RIDGE RD.
HANOVER, MD, 21076
WWW.VSL.NET

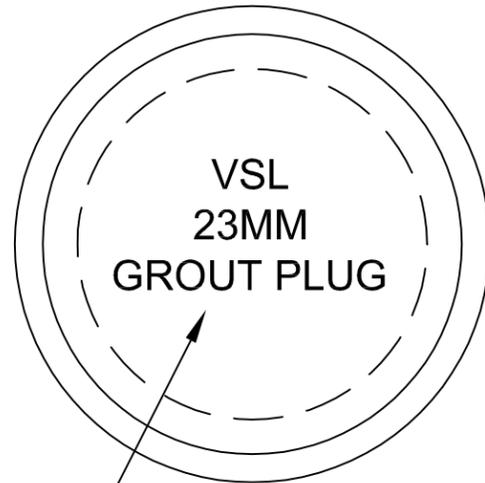


DWG. TITLE: TYPICAL 100 mm PT-PLUS DUCT TO 4" DR-17 HDPE PIPE
HEAT SHRINK WITH GTI SLIP ON COUPLER CONNECTION

PROJECT: VSL
SYSTEMS DRAWING

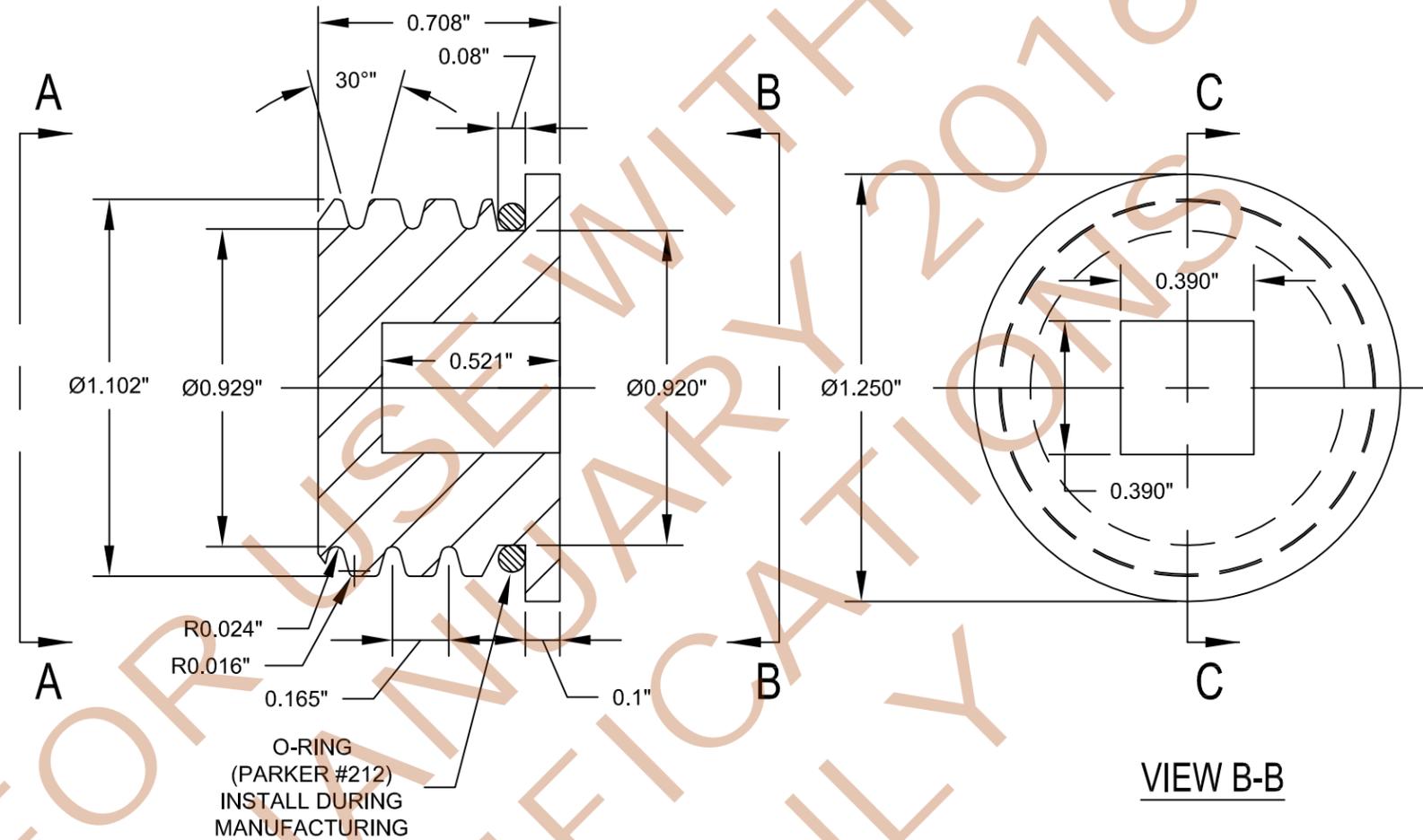
Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: NONE
VSL JOB NO:
VSL DWG. NO. A302



.1" LETTERING
RECESSED

VIEW A-A



SECTION C-C

VIEW B-B

TOLERANCES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS IN INCHES.

FRACTIONAL _____ ± 1/64

DECIMAL _____ .X _____ ± .030

_____ .XX _____ ± .010

_____ .XXX _____ ± .005

ANGULAR _____ ± 1/2°

SURFACE QUALITY √

NOTES:

- 1) BREAK SHARP EDGES .010 MAX.
- 2) REMOVE ALL BURRS.
- 3) DO NOT SCALE DRAWING.
- 4) DIMENSIONS SHOWN THUS "(XX)" ARE IN MILLIMETERS.
- 5) DIMENSIONS IN MM SHALL CONFORM TO DIN 1685 GTB16 TOLERANCES
- 5) MATERIAL: POLYPROPYLENE BLACK
- 5) INVENTORY No. 02DT0341

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

DWG. TITLE	23MM GROUT PLUG FABRICATION	DATE	4/26/04
PROJECT	VSL SYSTEMS DRAWING	REV.	1
SCALE	2:1	DATE	1/02/07
		REV.	2
		DATE	4/26/04
		BY	GDH
		CHK	ZX
		REVISION	RELEASED FOR PRODUCTION
		BY	GDH
		CHK	WF
		REVISION	MATERIAL CHANGE (BLACK)

VSL
7455 NEW RIDGE RD.
HANOVER, MD. 21076
WWW.VSL.NET



23MM GROUT PLUG
FABRICATION

VSL
SYSTEMS DRAWING

DWG. TITLE

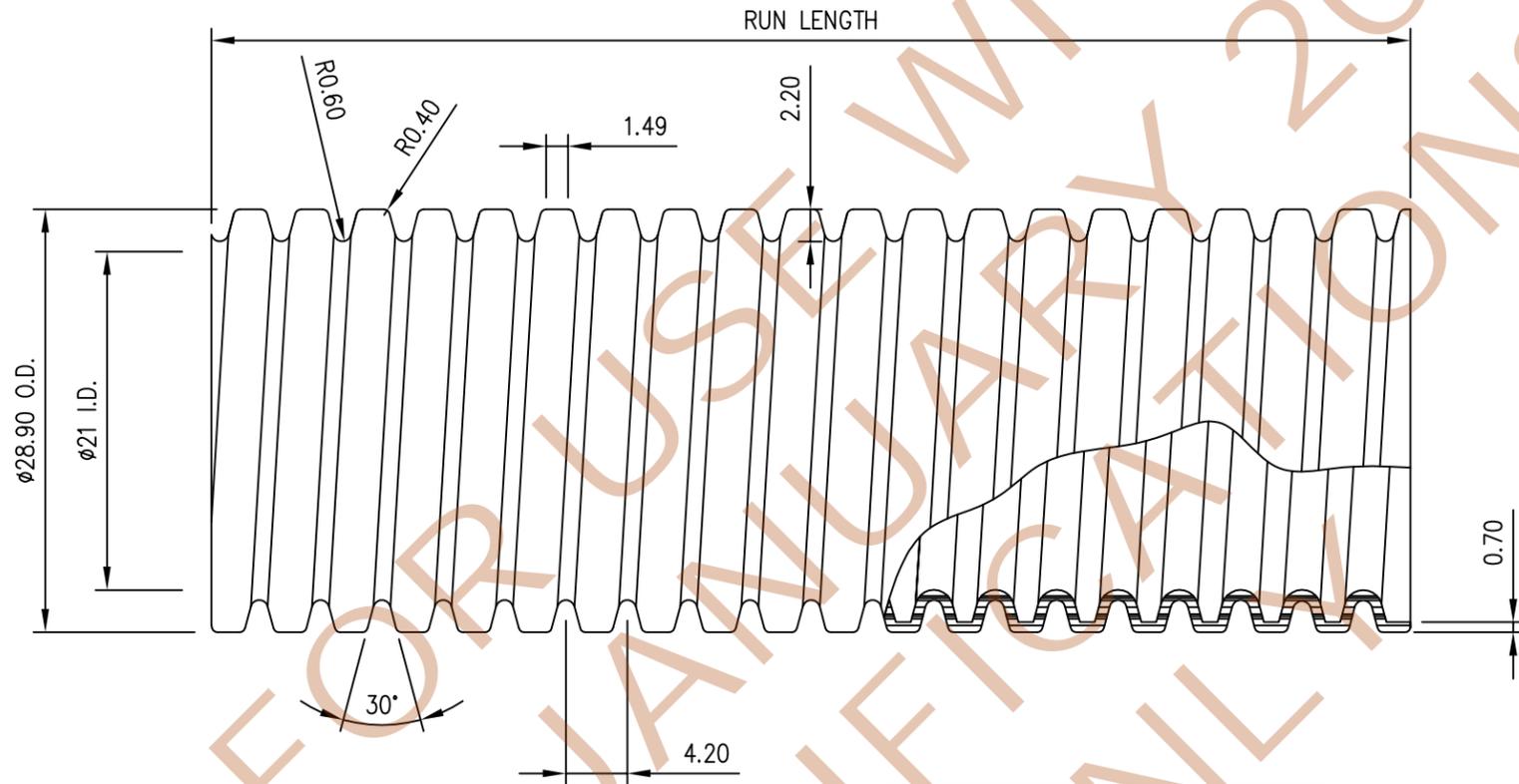
PROJECT

SCALE

VSL JOB NO.

VSL DWG. NO.

C583



TOLERANCES
UNLESS OTHERWISE SPECIFIED
DIMENSIONS IN MILLIMETERS.

0 THROUGH 50mm	±0.5
51mm THROUGH 100mm	±1.0
MORE THAN 100mm	±1.5
ANGULAR	±1/2°
SURFACE QUALITY	✓

NOTES:
 1) BREAK SHARP EDGES .25 MAX.
 2) REMOVE ALL BURRS.
 3) ALL RADII 1mm UNO
 4) DO NOT SCALE DRAWING.
 5) DIMENSIONS IN MM SHALL CONFORM TO DIN 1685 GTB16 TOLERANCES
 6) MATERIAL: PP
 INVENTORY No. 02DT0310

PRE-SPECIFIED FOR USE WITH 2016 VSL SYSTEMS

REV.	DATE	BY	CHK
1	4/26/04		
RELEASED FOR PRODUCTION			
REVISION			

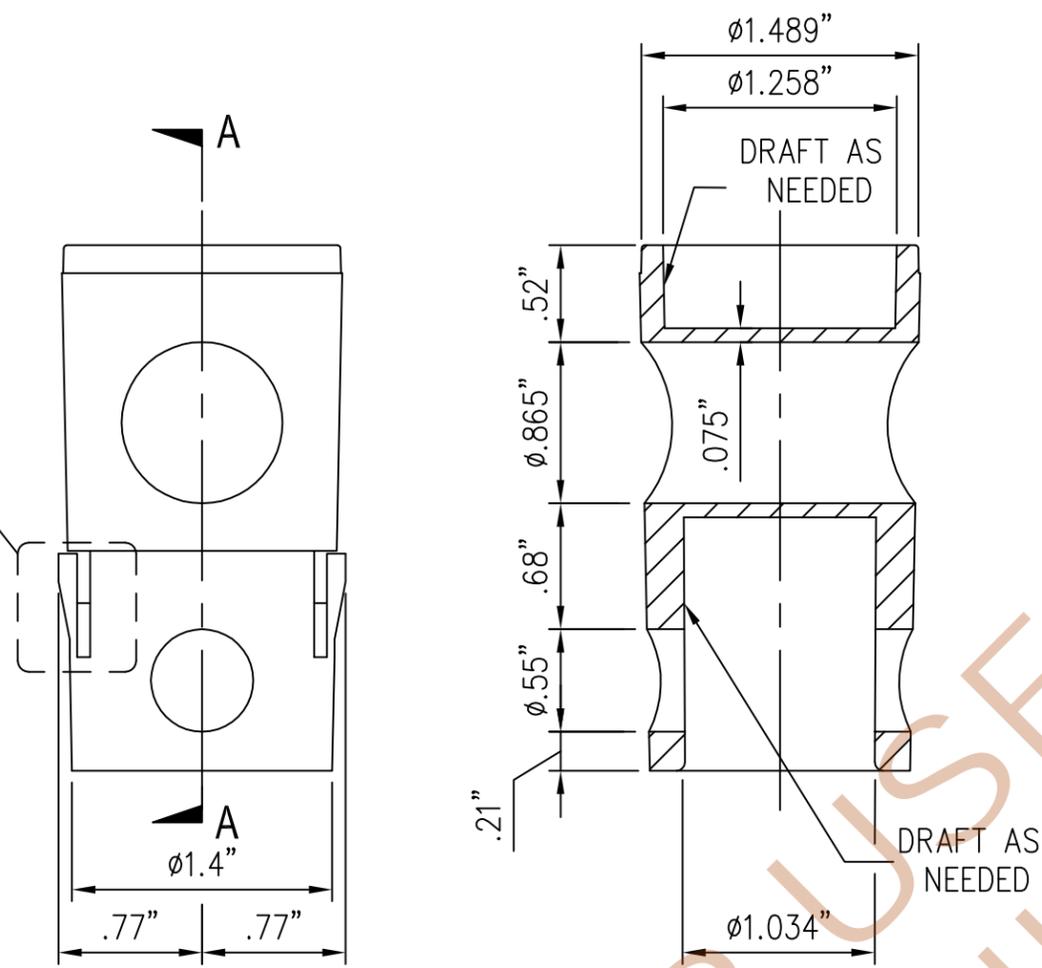

 VSL
 7455 NEW RIDGE RD.
 HANOVER, MD, 21076
 WWW.VSL.NET

DWG. TITLE: 23MM GROUT HOSE FABRICATION
 PROJECT: VSL SYSTEMS DRAWING

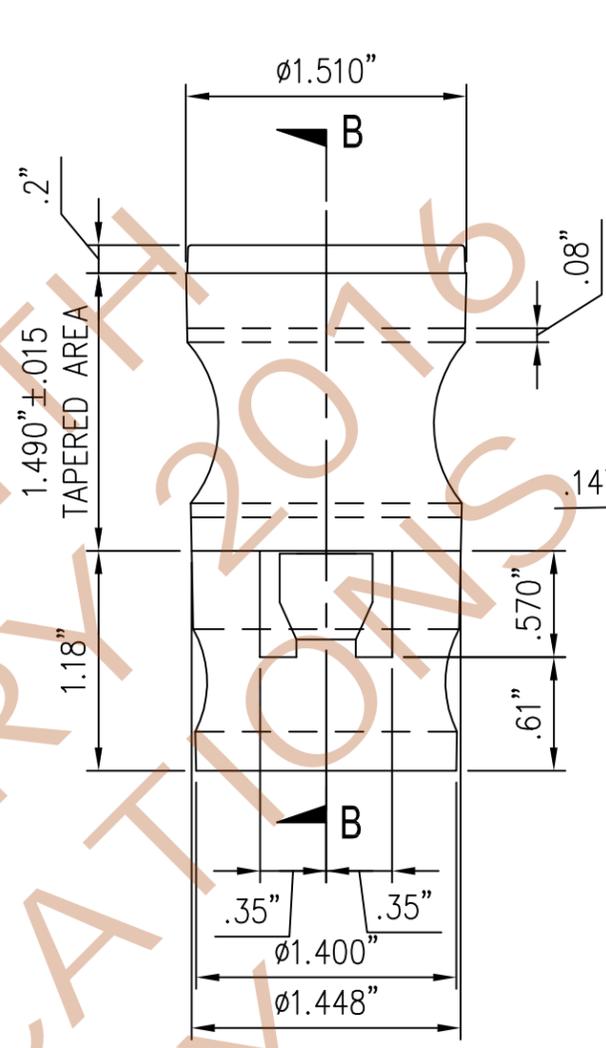
Copyright © 2004 VStructural LLC (VSL). All rights reserved.
 The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

SCALE: 2:1
VSL JOB NO.
VSL DWG. NO. C587

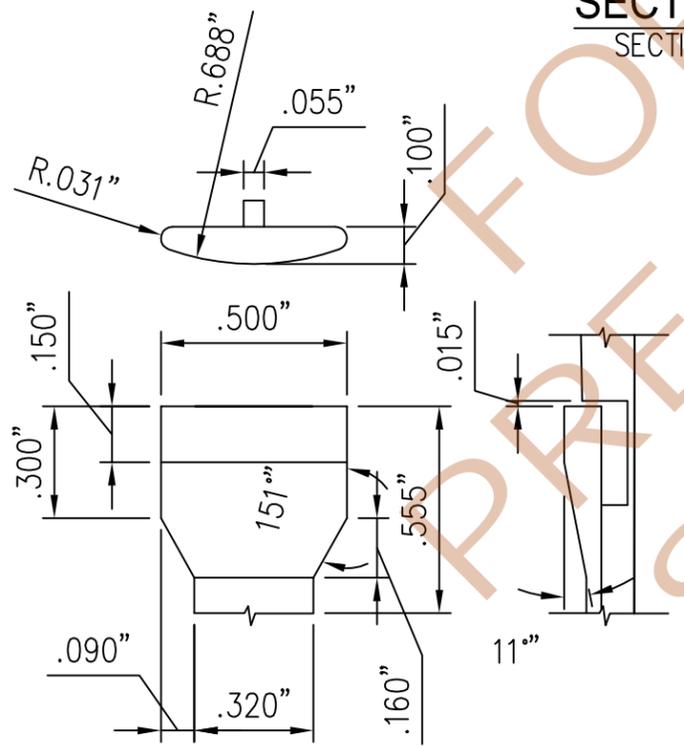
C
C589



SECTION A-A
SECTION VIEW



SECTION B-B
SECTION VIEW

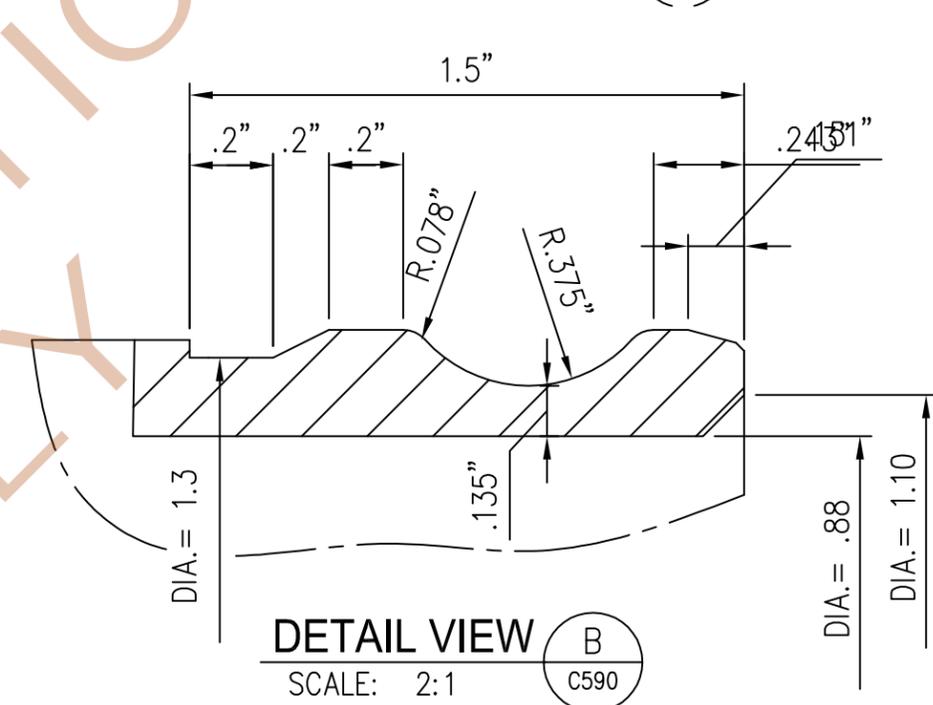
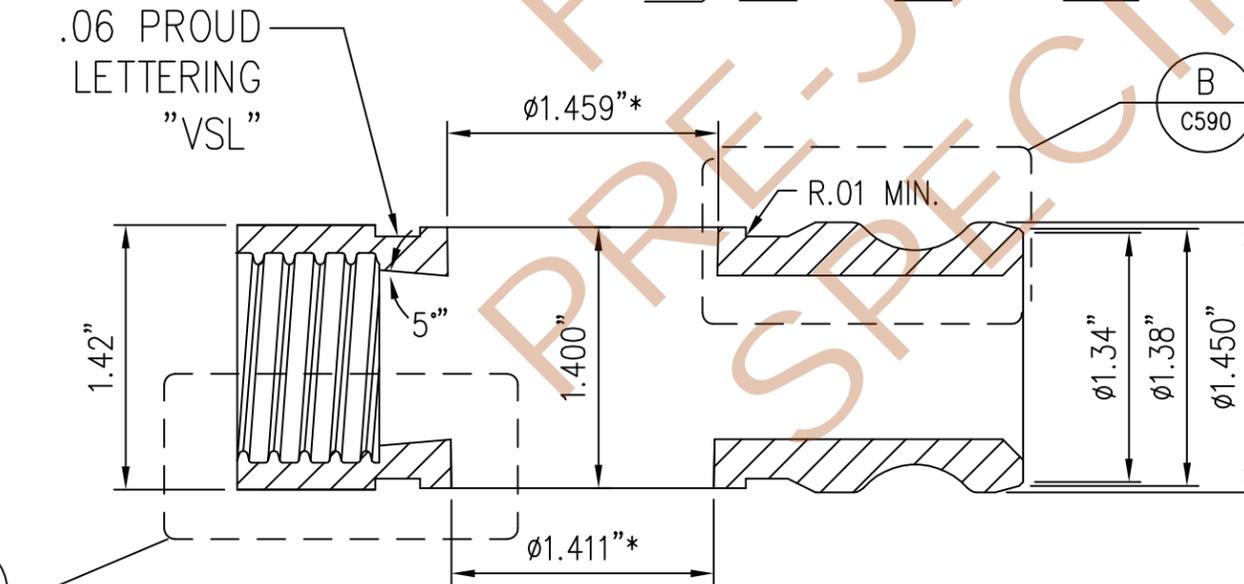
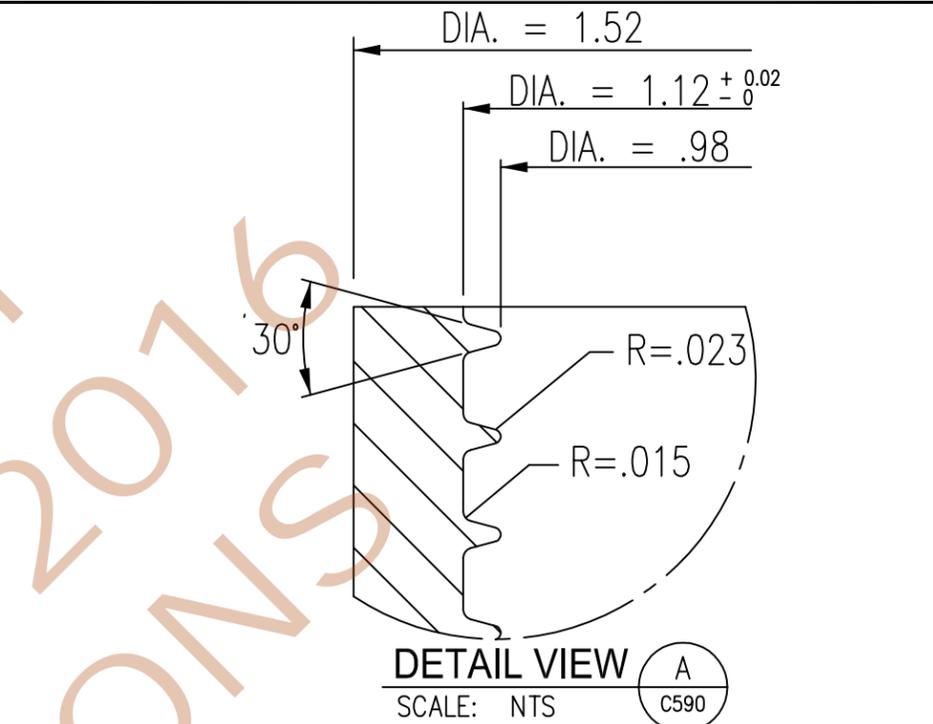
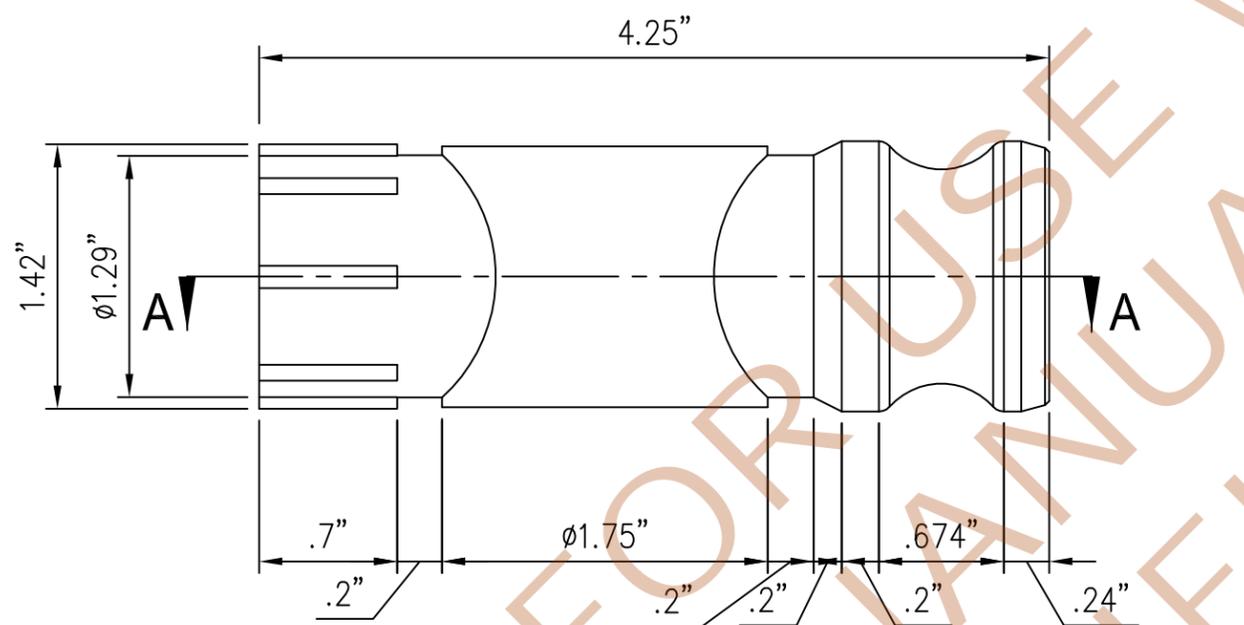
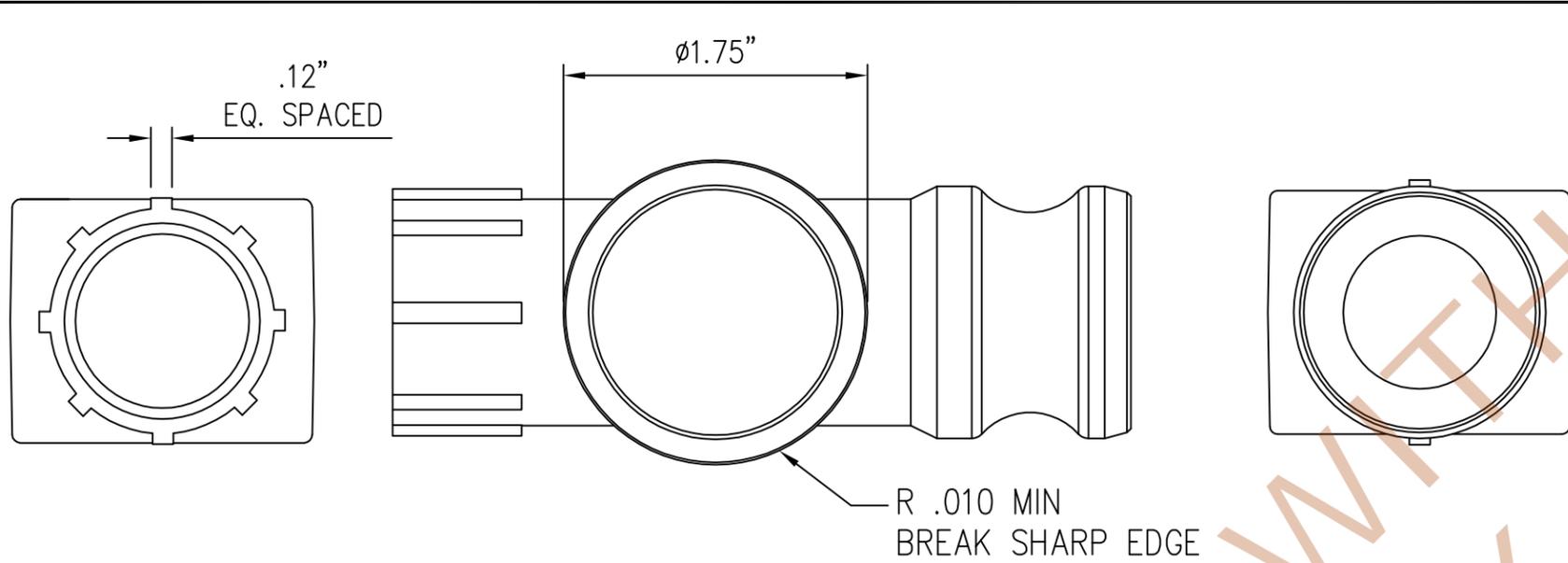


DEATAIL VIEW
LOCKING TANG
SCALE: 2:1
C
C589

TOLERANCES
UNLESS OTHERWISE SPECIFIED
DIMENSIONS IN INCHES.
FRACTIONAL _____ ± 1/32
DECIMAL ____ .X ____ ± .030
 ____ .XX ____ ± .010
 ____ .XXX ____ ± .005
ANGULAR _____ ± 1/2°
SURFACE QUALITY √
NOTES:
1) BREAK SHARP EDGES .010 MAX.
2) REMOVE ALL BURRS.
3) DO NOT SCALE DRAWING.
4) DIMENSION W/* CRITICAL DIMENSION
5) MATERIAL: HIPS COLOR BLACK
5) INVENTORY: 02DT0330

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

VSL 7455 NEW RIDGE RD. HANOVER, MD, 21076 WWW.VSL.NET		DATE	REV.	BY	CHK
VALVE GROUT SHUTOFF VALVE		4/26/04	1	GDH	GDH
VSL SYSTEMS DRAWING		6/22/05	2	GDH	GDH
PROJECT:		BLACK COLOR ADDED RELEASED FOR PRODUCTION			
DWG. TITLE:		REVISION			
SCALE: 1:1 UNO		C589			



TOLERANCES
UNLESS OTHERWISE SPECIFIED
DIMENSIONS IN INCHES.

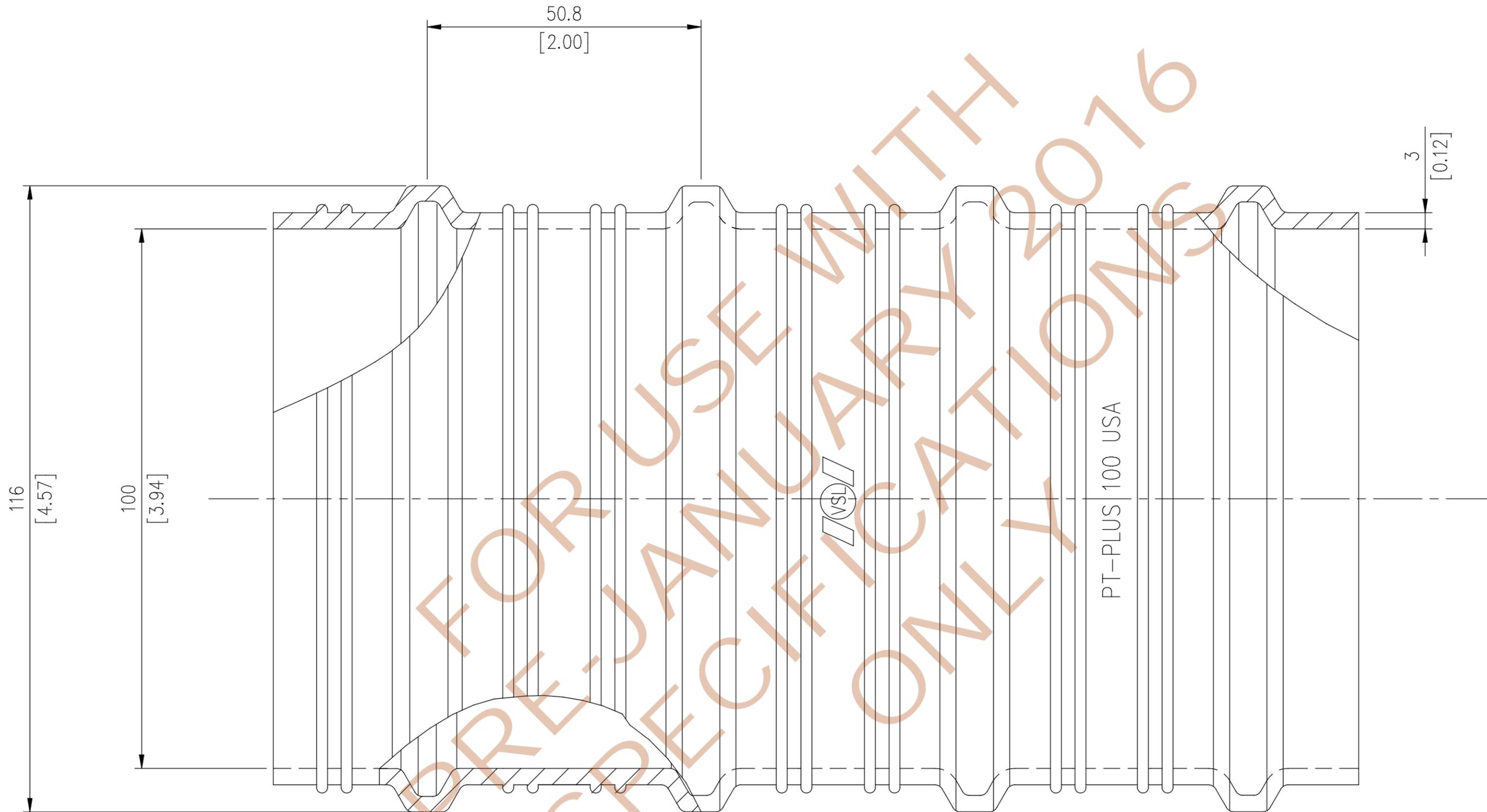
FRACTIONAL _____ ± 1/32
DECIMAL _____.X _____ ± .030
_____.XX _____ ± .010
_____.XXX _____ ± .005

ANGULAR _____ ± 1/2°
SURFACE QUALITY _____ √

NOTES:
1) BREAK SHARP EDGES .010 MAX.
2) REMOVE ALL BURRS.
3) DO NOT SCALE DRAWING.
4) DIMENSION W/* CRITICAL DIMENSION
5) MATERIAL: HIPS COLOR BLACK
5) INVENTORY: 02DT0330

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

VSL 7455 NEW RIDGE RD. HANOVER, MD, 21076 WWW.VSL.NET		BLACK COLOR ADDED RELEASED FOR PRODUCTION		GDI/INDS	
VSL		BODY GROUT SHUTOFF VALVE		BY	
VSL		VSL		CHK	
SYSTEMS DRAWING		DATE		REV.	
SCALE: 1:10		DATE		REV.	
VSL JOB NO.		DATE		REV.	
VSL DWG. NO.		DATE		REV.	
C590		DATE		REV.	



GENERAL NOTES

- 1) ALL HOLES TO BE FREE FROM BURRS
- 2) ALL RADII 2mm UNO
- 3) MATERIAL SHALL BE (PP, WHITE)
- 4) LOGO AND PART DESCRIPTION EVERY 2M
- 5) SCALE: DRAWING NOT TO SCALE
- 6) MINIMUM BEND RADIUS: 20FT

INVENTORY No. 02DT0443

DIMDENSIONS IN MILLIMETERS [INCHES]

Copyright © 2004 VStructural LLC (VSL). All rights reserved.
 The drawings, specifications and calculations set forth on this sheet
 may not be reproduced, changed, copied or transmitted in any
 form or by any means, electronic or mechanical, including, but not
 limited to, photocopying, digital imaging or film, except as may
 be expressly permitted in writing by VSL. Any unauthorized use is
 strictly prohibited, and VSL disclaims any liability therefrom.

DWG. TITLE:

PT-PLUS 100 DUCT

SCALE: 1:10

VSL JOB NO:

VSL DWG. NO.

C822

PROJECT:

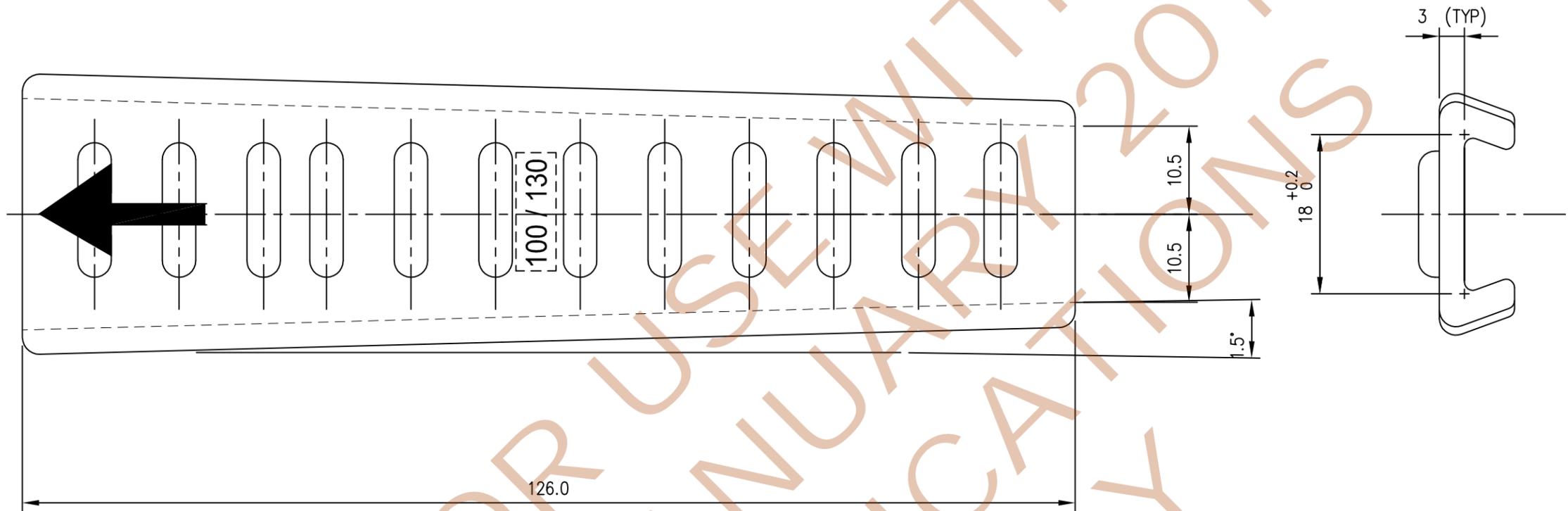
VSL
SYSTEMS DRAWING

VSL
7455 NEW RIDGE RD.
HANOVER, MD. 21076
WWW.VSL.NET



REV.	DATE	CHK
1	1/03/07	GDH

PRELIMINARY NOT FOR PRODUCTION
REVISION



FOR USE WITH 2016 PRE-JANUARY ONLY SPECIFICALLY ONLY

GENERAL NOTES

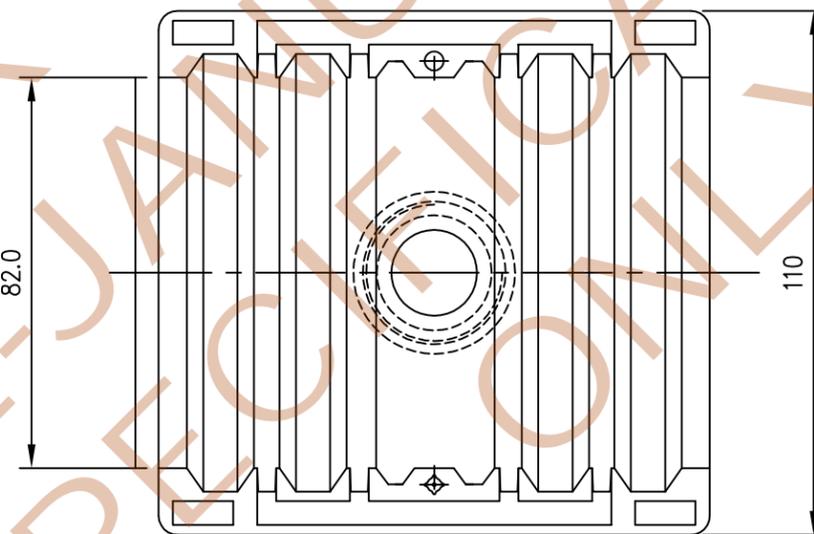
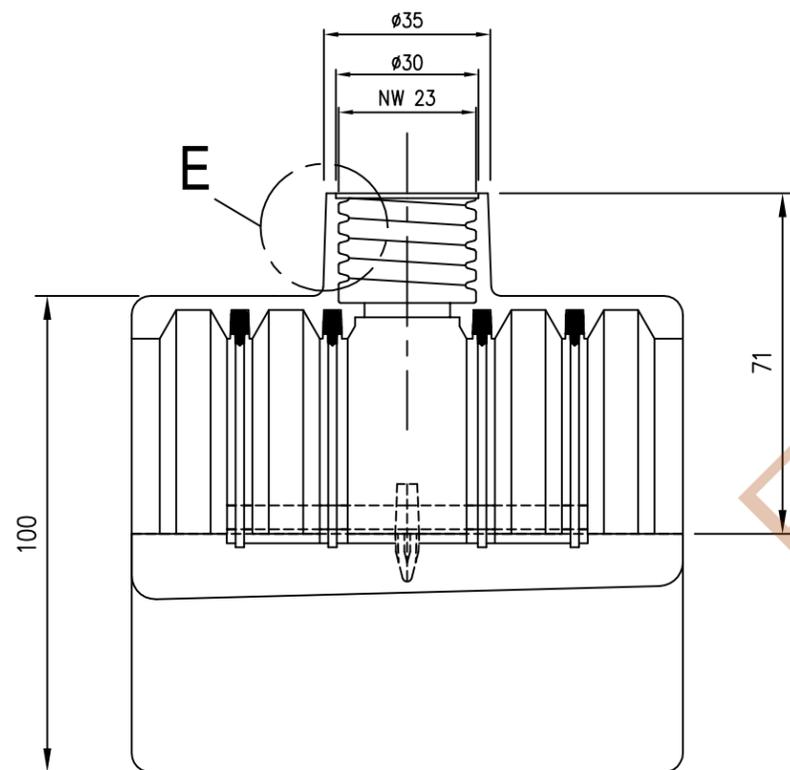
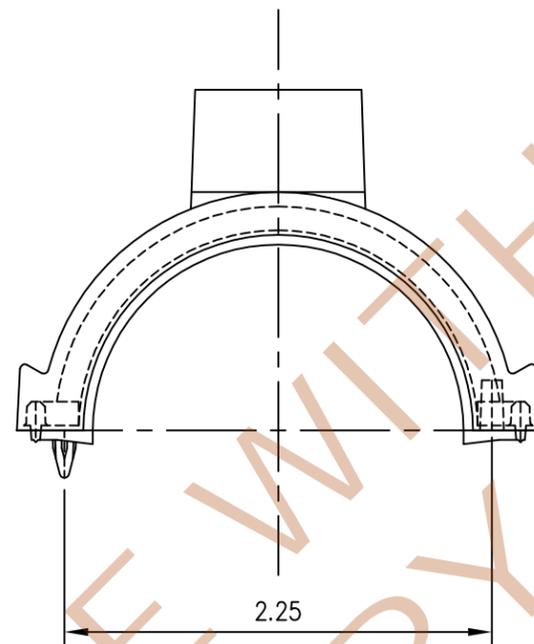
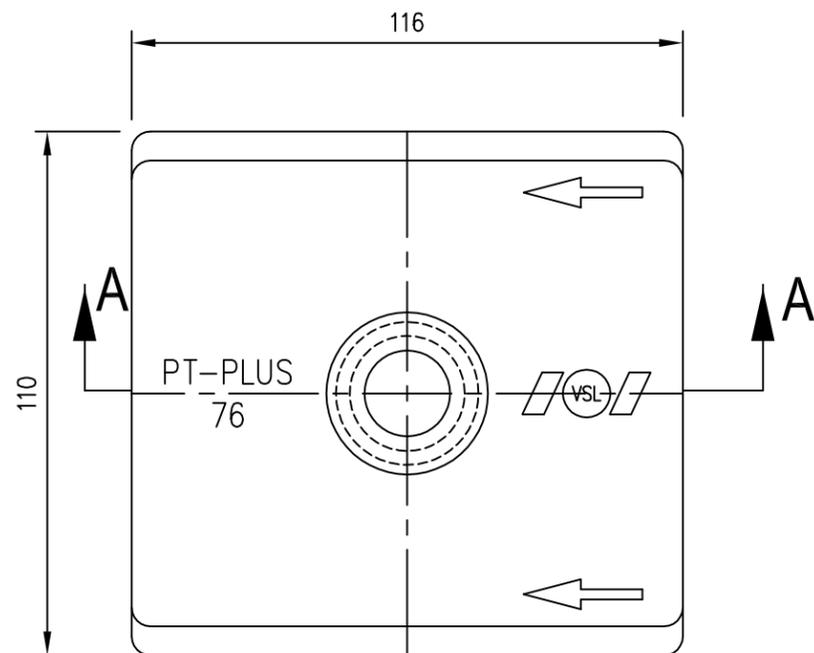
- 1) ALL HOLES TO BE FREE FROM BURRS
- 2) ALL RADII 1mm UNO
- 3) MATERIAL SHALL BE: PP SG702 HI-IMPACT COPOLYMER
- 4) MANUFACTURERS IDENTIFICATION AND BATCH No. MUST BE CLEARLY VISIBLE ON PART
- 5) SCALE: DRAWING NOT TO SCALE

INVENTORY No. 02DT0046

TOLERANCES - U.S.	
UNLESS OTHERWISE SPECIFIED	
DIMENSIONS IN INCHES.	
FRACTIONAL _____	± 1/64
DECIMAL _____ .X _____	± .030
_____ .XX _____	± .010
_____ .XXX _____	± .005
ANGULAR _____	± 1/2°
SURFACE QUALITY	√
NOTES:	
1) BREAK SHARP EDGES .010 MAX.	
2) REMOVE ALL BURRS.	
3) DO NOT SCALE DRAWING.	
4) DIMENSIONS SHOWN THUS "(XX)" ARE IN MILLIMETERS.	
5) DIMENSIONS IN MM SHALL CONFORM TO DIN 1685 GTB16 TOLERANCES	

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

VSL 7455 NEW RIDGE RD. HANOVER, MD. 21076 WWW.VSL.NET		REV. 1	DATE 6/17/03	BY GDH	CHK
100 / 130 MM PT-PLUS CLIP FABRICATION		PRELIMINARY NOT FOR PRODUCTION		REVISION	
PROJECT: VSL SYSTEMS DRAWING		SCALE: 1:10		VSL JOB NO:	
DWG. TITLE:		VSL DWG. NO. C625			



SECTION A-A

NOTES:

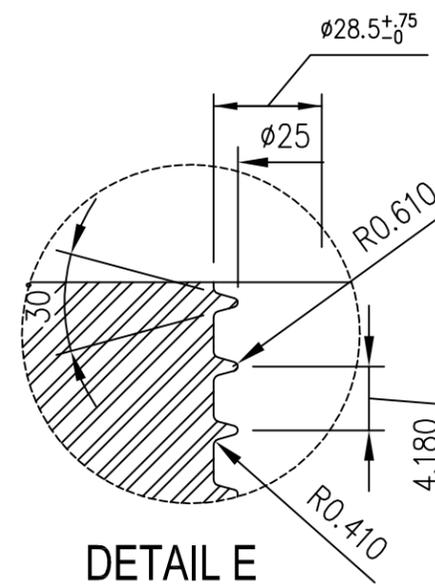
1. MATERIAL POLYPROPYLENE ELTEX PRS210 (OR EQUIVALENT)
2. DIMENSIONS ARE IN mm
3. DO NOT SCALE
4. COMPATIBILITY WITH PT+76-US DUCT
5. ONE HALF SHELL WITH VENT AND ONE WITHOUT.

NOTE:

USE 2 HALF SHELLS WITHOUT VENT (02DT0027) FOR STANDARD DUCT COUPLING.

USE ONE HALF SHELL WITHOUT VENT (02DT0027) AND ONE HALF SHELL WITH VENT (02DT0028) FOR DUCT COUPLING WHERE A GROUT VENT IS NEEDED.

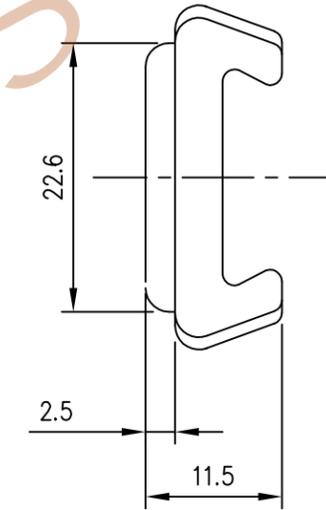
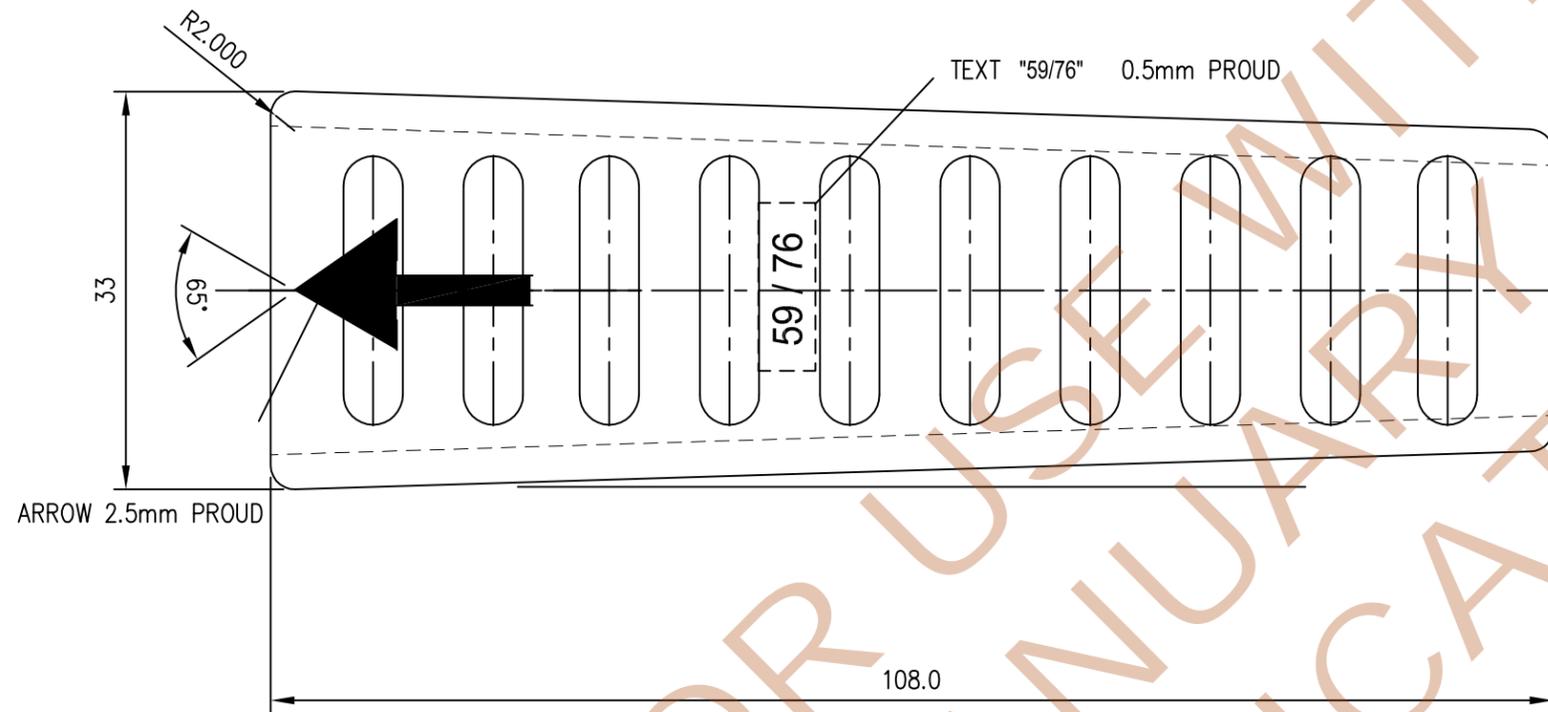
INVENTORY No. 02DT0027, W/OUT VENT
 INVENTORY No. 02DT0028, WITH VENT



DETAIL E

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

VSL 7455 NEW RIDGE RD. HANOVER, MD. 21076 WWW.VSL.NET		6/4/07	DEMINSION CHANGES	GDH
VSL SYSTEMS DRAWING		3/9/07	APPROVED PRODUCTION	GDH MM
76MM PT-PLUS DUCT COUPLER Half Shell Non-Vented and Half Shell Vented		1	REVISION	BY
PROJECT:		DATE	REV.	CHK
DWG. TITLE:		SCALE: NTS		
PROJECT:		VSL JOB NO:		
DWG. NO.:		VSL DWG. NO.		
		C626		



FOR US SPECIFICATIONS ONLY

PRE-JANUARY 2016

TOLERANCES - U.S.	
UNLESS OTHERWISE SPECIFIED	
DIMENSIONS IN INCHES.	
FRACTIONAL _____	± 1/64
DECIMAL _____ .X _____	± .030
_____ .XX _____	± .010
_____ .XXX _____	± .005
ANGULAR _____	± 1/2°
SURFACE QUALITY	√

NOTES:

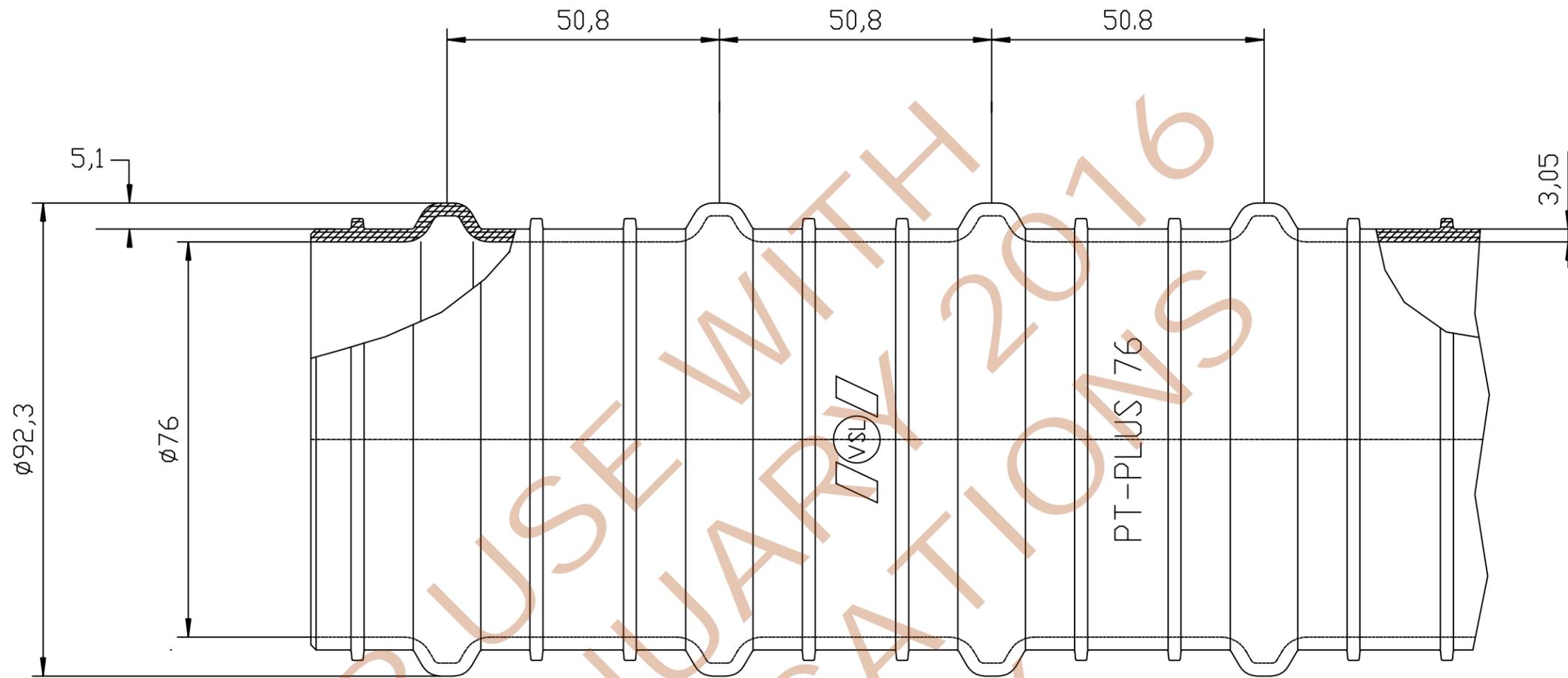
- 1) BREAK SHARP EDGES .010 MAX.
- 2) REMOVE ALL BURRS.
- 3) DO NOT SCALE DRAWING.
- 4) DIMENSIONS SHOWN THUS "(XX)" ARE IN MILLIMETERS.
- 5) DIMENSIONS IN MM SHALL CONFORM TO DIN 1685 GTB16 TOLERANCES

- GENERAL NOTES**
- 1) ALL HOLES TO BE FREE FROM BURRS
 - 2) ALL RADII 1mm UNO
 - 3) MATERIAL SHALL BE: NYLON
 - 4) MANUFACTURERS IDENTIFICATION AND BATCH No. MUST BE CLEARLY VISIBLE ON PART
 - 5) SCALE: DRAWING NOT TO SCALE

INVENTORY No. 02DT0029

Copyright © 2004 VStructural LLC (VSL). All rights reserved. The drawings, specifications and calculations set forth on this sheet may not be reproduced, changed, copied or transmitted in any form or by any means, electronic or mechanical, including, but not limited to, photocopying, digital imaging or film, except as may be expressly permitted in writing by VSL. Any unauthorized use is strictly prohibited, and VSL disclaims any liability therefrom.

 VSL 7455 NEW RIDGE RD. HANOVER, MD. 21076 WWW.VSL.NET	3	01/20/12	FOR CONSTRUCTION	TB	DD
	2	7/32/07	OVERALL DIMENSION CHANGES	GDH	MM
	1	3/14/07	APPROVED FOR CONSTRUCTION	GDH	GDH
DWG. TITLE: 59 / 76 MM PT-PLUS CLIP FABRICATION PROJECT: VSL SYSTEMS DRAWING			REV.	DATE	BY
SCALE: 1:10 VSL JOB NO: VSL DWG. NO. C628			REVISION	CHK	



Units shown in mm unless otherwise noted.

Weight: 0,58 kg/m
INVENTORY No. 02DT0426

qty.	description	item	material	remarks
1	PT-PLUS 76	1	PP	



PT-PLUS 76

MARKING EVERY 2 m
MINIMUM BEND RADIUS: 4.88 m
(16 ft)



rev. 2.) PP war MDPE 1.6.92 HB
3.) Add Inventory No. FEB-18-97
4.) Edit for US duct dimensions DEC-22-2011

proj./job PT-PLUS System

title DUCT

PT-PLUS 76

this drawing must not be copied or reproduced in any form or used for any purpose than originally intended without written approval from VSL

scale N.T.S

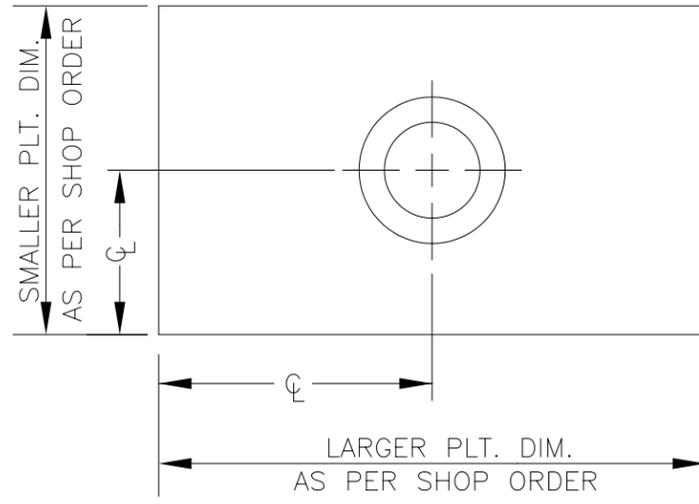
drawn 16.01.1992 HB

checked U

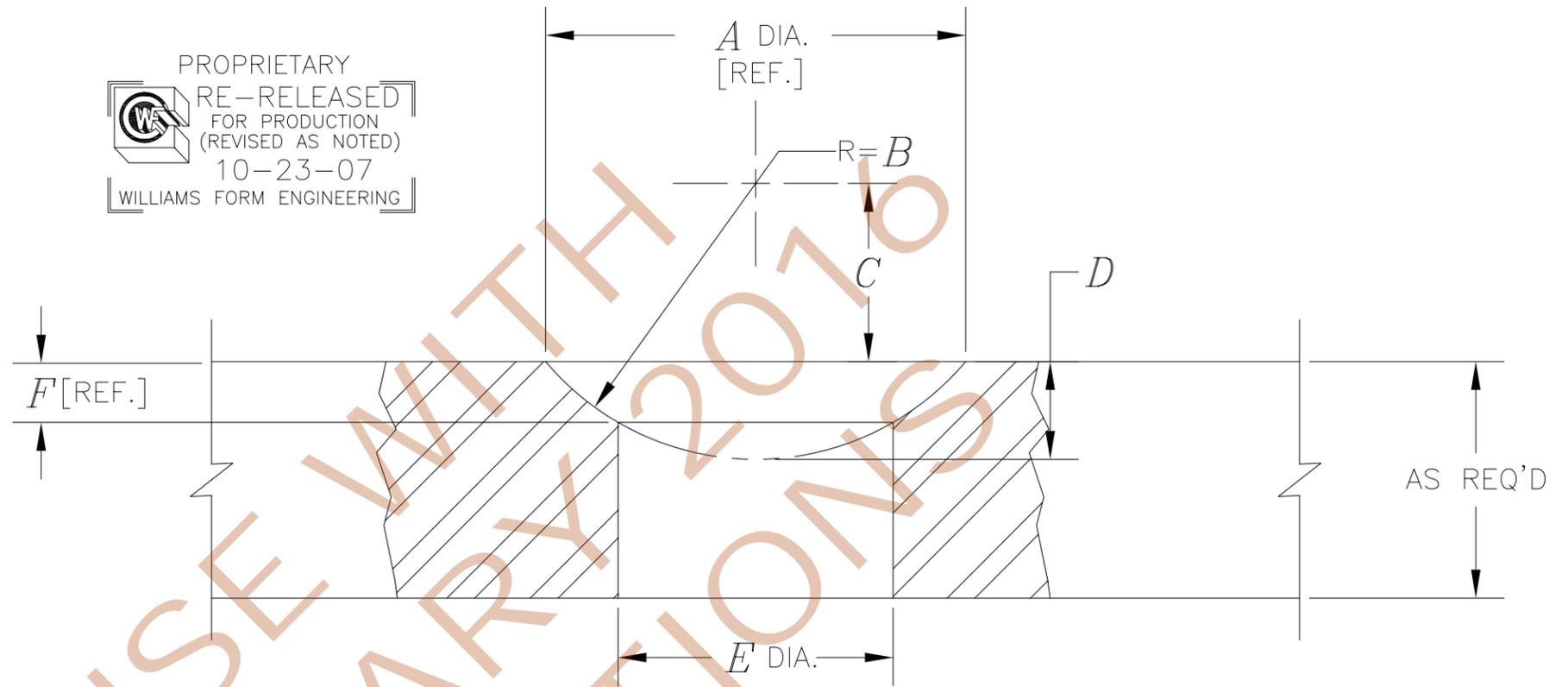
subst. by/for

proj.no

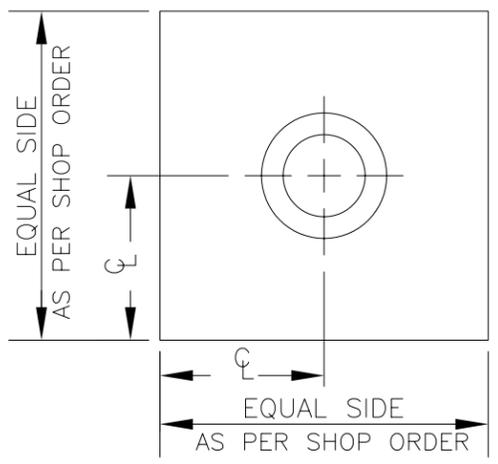
E0937-4



PROPRIETARY
 RE-RELEASED
 FOR PRODUCTION
 (REVISED AS NOTED)
 10-23-07
 WILLIAMS FORM ENGINEERING



C	10-23-07	CAC	ADDED 75mm DIM & MATR'L NOTE
B	11-18-03	CAC	REVISED FOR PRODUCTION
A	1-18-00	CAC	RELEASED TO CAD
REV	DATE	NAME	CHK. CHANGE DESCRIPTION



NOMINAL BAR SIZE (GR150)	A DIA.	B ^{±.010} RAD.	C DIM.	D DIM.	E DIA.	F DIM.
46mm (1 3/4" nom.)	3.64	2.19	1.22	.98	2.38	.63

NOTE: FOR ROUND PLATES AND PLATES WITH DUCT COLLARS, SINGLE OR ANGLED GROUT TUBE HOLES REQUEST PRINT FROM ENGINEERING DEPT.

TOLERANCES UNLESS OTHERWISE SPECIFIED
 .XX, +/- .03, .XXX +/- .015
 ANGLES +/- 0° - 30'

X:\TOP PART PRINTS\SK1 PLATES\410129 B.dwg, 10/23/2007 11:43:49 AM

WILLIAMS
 FORM ENGINEERING CORP.
<http://www.williamsform.com>

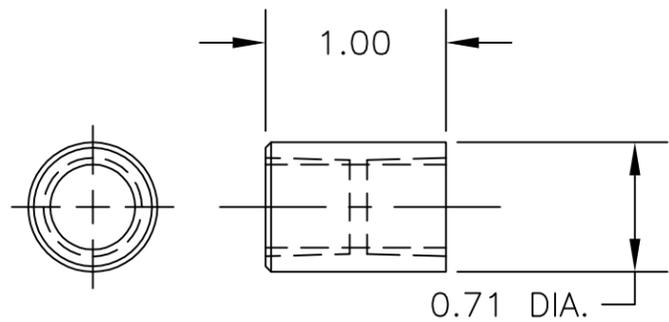
Customer: _____
 Project: MASTER CHART OF DISHED PLATES FOR GR150 BARS

DRAWN BY: CAC	ECO NO.: 410-1291
SCALE: NTS	C/O:
DATE: 1-18-00	APPRO BY:
SHEET NO. 1	TOTAL SHEETS 1
DESIGNED BY:	TECH REP:

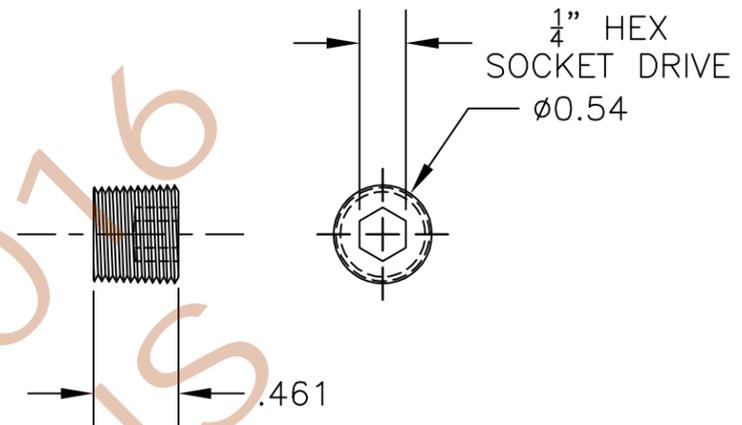
280 ANN ST. N.W., GRAND RAPIDS, MI 49504, PH: 616.365.9220 - FX: 616.365.2668

THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

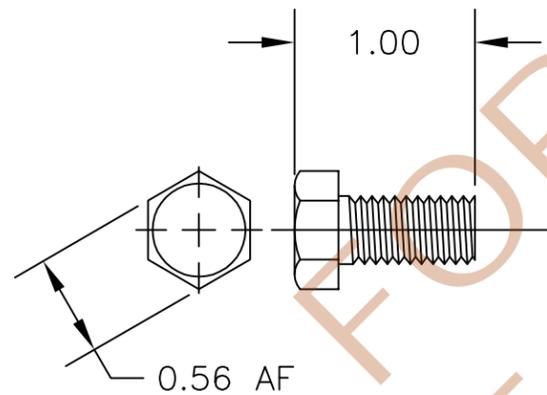
PRINT NO.: 1B-FK-5-129
 REV: C



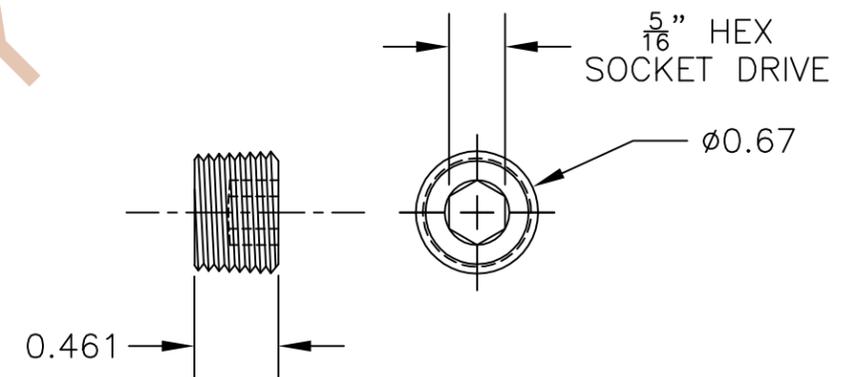
1/4" NPT SS316 PIPE COUPLING, 150 PSI RATED. (17)
PART NO.: STD.



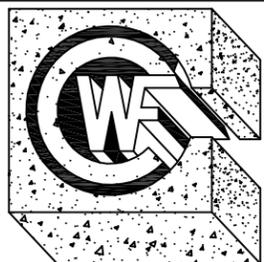
1/4" NPT SS316 PIPE HEX SOCKET PLUG, 150 PSI RATED. (18)
PART NO.: STD.



3/8" - 16UNC SS316 PIPE HEX SCREW, DE-AIR PLUG (16)
PART NO.: STD. (PLUG B, TEST 2, NDT)
(OPTIONAL PLUG FOR NYLON END CAP)



3/8" NPT SS316 PIPE COUPLING, 150 PSI RATED. (15)
PART NO.: STD. (PLUG A, TEST 2, NDT)



WILLIAMS
FORM ENGINEERING CORP.

<http://www.williamsform.com>

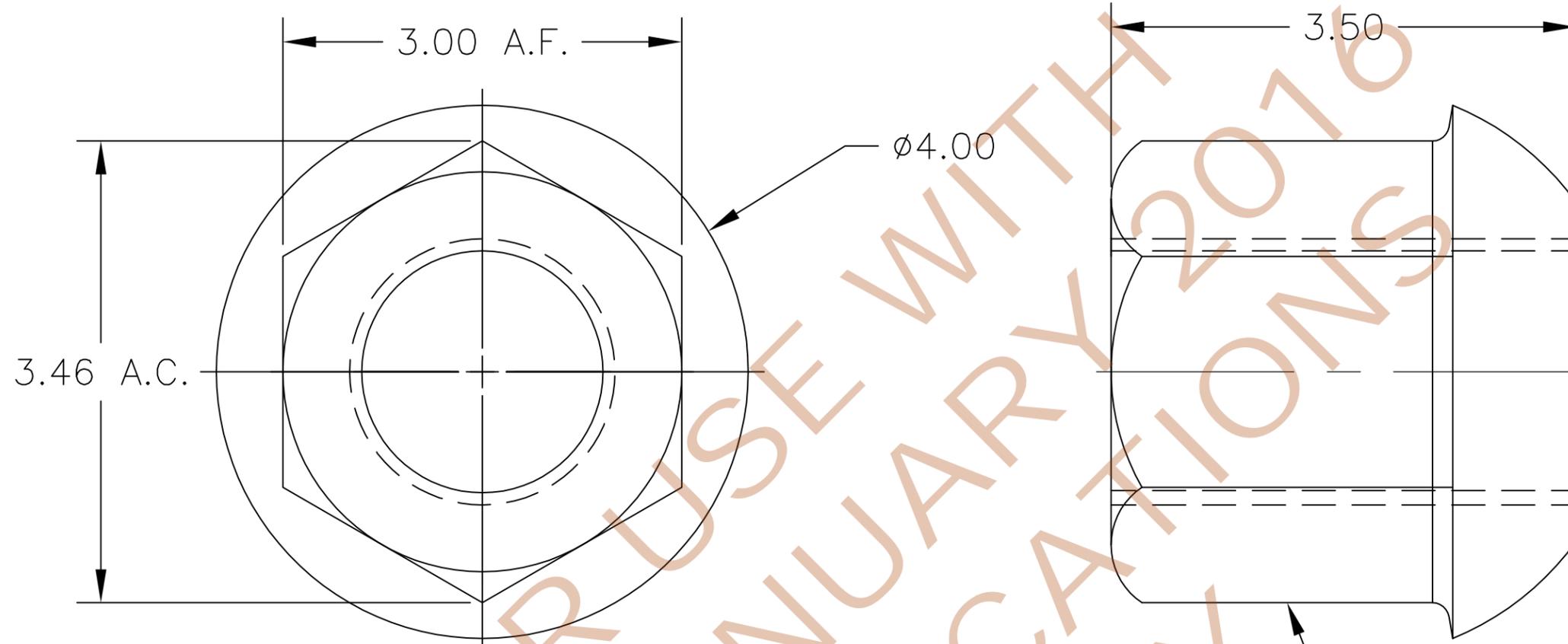
280 ANN ST. N.W., GRAND RAPIDS, MI 49504, PH: 616.365.9220 - FX: 616.365.2668

Customer: FDOT
Project: WMS. STD. PLUG AND PIPE FITTING
FOR INSECTION PORT ASSEMBLY,
AND NYLON REINFORCED END CAP.

DRAWN BY:	CAC/RHT	ECO NO.:	440-10113
SCALE:	FULL	C/O:	---
DATE:	10-18-04	APPRO BY:	---
SHEET NO.	1	DESIGNED BY:	---
TOTAL SHEETS	1	TECH REP:	---

THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

PRINT NO.: 1B-R7P-001-13 Ø



WMS. 46mm (1 3/4" nom.) SPHERICAL HEX NUT:
 ASTM A-536, 100-70-03, DUCTILE IRON



WILLIAMS
FORM ENGINEERING CORP.

<http://www.williamsform.com>

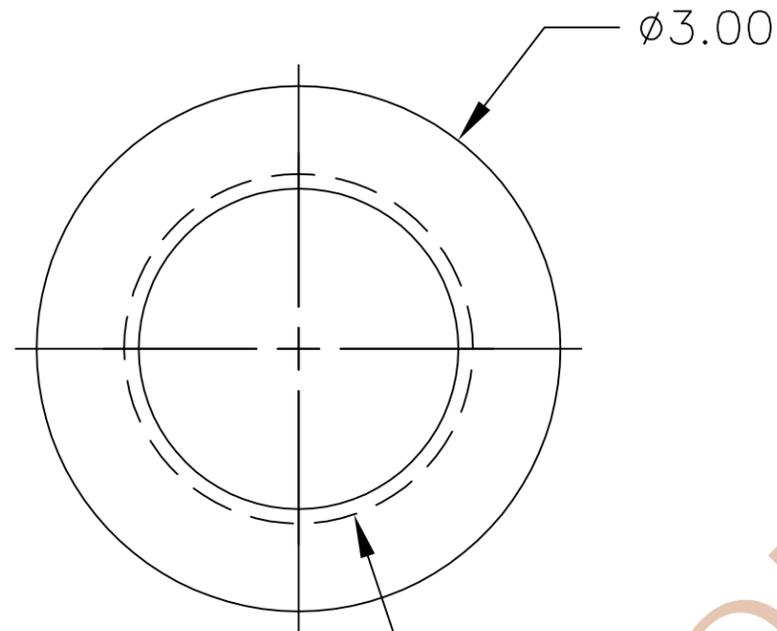
8165 GRAPHIC DR, BELMONT, MI 49306, PH: 616.866.0815 - FX: 616.8661890

Customer: VSL
 Project: WMS. 46mm (1 3/4" nom.) GR150 DOMED HEX NUT
 150 KSI 1-3/4" DOMED HEX NUT

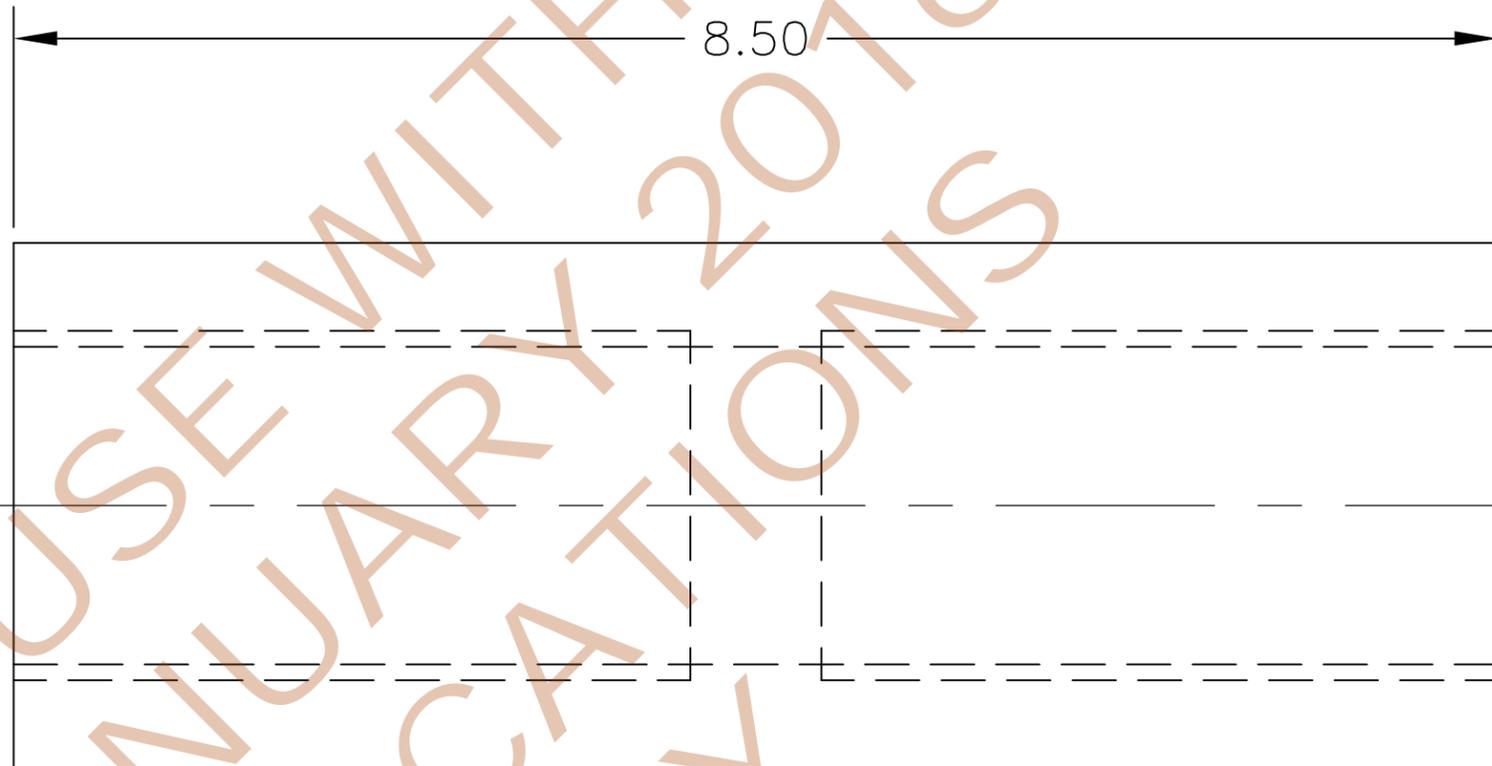
DRAWN BY: KRH		ECO NO.: 410-9241
SCALE: FULL		C/O: -----
DATE: 9-20-11		APPRO BY:
SHEET NO.	TOTAL SHEETS	DESIGNED BY:
2	9	TECH REP: JAW

THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

PRINT NO.: 1B-R7P-003-2
 REV: -



TAP 1 3/4" - 3 1/2 COIL
GR150



WILLIAMS
FORM ENGINEERING CORP.

<http://www.williamsform.com>

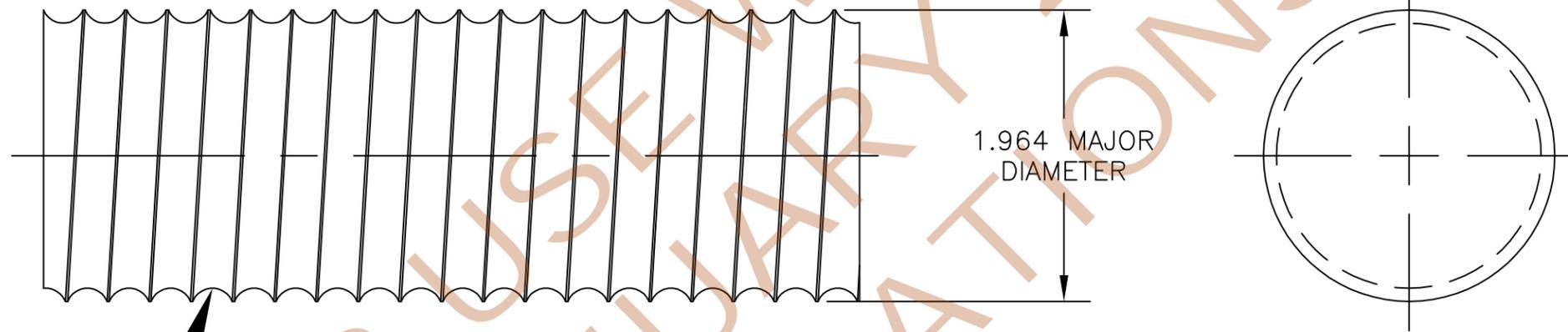
8165 GRAPHIC DR, BELMONT, MI 49306, PH: 616.866.0815 - FX: 616.8661890

Customer: VSL
Project: WMS. 46mm (1 3/4" nom.) GR150 STOP TYPE COUPLING

DRAWN BY: KRH	ECO NO.: 410-9241
SCALE: FULL	C/O: -----
DATE: 9-20-11	APPRO BY:
SHEET NO. TOTAL SHEETS	DESIGNED BY:
5 9	TECH REP: JAW

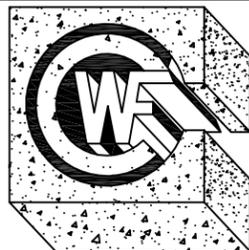
THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

PRINT NO.:	REV:
1B-R7P-003-5	-



WMS. 46mm (1 3/4" nom.) GRADE 150 KSI TYPE II, ALL-THREAD-BAR,
 ASTM A-722, AASHTO M275.

FOR PRELIMINARY SPECIFICATIONS ONLY 2016



WILLIAMS
FORM ENGINEERING CORP.

<http://www.williamsform.com>

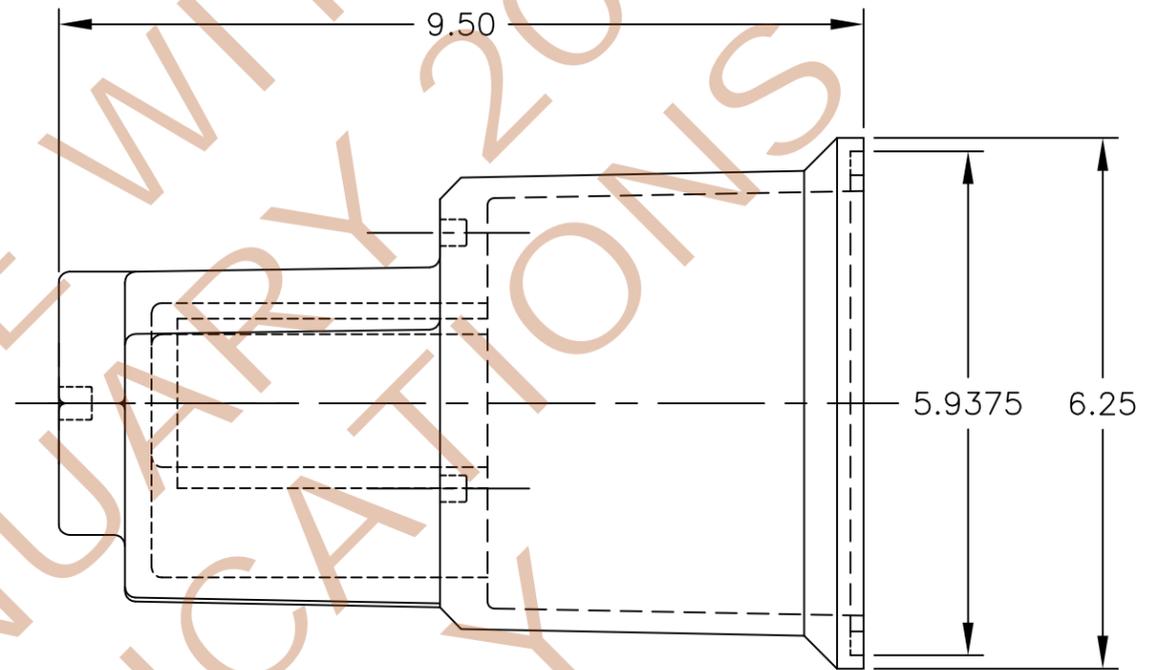
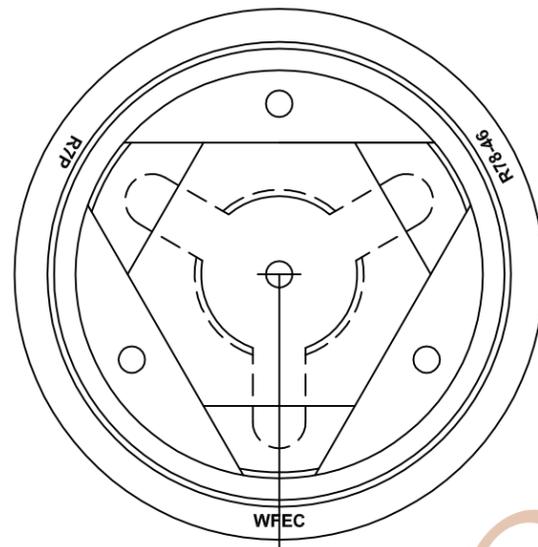
8165 GRAPHIC DR, BELMONT, MI 49306, PH: 616.866.0815 - FX: 616.8661890

Customer: VSL
 Project: WMS. 46mm (1 3/4" nom.) GR150 ALL-THREAD-BAR

DRAWN BY: KRH		ECO NO.: 410-9241
SCALE: FULL		C/O: -----
DATE: 9-20-11		APPRO BY:
SHEET NO.	TOTAL SHEETS	DESIGNED BY:
6	9	TECH REP: JAW

THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

PRINT NO.: **1B-R7P-003-6** REV: —



MATERIAL: NYLON 6, FIBERGLASS REINFORCED PER ASTM D-4066, SPA0221 AND D-5989, SPA0231

PRE-JANUARY 2016
 FOR USE WITH
 SPECIFIC APPLICATIONS ONLY



WILLIAMS
FORM ENGINEERING CORP.

<http://www.williamsform.com>

8165 GRAPHIC DR, BELMONT, MI 49306, PH: 616.866.0815 - FX: 616.8661890

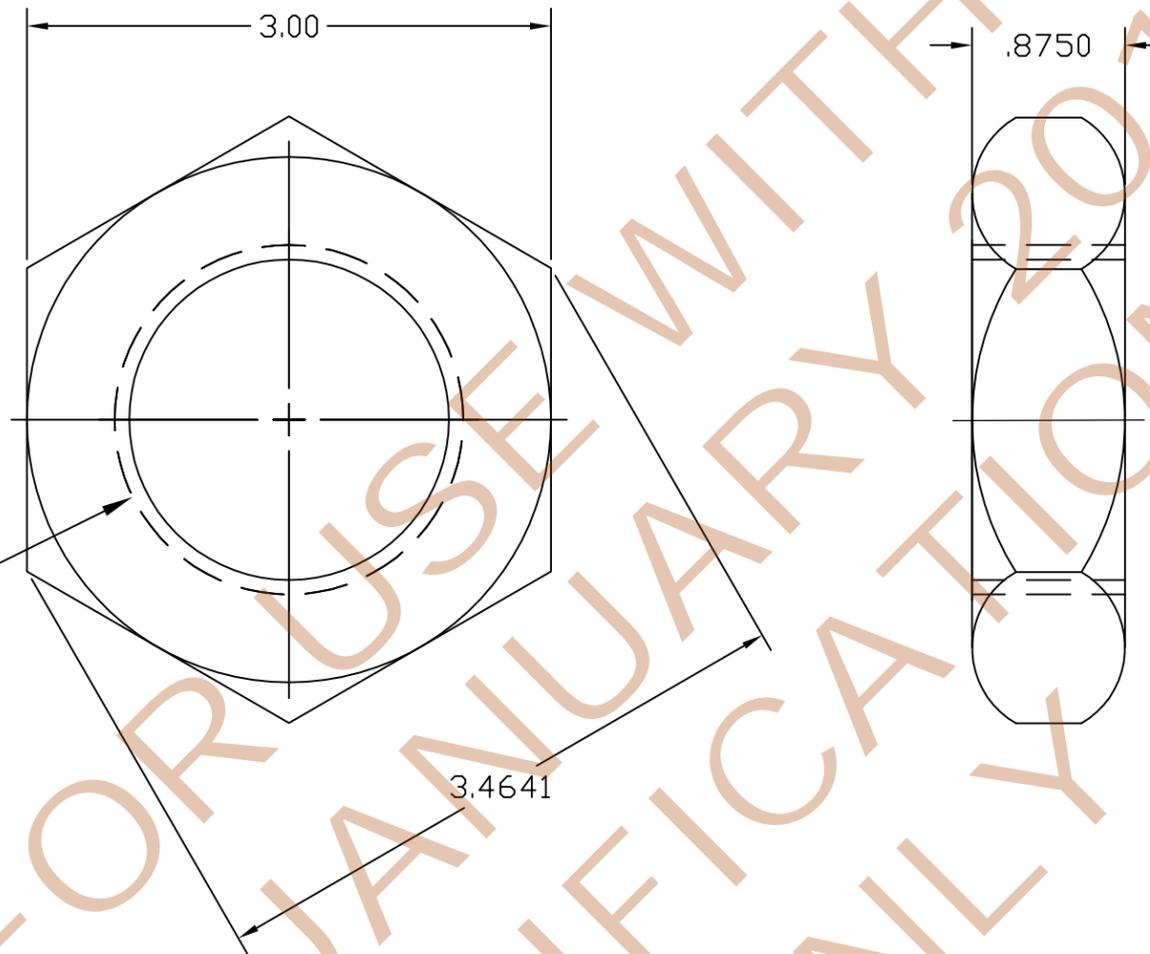
Customer: VSL
 Project: WMS. NYLON REINFORCED END CAP FOR 46mm GR150 KSI BAR

DRAWN BY: KRH		ECO NO.: 410-9241
SCALE: 1/2		C/O: -----
DATE: 9-20-11		APPRO BY:
SHEET NO.	TOTAL SHEETS	DESIGNED BY:
7	9	TECH REP: JAW

THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

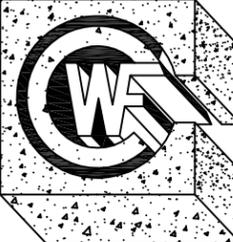
PRINT NO.: 1B-R7P-003-7
 REV: -

TAP 1 $\frac{3}{4}$ " -3 $\frac{1}{2}$ COIL
GR150



Customer: VSL
 Project: WMS. 46mm (1 3/4" nom.) GR150 JAM NUT

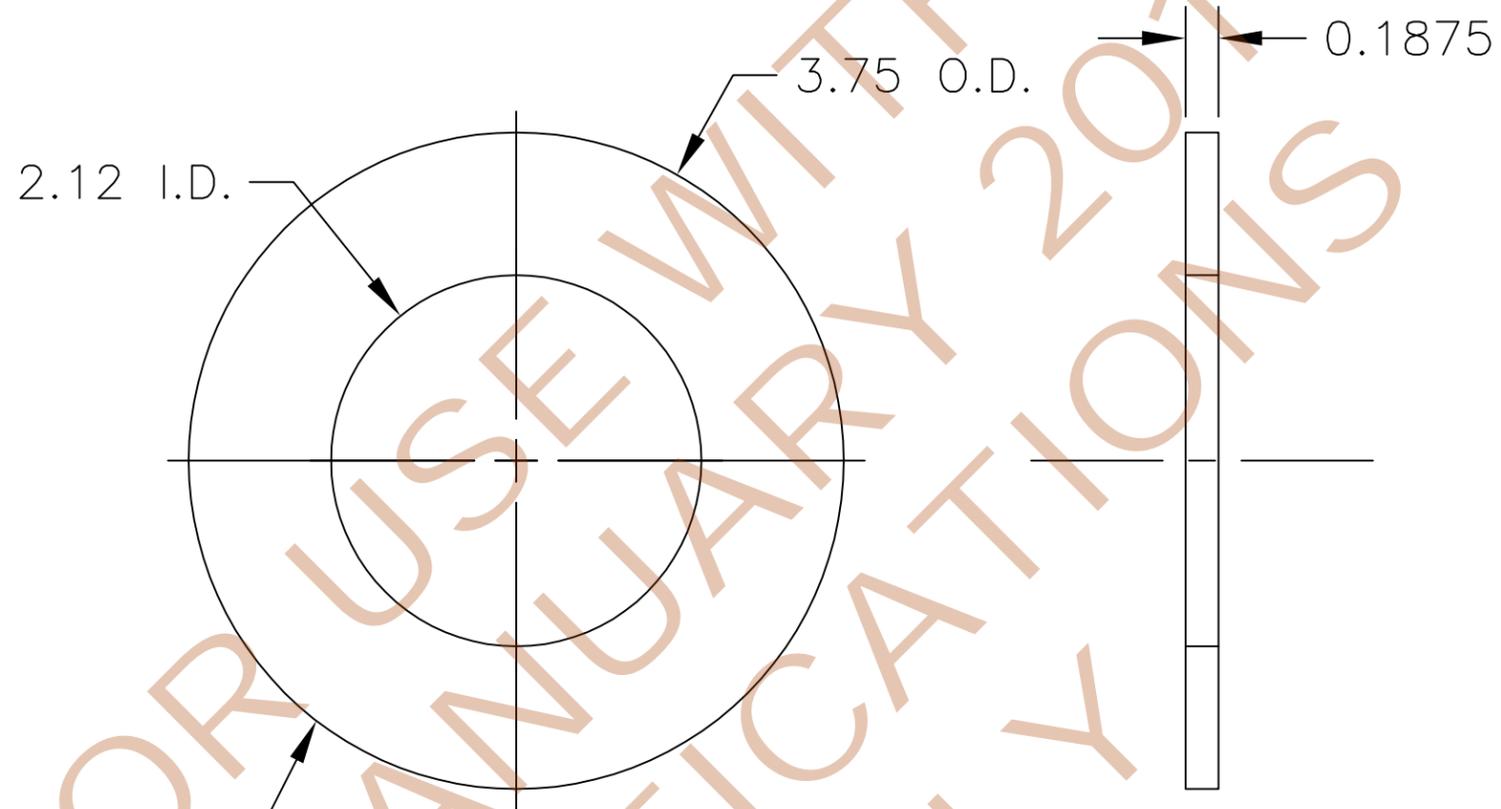
DRAWN BY: KRH	ECO NO.: 410-9241
SCALE: FULL	C/O: -----
DATE: 9-20-11	APPRO BY:
SHEET NO. 3	TOTAL SHEETS 9
DESIGNED BY:	
TECH REP: JAW	



WILLIAMS
FORM ENGINEERING CORP.
<http://www.williamsform.com>
 8165 GRAPHIC DR, BELMONT, MI 49306, PH: 616.866.0815 - FX: 616.8661890

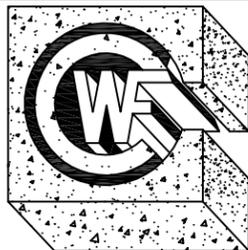
THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

PRINT NO.: 1B-R7P-003-3	REV: -
-------------------------	--------



WMS. 46mm (1 3/4" nom.) HARDENED WASHER:
 ASTM F-436, TYPE I, AASHTO M293

FOR USE WITH 2016
 PRELIMINARY SPECIFICATIONS ONLY



WILLIAMS
FORM ENGINEERING CORP.

<http://www.williamsform.com>

8165 GRAPHIC DR, BELMONT, MI 49306, PH: 616.866.0815 - FX: 616.8661890

Customer: VSL
 Project: WMS. 46mm (1 3/4" nom.) GR150 HARDENED WASHER

DRAWN BY: KRH		ECO NO.: 410-9241
SCALE: FULL		C/O: -----
DATE: 9-20-11		APPRO BY:
SHEET NO.	TOTAL SHEETS	DESIGNED BY:
4	9	TECH REP: JAW

THIS DRAWING IS THE PROPERTY OF WILLIAMS FORM ENGINEERING CORPORATION AND IS SUBMITTED TO THE CONTRACTOR SOLELY AS A SUGGESTED DESIGN FOR APPROVAL BY HIS JOB DESIGN AGENCY. IT IS SUBJECT TO RECALL AND MUST NOT BE REPRODUCED OR ITS CONTENTS DIVULGED WITHOUT WRITTEN PERMISSION. ALL WILLIAMS PRODUCTS ARE PATENTED OR HAVE PATENTS APPLIED FOR.

PRINT NO.: 1B-R7P-003-4
 REV: -

CanusaTube™ - PLA

Tubular sleeve for pipeline corrosion protection

For more than 35 years, Canusa-CPS has been a leading developer and manufacturer of specialty pipeline coatings for the sealing and corrosion protection of pipeline joints and other substrates. Canusa-CPS high performance products are manufactured to the highest quality standards and are available in a number of configurations to accommodate many specific project applications.

Product Description

The CanusaTube™ is a heat shrinkable tubular sleeve designed for corrosion protection of buried and exposed steel pipelines. CanusaTube™ consists of a crosslinked polyolefin backing, coated with a protective heat sensitive adhesive which effectively bonds to steel substrates and common pipeline coatings including polyethylene and fusion bonded epoxy.

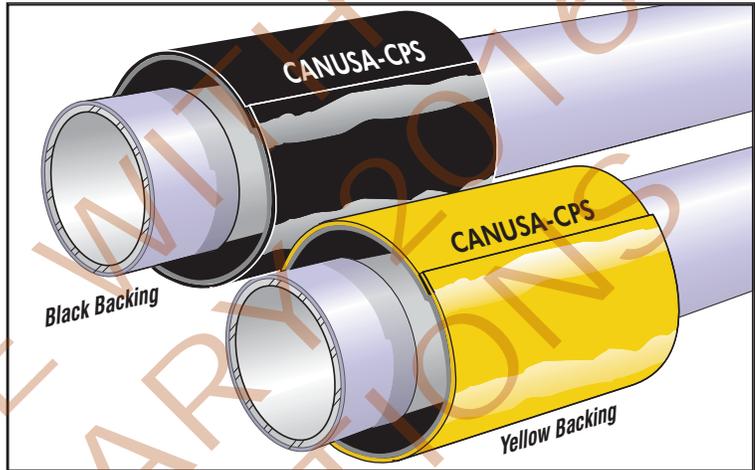
Features & Benefits

Rapid & Reliable Installation

Because CanusaTube™ consists of a unique tubular configuration that has been factory constructed, quick and reliable field installation is easy to accomplish. CanusaTube™ is available with a specially formulated adhesive to accommodate demanding operating temperatures and soil stress conditions. To further optimize installation, CanusaTube™ is available in yellow which includes a thermochromic indicator to visually confirm proper installation.

Long Term Corrosion Protection

CanusaTube™ provides excellent resistance to cathodic disbondment resulting in effective long term corrosion protection. The high performance crosslinked backing in combination with the specially formulated adhesive is engineered to have excellent resistance against temperature cycling, and chemical and environmental attack.



Saves Time & Money

With CanusaTube's™ unique construction, less time is required handling, positioning and installing separate closures. With the application of heat, this feature allows for fast, simple and complete installation of the sleeve. No additional costly primers are required. This minimizes installation time and labour costs while promoting high production rates. CanusaTube™ is also available in a high shrink ratio for high profile joint protection. Consult the High Shrink data sheet for additional information.

Applications

-  Oil & Gas
-  Girth-Weld Joints
-  Water Pipelines
-  Pre-Insulated Pipes
-  Utility Poles

Configurations

-  CanusaTube™
-  2-Layer
-  Standard Shrink

Pipe Sizes

-  55 - 315 (2" - 12")

Temperature Range

-  up to 55°C (131°F)

Approvals

-  DIN 30672

The product selection chart shown here is intended as a guide for standard products. Consult your Canusa representative for specific projects or unique applications. The following are typical values based on Black, Heavy Duty (L) Sleeves.

CanusaTube™ - PLA

Product Selection Guide Choose your sleeve based on your Pipe Diameter

Shrink Range	Nominal Pipe Diameter DN (inches)	Outside Pipe Diameter mm (inches)	Tubular Sleeve PLA XXX-YYY ZZ	Tubular Sleeve Diameter	
				As Supplied mm (in)	Fully Recovered mm (in)
	50 (2)	61 (2.4)	PLA 55-YYY ZZ	90 (3.5)	55 (2.3)
	65 (2.5)	76 (3)	PLA 63-YYY ZZ	90 (3.5)	63 (2.5)
	80 (3)	89 (3.5)	PLA 90-YYY ZZ	120 (4.8)	81 (3.3)
	90 (3.5)	102 (4)	PLA 100-YYY ZZ	130 (5)	90 (3.5)
	100 (4)	114 (4.5)	PLA 115-YYY ZZ	145 (5.5)	98 (3.8)
	125 (5)	141 (5.5)	PLA 125-YYY ZZ	160 (6.3)	110 (4.3)
	150 (6)	168 (6.6)	PLA 170-YYY ZZ	205 (8)	140 (5.5)
	200 (8)	219 (8.6)	PLA 230-YYY ZZ	260 (10)	180 (7)
	250 (10)	273 (10.7)	PLA 280-YYY ZZ	315 (12.3)	211 (8.3)
	300 (12)	324 (12.8)	PLA 315-YYY ZZ	360 (14)	245 (9.5)

For pipe diameters > DN300 (12"), consult your Canusa representative.

Operating Characteristics

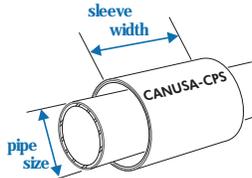
Sleeve Operating Characteristics	Celsius Fahrenheit		Hot Melt PLA
	Pipeline Operating Temperature	70° 158°	60° 140°
	50° 120°		very good
	40° 104°		very good
	30° 85°		very good
Minimum Installation Temp.	°C (°F)		60 (140)
Resistance to Circumferential Forces			very good
Resistance to Soil Stress			very good
Resistance to Axial Pipe Movement			very good
Main Line Coating Compatibility			PU, PE, FBE, PP

Typical Product Properties

Adhesive	Test Standard	Unit	PLA	
	Softening Point	ASTM E28	°C (°F)	72 (162)
Lap Shear	DIN 30 672	N/cm ² (psi)	60 (87)	
Backing	Specific Gravity	ASTM D792	0.93	
	Tensile Strength	ASTM D638	MPa (psi)	20 (2900)
	Elongation	ASTM D638	%	600
	Hardness	ASTM D2240	Shore D	46
	Abrasion Resistance	ASTM D1044	mg	45
Sleeve	Volume Resistivity	ASTM D257	ohm-cm	10 ¹⁷
	Dielectric Voltage Brkdown	ASTM D149	kV/mm	20
	Impact	DIN 30 672	class B	pass
	Indentation	DIN 30 672	class B	pass
	Peel	ASTM D1000	N/cm (pli)	50 (29)
Peel	DIN 30 672	N/cm (pli)	35 (20)	
Cathodic Disbondment	ASTM G8	mm rad	13	
Water Absorption	ASTM D570	%	0.05	
Low Temp. Flexibility	ASTM D2671-C	°C (°F)	-32 (-26)	
DIN Approval	DIN 30 672	class	B50	
Fully Recovered Thickness		mm (mils)	2.3 (92)	

How To Order:

Dimensions & Ordering Info	PLA 115-450 YE	
		Standard Ordering Options
Colour	YE - Yellow, BK - Black	
Sleeve Width	300mm, 450mm, 600mm, 900mm (12", 18", 24", 36")	
Pipe Size	55mm - 315mm (2" - 12")	
Adhesive (thickness as supplied)	A - 0.75 mm (30 mils)	
Backing (thickness as supplied)	L - 0.80 mm (31 mils)	
Configuration	P - Tubular	



Min. Sleeve Width = Bare Steel Dimension + 50 mm (2") min. on each side of the pipe joint.

The above represent standard ordering options. Consult your Canusa representative for any unique project requirements.



www.canusacps.com

Canada

CANUSA-CPS
a division of SHAWCOR LTD.
25 Bethridge Road
Toronto, Ontario
M9W 1M7,
Canada
Tel: +1 (416) 743-7111
Fax: +1 (416) 743-5927

U.S.A./Latin America

CANUSA-CPS
a division of SHAWCOR INC.
2408 Timberloch Place
Building C-8
The Woodlands, Texas
77380, U.S.A.
Tel: +1 (281) 367-8866
Fax: +1 (281) 367-4304

Europe/Middle East

CANUSA-CPS
a division of Canusa Systems Ltd.
Unit 3, Sterling Park
Gatwick Road
Crawley, West Sussex
England RH10 9QT
Tel: +44 (1293) 541254
Fax: +44 (1293) 541777

Asia/Pacific

CANUSA-CPS
a division of SHAWCOR LTD.
#05-31, Blk 52, Frontier
Ubi Avenue 3
Singapore
408867
Tel: +65-6749-8918
Fax: +65-6749-8919

Canusa warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the installation guide when used in compliance with Canusa's written instructions. Since many installation factors are beyond our control, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection therewith. Canusa's liability is stated in the standard terms and conditions of sale. Canusa makes no other warranty either expressed or implied. All information contained in this installation guide is to be used as a guide and is subject to change without notice. This installation guide supersedes all previous installation guides on this product. E&OE

Printed on recycled paper. ♻️ Recyclable. PDS-CTpla-rev013