

The **Penny+Giles ICT050 Contactless In-Cylinder Linear Transducer** has been specifically designed for small bore mobile and static hydro-pneumatic actuators.

Designed primarily for the off-highway markets, the ICT050 linear transducer provides reliable, fit-and-forget position sensing of the cylinder rod in actuators with strokes up to 500mm.

It is a robust, non-contact transducer suitable for the harsh conditions of lifting and steering position applications and hydro-pneumatic active suspension systems. It works on an inductive coil principle, with virtually infinite resolution and is capable of withstanding temperatures up to 200°C and working pressures up to 500Bar.



## ICT050 IN-CYLINDER LINEAR TRANSDUCER

[www.pennyandgiles.com](http://www.pennyandgiles.com)

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info@penny-giles.de

1	2	3	4	5	6	7	8	9	10
<b>METRIC</b> IF IN DOUBT ASK		<b>SPECIFICATION</b>							
ELECTRICAL STROKE LENGTH 'E'		25mm TO 200mm (IN 5mm INCREMENTS) 210mm TO 500mm (IN 10mm INCREMENTS)							
TEMPERATURE RANGE (OPERATING)		SEE ORDERING CODE							
TEMPERATURE RANGE (STORAGE)		-55°C TO +200°C							
TEMPERATURE PERFORMANCE		$\leq \pm 100$ ppm OF ELECTRICAL STROKE/°C (+20°C TO +60°C) $\leq \pm 200$ ppm OF ELECTRICAL STROKE/°C (-20°C TO +100°C) $\leq \pm 300$ ppm OF ELECTRICAL STROKE/°C (-20°C TO +200°C)							
LEAST SQUARES LINEARITY		$\leq \pm 0.75\%$ STROKE MAX							
RESOLUTION		INFINITE							
MAX. WORKING PRESSURE		500 BAR							
INSULATION RESISTANCE		YELLOW/ BLUE TO CASE $>50M\Omega$ @50Vdc SCREEN TO CASE $>50M\Omega$ @50Vdc							
GREEN WIRE BONDING RESISTANCE		$< 1 + (0.21 \times \text{CABLE LENGTH IN METRES}) \Omega$ , e.g. 20M CABLE = $1 + (0.21 \times 20) = 5.20 \Omega$							

**NOTES**

- STROKE LENGTH 'E' SPECIFIED BY CUSTOMER WITHIN RANGE 25mm TO 500mm.
- THESE SPECIFICATIONS APPLY ONLY WHEN THE ICT IS OPERATED IN CONJUNCTION WITH A Penny & Giles 'EICT' ELECTRONIC MODULE.
- ELECTRONIC MODULES ARE ORDERED SEPARATELY, SEE APPROPRIATE Penny & Giles DATA SHEET (S)

**PROGRAMMING MODULE**  
EACH TRANSDUCER IS SUPPLIED WITH A SENSOR LENGTH MODULE CALIBRATED TO MATCH THE ELECTRICAL STROKE LENGTH 'E'. THE MODULE IS PLUGGED INTO THE REQUIRED 'EICT' ELECTRONIC MODULE VIA MATING CONNECTORS. IT IS IMPORTANT THE TRANSDUCER STROKE LENGTH AND THE SENSOR LENGTH MODULE STROKE LENGTH ARE MATCHED.

E.G. SENSOR LENGTH MODULE SA204323/200  
TRANSDUCER ICT050/EM/T/200

**ORDERING CODE THREADED FLANGE**

ICT 050/\_\_\_/\_\_\_/\_\_\_/\_\_\_/\_\_\_

**FLANGE OPTION**  
EM = EXTERNAL METRIC FLANGE  
EU = EXTERNAL UNIFIED FLANGE  
RM = REVERSED THREADED METRIC FLANGE  
RU = REVERSED THREADED UNIFIED FLANGE

**CORE OPTION**  
SC = SLEEVED CORE  
TU = THREADED CORE UNIFIED  
TM = THREADED CORE METRIC  
FF = FORCE FIT

STROKE LENGTH 'E' IN mm \_\_\_\_\_

**CABLE OPTION**  
P5 = 0.5m CABLE  
01 = 1.0m CABLE  
06 = 6.0m CABLE

TEMPERATURE RANGE (OPERATING)  
H = -20°C TO +200°C  
L = -55°C TO +120°C

**ORDERING CODE INTERNAL FLANGE**

ICT 050/\_\_\_/\_\_\_/\_\_\_/\_\_\_/\_\_\_

**FLANGE OPTION**  
IN = INTERNAL FLANGE

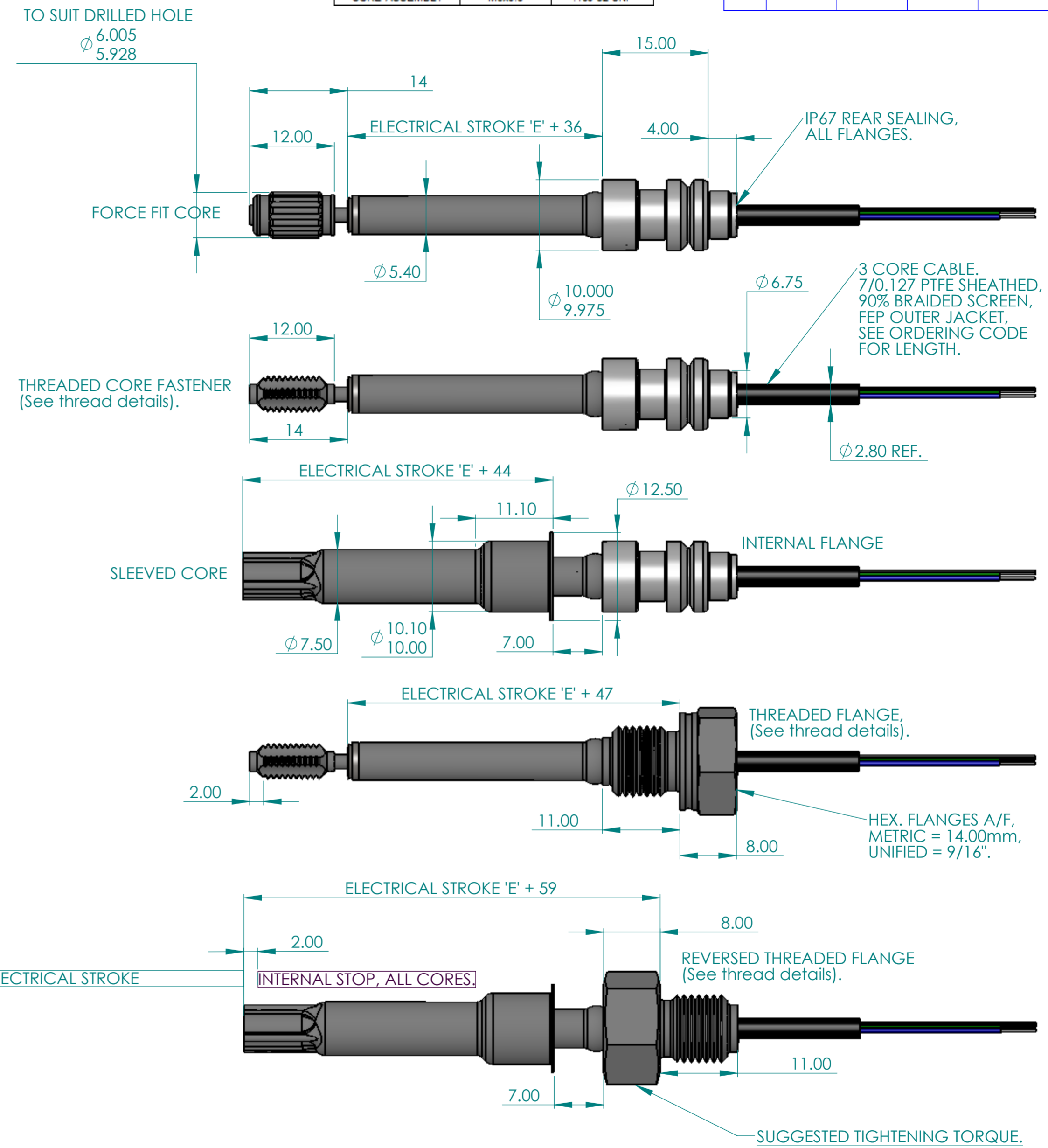
**CORE OPTION**  
SC = SLEEVED CORE  
TM = THREADED CORE METRIC  
TU = THREADED CORE UNIFIED  
FF = FORCE FIT

STROKE LENGTH 'E' IN mm \_\_\_\_\_

TEMPERATURE RANGE (OPERATING)  
H = -20°C TO +200°C  
L = -55°C TO +120°C

THREAD DETAILS		
THREADED & REVERSE	METRIC THREAD	UNIFIED THREAD
THREADED FLANGE	M10x1.0	3/8"-24 UNF
CORE ASSEMBLY	M5x0.8	.190-32 UNF

ISS	DATE	DRAWN	ECR No.	CHK	APP
9	08/02/11	S COLE	10426/22	M BENTLEY	M BENTLEY



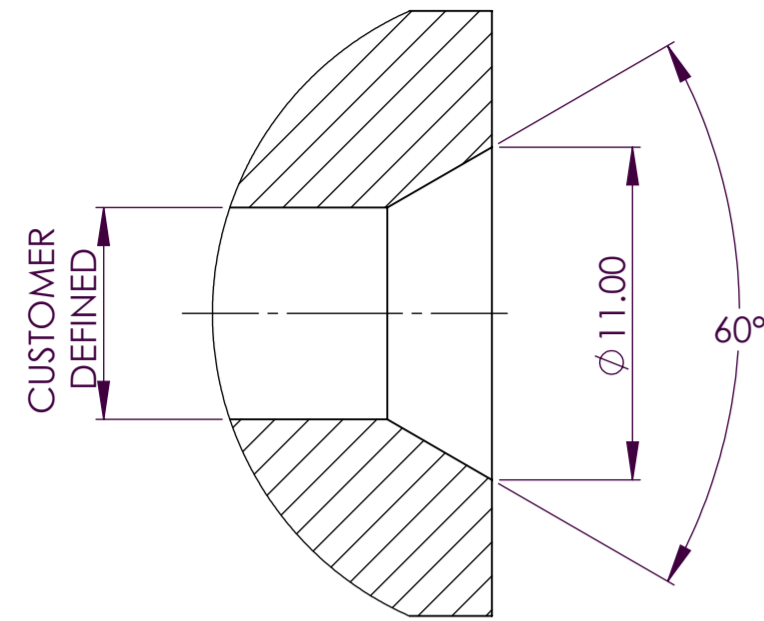
**FOR SUGGESTED FITTING PROFILES AND DIMENSIONS REFER TO AI203558 (H TEMP RANGE) OR AI208549 (L TEMP RANGE)**

SCALE	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No.	MATERIAL	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES (µm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6	TITLE	<b>PENNY + GILES</b>	A2
UNLESS STATED	MASS (g)	VOL. (mm <sup>3</sup> )	REF.	FINISH	CLEAN	IN CYLINDER TRANSDUCER	PART NUMBER: <b>ICT050</b>
THIRD ANGLE PROJECTION TO BS 8888							SHT 1 OF 1 SHTS

**METRIC**  
IF IN DOUBT ASK

ISS	DATE	DRAWN	ECR No.	CHK	APP
2B	09/02/11	S COLE	10426/22	M BENTLEY	M BENTLEY

PISTON ROD END DETAIL TO ASSIST  
BLIND LOADING OF LONGER STROKE  
INTERNAL FLANGE OPTIONS



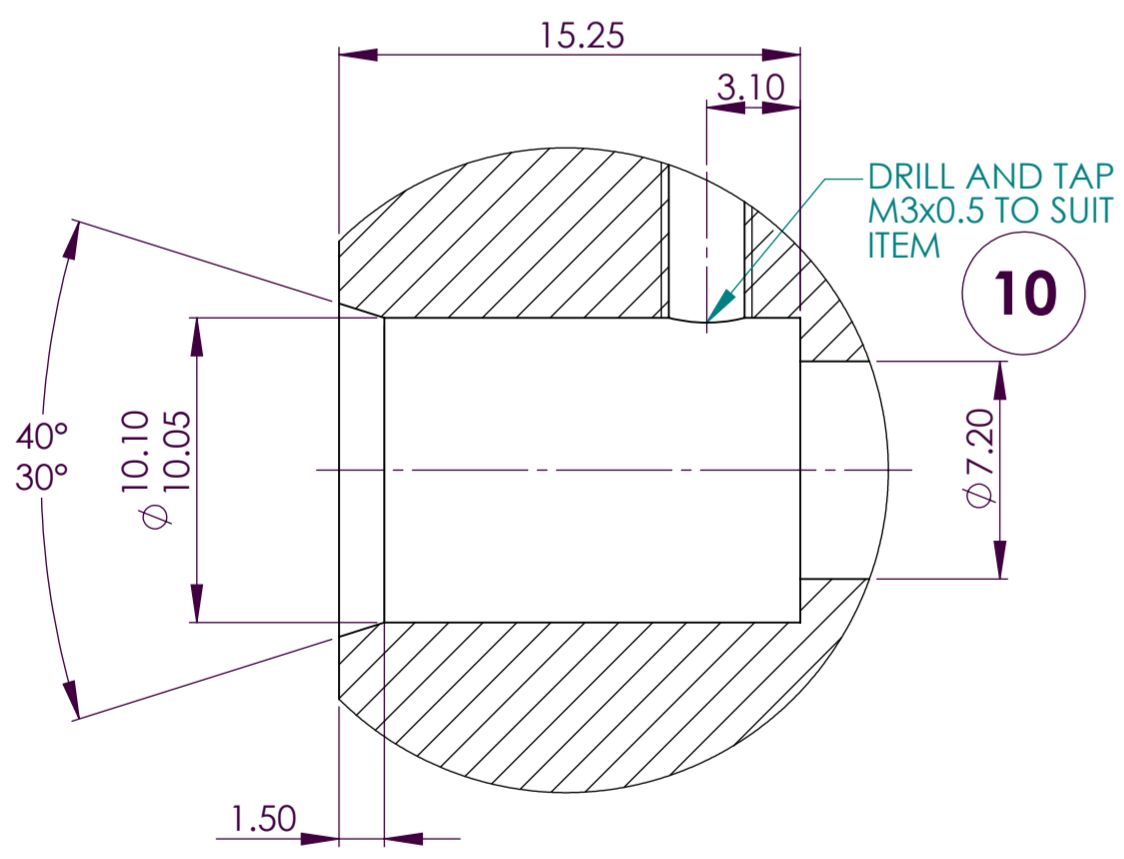
ITEM NO.	DESCRIPTION	P&G PART No.	QTY.
1	THIN NUT M5x0.8	X63-072-050	1
2	FULL NUT 0.190-32 UNF	X63-111-003	1
3	WAVEY WASHER - ELP2	X63-112-002	2
4	SHIM WASHER	P55044/3	1
5	CIRCLIP D1300-0130	X69-005-109	1
6	O'RING BROWN(7.65x1.63)	X64-194-114	1
7	O'RING (8.1x1.6)	X64-194-015	1
8	O'RING (7x2)	X64-194-016	1
9	ANTI EXTRUSION RING	X64-081-001	1
10	M3x0.5 CONICAL SET SCREW	X63-096-305	1
11	COPY OF AI203558	AI203558	1
12	LABEL (SUPPLIED LOOSE)	P200919	1
13	INSTALATION KIT LABEL	P204986	1
14	ALTERNATE CABLE GLAND SEAL	X61-213-202	1

ITEM 12, LABEL, IS SUPPLIED FOR THE CUSTOMER TO RECORD ICT ORDERING CODE AND TO BE FITTED IN VISIBLE LOCATION ADJACENT TO SENSOR FOR RE-ORDERING REFERENCE.  
ITEM 14, ALTERNATE CABLE GLAND SEAL, IS SUPPLIED FOR CONNECTING ICT050 DIRECT TO EICTM.

BECAUSE OF THE MULTIPLICITY OF POTENTIAL APPLICATION, THE INSTALLATION DETAILS SHOWN ARE SUGGESTIONS ONLY. THE USER SHOULD ENSURE THAT THE DESIGN, METHOD OF ASSEMBLY AND MATERIALS USED ARE SATISFACTORY FOR THE INSTALLATION.

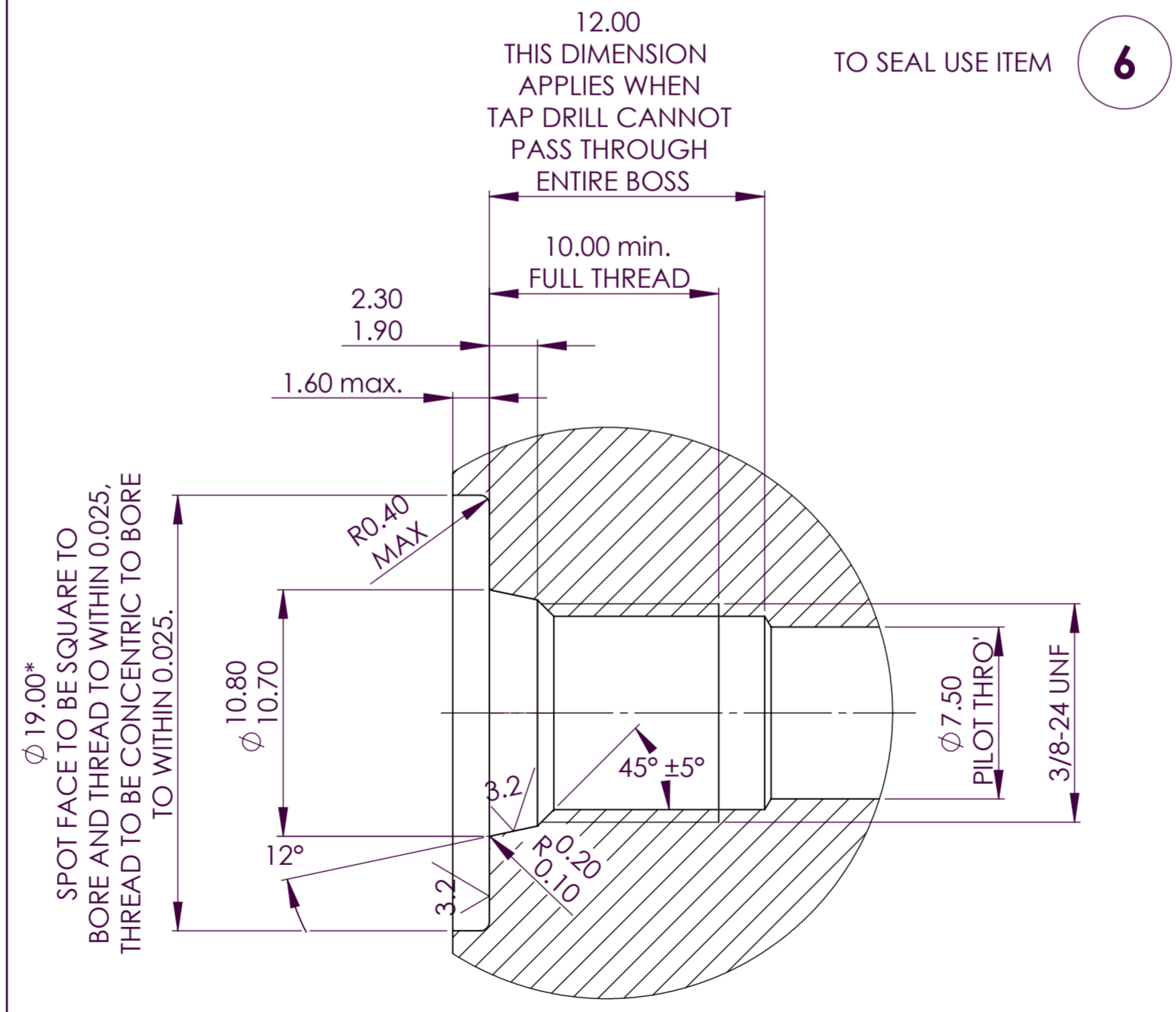
INTERNAL FLANGE  
MACHINING DETAILS

TO SEAL USE ITEMS **8** & **9**



MACHINING DETAILS FOR UNIFIED FLANGE.  
PORT CONFORMS TO SAE J1926/1, CONNECTIONS FOR FLUID POWER AND GENERAL USE - PORTS AND STUD ENDS WITH ISO 725 THREADS AND O'RING SEALING - PART 1: THREADED PORTS WITH O'RING SEAL IN TRUNCATED HOUSING

SUITABLE PORT CUTTERS ARE AVAILABLE FOR THESE DETAILS.....

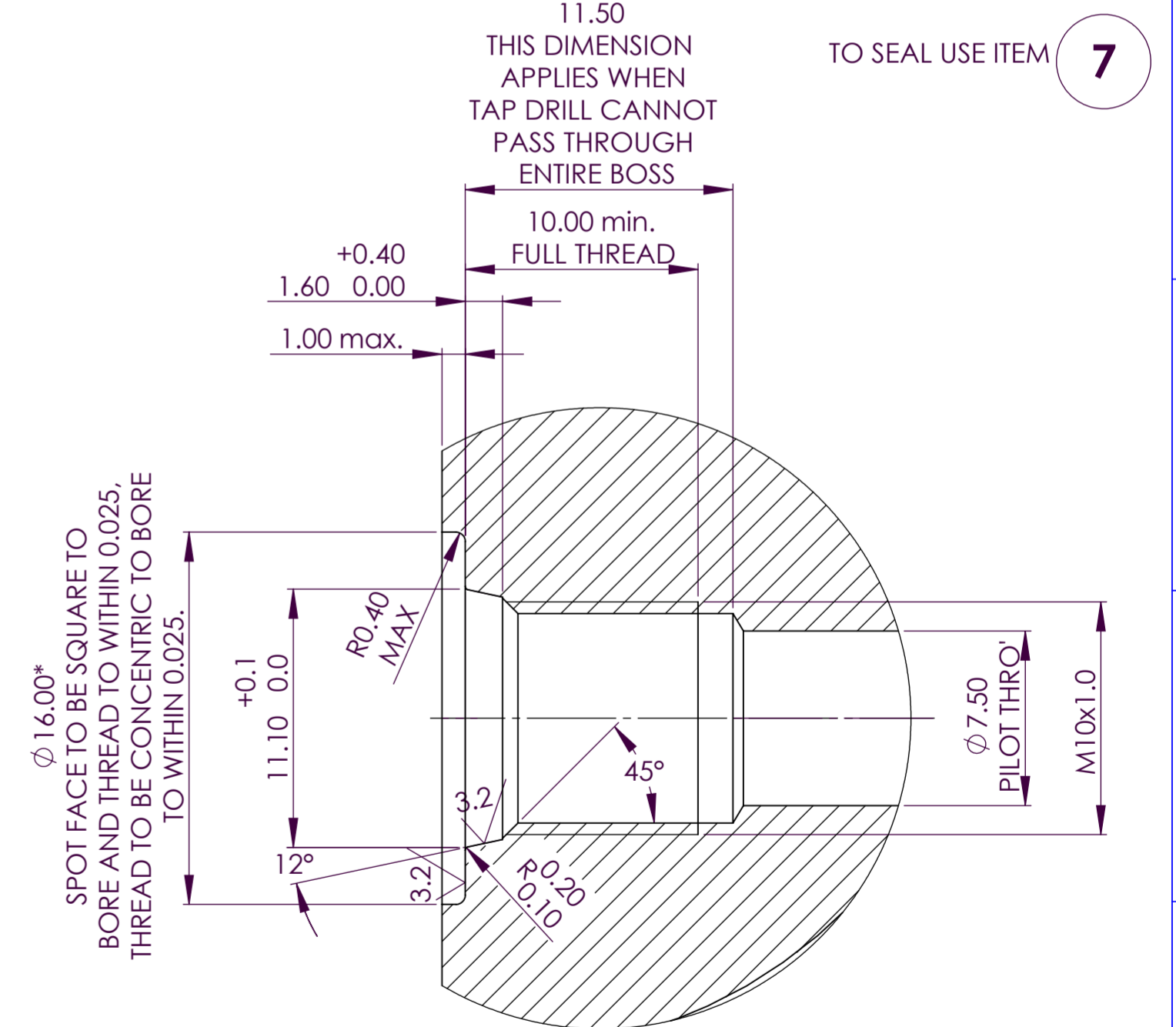


SPOT FACE TO BE SQUARE TO BORE AND THREAD TO WITHIN 0.025, THREAD TO BE CONCENTRIC TO BORE TO WITHIN 0.025.

\* IF FACE OF PORT IS MACHINED DIMENSIONS  $\phi 19.00 \times 1.6 \text{ max}$  NEED NOT APPLY AS LONG AS R0.2/0.1 IS MAINTAINED TO AVOID DAMAGE TO O-RING DURING INSTALLATION.

MACHINING DETAILS FOR METRIC FLANGE.  
PORTS CONFORM TO ISO 6149-1:1993, CONNECTIONS FOR FLUID POWER AND GENERAL USE - PORTS AND STUD ENDS WITH ISO 261 THREADS AND O'RING SEALING - PART 1: PORTS WITH O'RING SEAL IN TRUNCATED HOUSING

SUITABLE PORT CUTTERS ARE AVAILABLE FOR THESE DETAILS.....



SPOT FACE TO BE SQUARE TO BORE AND THREAD TO WITHIN 0.025, THREAD TO BE CONCENTRIC TO BORE TO WITHIN 0.025.

\* IF FACE OF PORT IS MACHINED DIMENSIONS  $\phi 16.00 \times 1.00 \text{ max}$  NEED NOT APPLY AS LONG AS R0.2/0.1 IS MAINTAINED TO AVOID DAMAGE TO O-RING DURING INSTALLATION.

SCALE	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No.	MATERIAL
UNLESS STATED		ICT050	
	MASS (g)	REF.	FINISH
	VOL. (mm <sup>3</sup> )	AI56140	

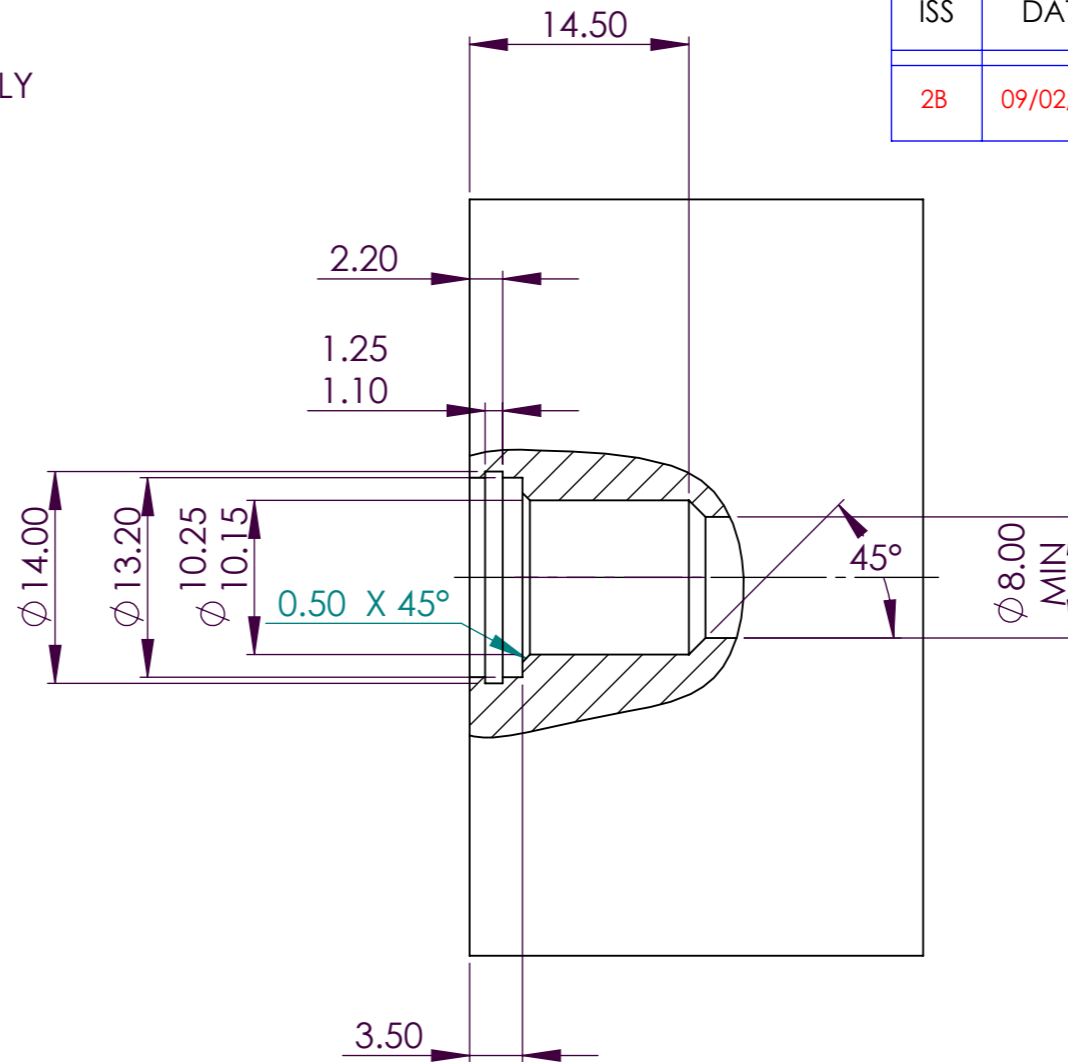
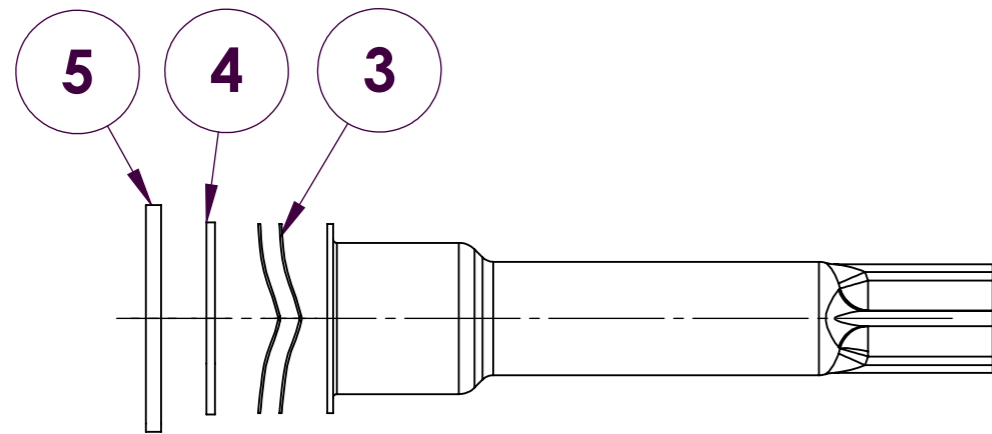
TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301	TITLE
SURFACE TEXTURE VALUES IN MICROMETRES (µm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6	SUGGESTED ICT050 INSTALLATION DETAILS AND INSTALLATION KIT 'H' TEMP RANGE
ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H	
ANGULAR ± 1°	
LINEAR 0. mm +/- 0.5 mm	
0.0 mm +/- 0.2 mm	
0.00mm +/- 0.1mm	
0.000mm +/- 0.01mm	
BREAK EDGE 0.05 - 0.15mm	
FILLET RADS 0.1 - 0.3mm	
UNLESS OTHERWISE STATED	

<p align="center"><b>PENNY + GILES</b></p> <p align="center">PART NUMBER: <b>AI203558</b></p>		<p align="center"><b>A2</b></p> <p align="center">SHT 1 OF 2 SHTS</p>
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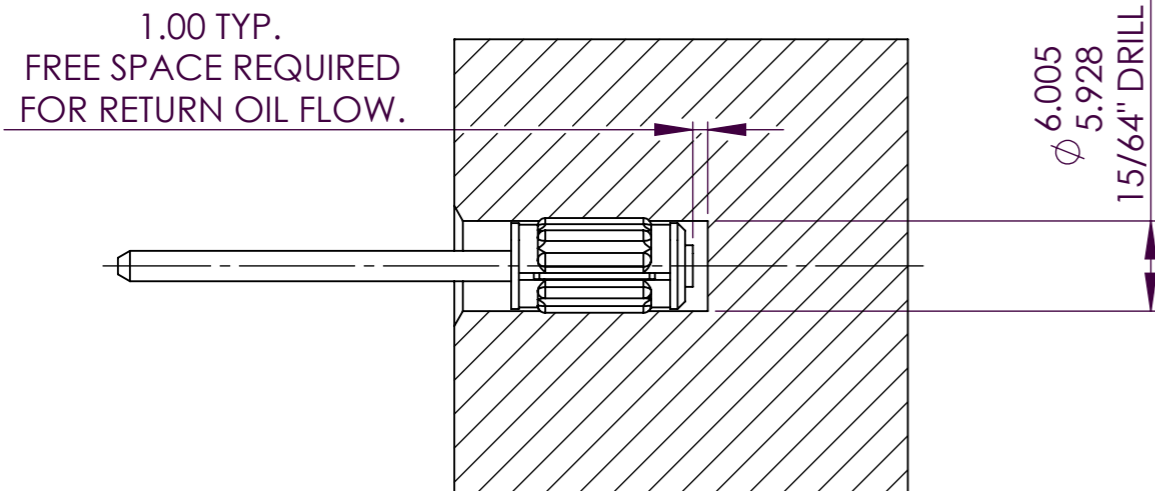
**METRIC**  
IF IN DOUBT ASK

ISS	DATE	DRAWN	ECR No.	CHK	APP
2B	09/02/11	S COLE	10426/22	M BENTLEY	M BENTLEY

**SLEEVED CORE ASSEMBLY  
MACHINING DETAILS**



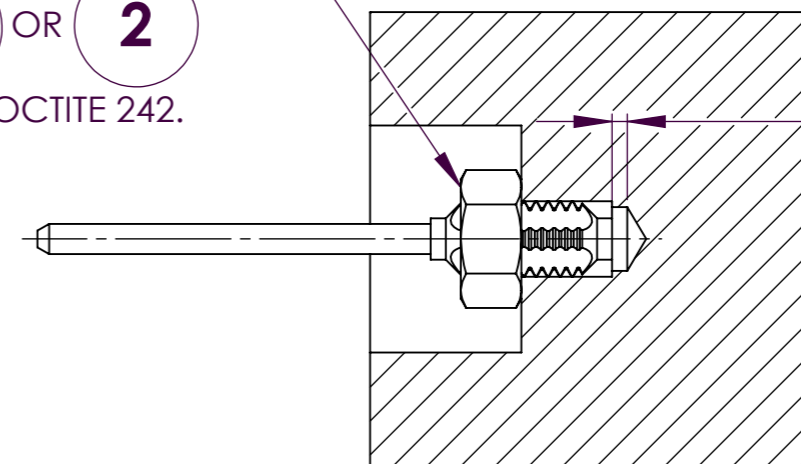
**FORCE FIT CORE  
MACHINING DETAILS**



NOTE- INSTALLATION TOOL  
REQUIRED SEE P&G DRAWING T56726

**THREADED CORE ASSEMBLY  
M5 x 0.8 OR 0.190-32 UNF**

LOCK CORE ASSEMBLY  
WITH NUT  
**1** OR **2**  
AND LOCTITE 242.



SCALE UNLESS STATED 	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No <b>ICT050</b>	MATERIAL	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES (µm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6 ✓ ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H	TITLE <b>SUGGESTED ICT050 INSTALLATION DETAILS AND INSTALLATION KIT 'H' TEMP RANGE</b>	<b>PENNY + GILES</b>	<b>A3</b>
THIRD ANGLE PROJECTION TO BS 8888	MASS (g) VOL. (mm <sup>3</sup> )	FIRST USED ON <b>Al56140</b>	FINISH	ANGULAR ± 1° LINEAR 0. mm +/- 0.5 mm 0.0 mm +/- 0.2 mm 0.00mm +/- 0.1mm 0.000mm +/- 0.01mm (MACHINING) BREAK EDGE 0.05 - 0.15mm FILLET RADS 0.1 - 0.3mm UNLESS OTHERWISE STATED	PART NUMBER: <b>Al203558</b>	SHT 2 OF 2 SHTS	

**METRIC**  
IF IN DOUBT ASK

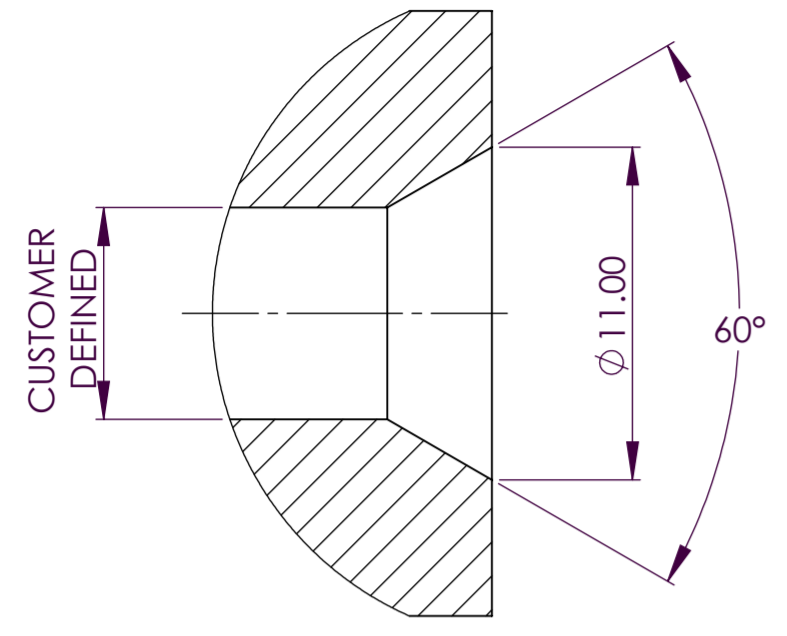
ISS	DATE	DRAWN	ECR No.	CHK	APP
1	09/02/11	S COLE	10426/22	M BENTLEY	M BENTLEY

ITEM NO.	DESCRIPTION	P&G PART No.	QTY.
1	THIN NUT M5x0.8	X63-072-050	1
2	FULL NUT 0.190-32 UNF	X63-111-003	1
3	WAVEY WASHER - ELP2	X63-112-002	2
4	SHIM WASHER	P55044/3	1
5	CIRCLIP D1300-0130	X69-005-109	1
6	O'RING BROWN(7.65x1.63)	X64-213-014	1
7	O'RING (8.1x1.6)	X64-213-015	1
8	O'RING (7x2)	X64-213-016	1
9	ANTI EXTRUSION RING	X64-081-001	1
10	M3x0.5 CONICAL SET SCREW	X63-096-305	1
11	COPY OF AI208549	AI208549	1
12	LABEL (SUPPLIED LOOSE)	P200919	1
13	INSTALATION KIT LABEL	P208550	1
14	ALTERNATE CABLE GLAND SEAL	X61-213-202	1

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ITEM 12, LABEL, IS SUPPLIED FOR THE CUSTOMER TO RECORD ICT ORDERING CODE AND TO BE FITTED IN VISIBLE LOCATION ADJACENT TO SENSOR FOR RE-ORDERING REFERENCE.  
ITEM 14, ALTERNATE CABLE GLAND SEAL, IS SUPPLIED FOR CONNECTING ICT050 DIRECT TO EICTM.

PISTON ROD END DETAIL TO ASSIST BLIND LOADING OF LONGER STROKE INTERNAL FLANGE OPTIONS

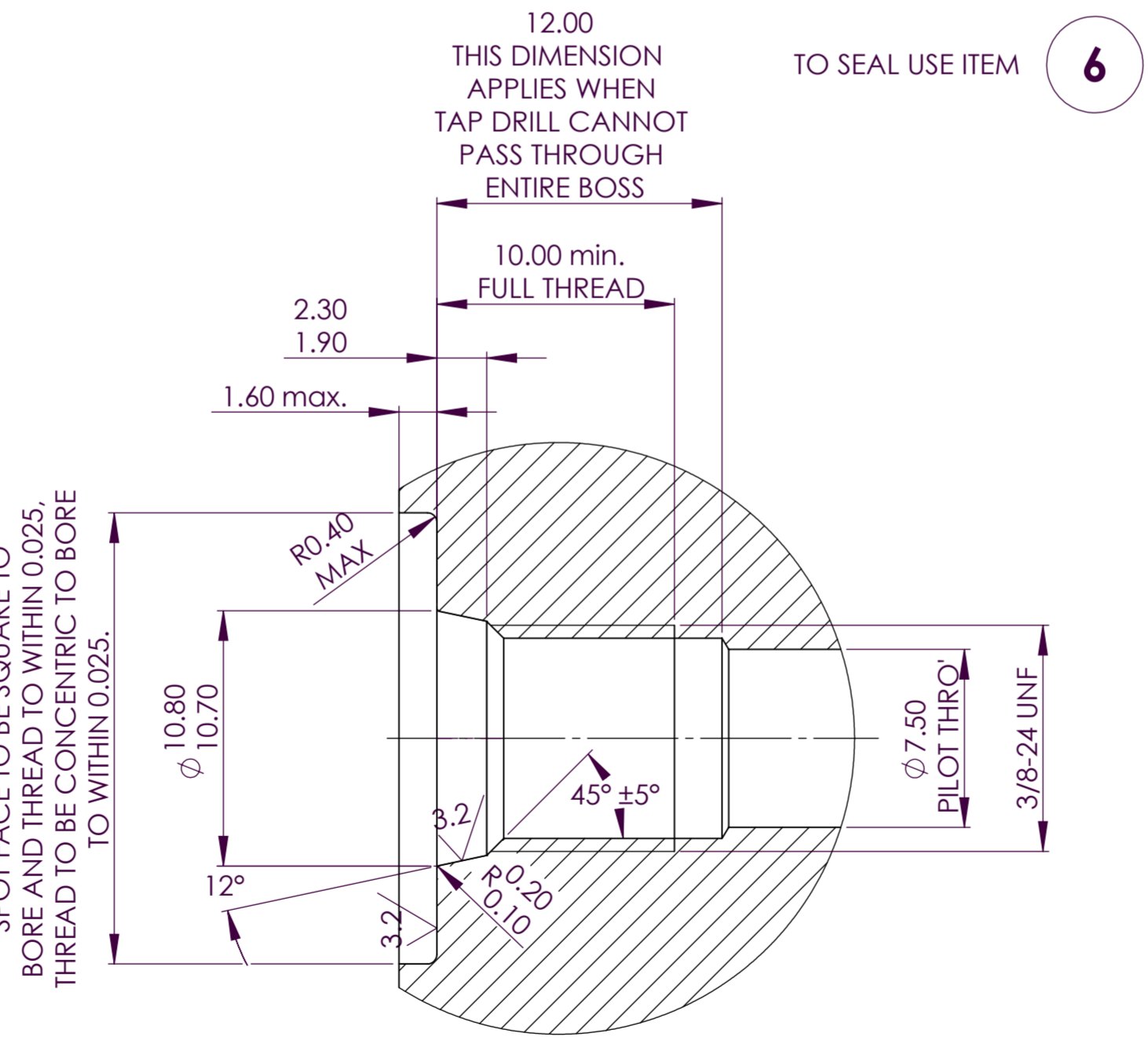
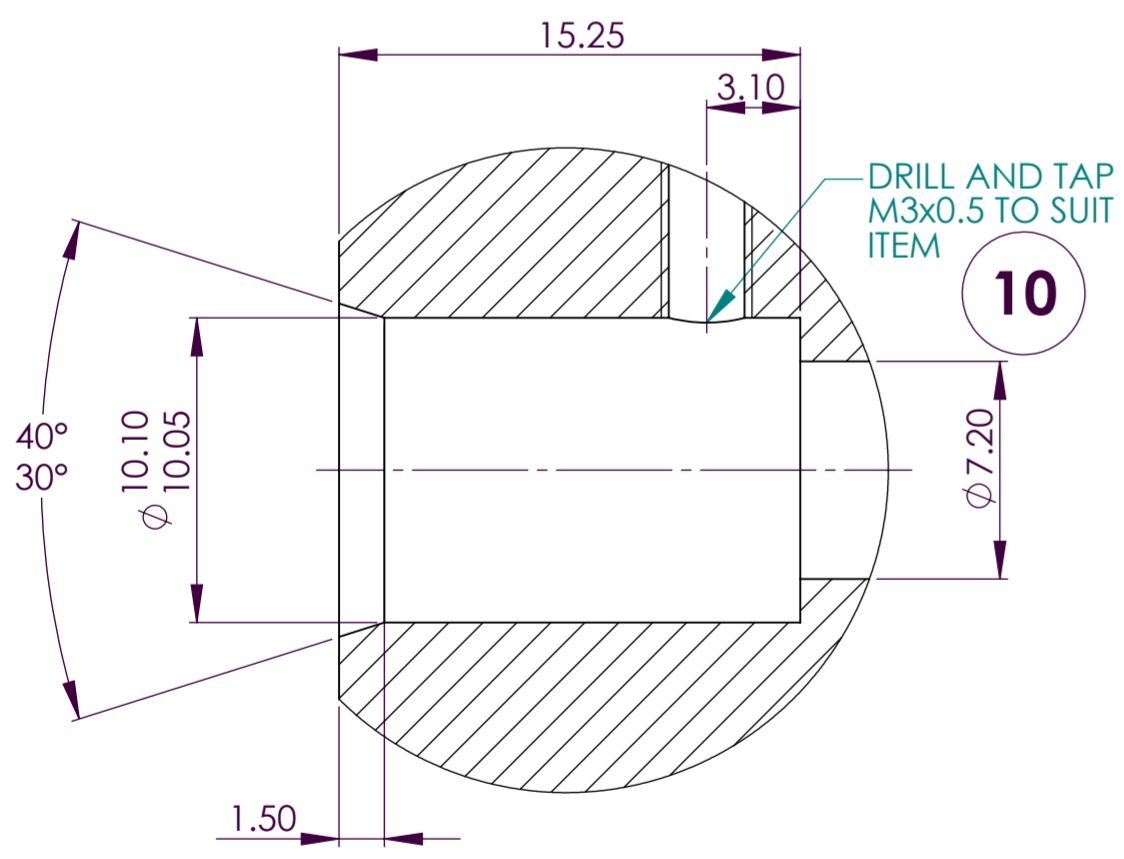


MACHINING DETAILS FOR UNIFIED FLANGE.  
PORT CONFORMS TO SAE J1926/1, CONNECTIONS FOR FLUID POWER AND GENERAL USE - PORTS AND STUD ENDS WITH ISO 725 THREADS AND O'RING SEALING - PART 1: THREADED PORTS WITH O'RING SEAL IN TRUNCATED HOUSING

SUITABLE PORT CUTTERS ARE AVAILABLE FOR THESE DETAILS.....

INTERNAL FLANGE MACHINING DETAILS

TO SEAL USE ITEMS **8** & **9**

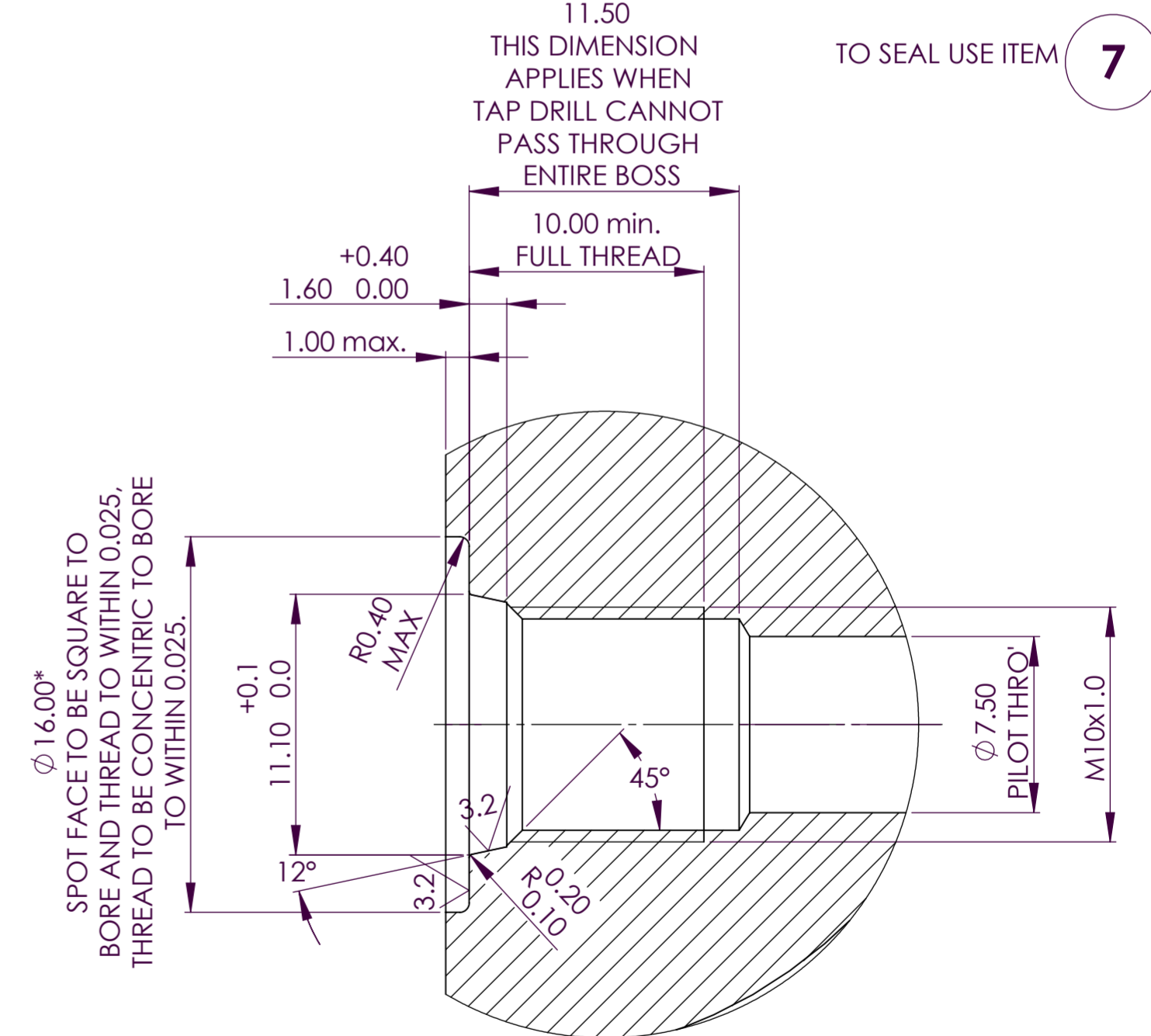


\* IF FACE OF PORT IS MACHINED DIMENSIONS  $\phi 19.00 \times 1.6 \text{ max}$  NEED NOT APPLY AS LONG AS R0.2/0.1 IS MAINTAINED TO AVOID DAMAGE TO O-RING DURING INSTALATION.

MACHINING DETAILS FOR METRIC FLANGE.  
PORTS CONFORM TO ISO 6149-1:1993, CONNECTIONS FOR FLUID POWER AND GENERAL USE - PORTS AND STUD ENDS WITH ISO 261 THREADS AND O'RING SEALING - PART 1: PORTS WITH O'RING SEAL IN TRUNCATED HOUSING

SUITABLE PORT CUTTERS ARE AVAILABLE FOR THESE DETAILS.....

TO SEAL USE ITEM **7**



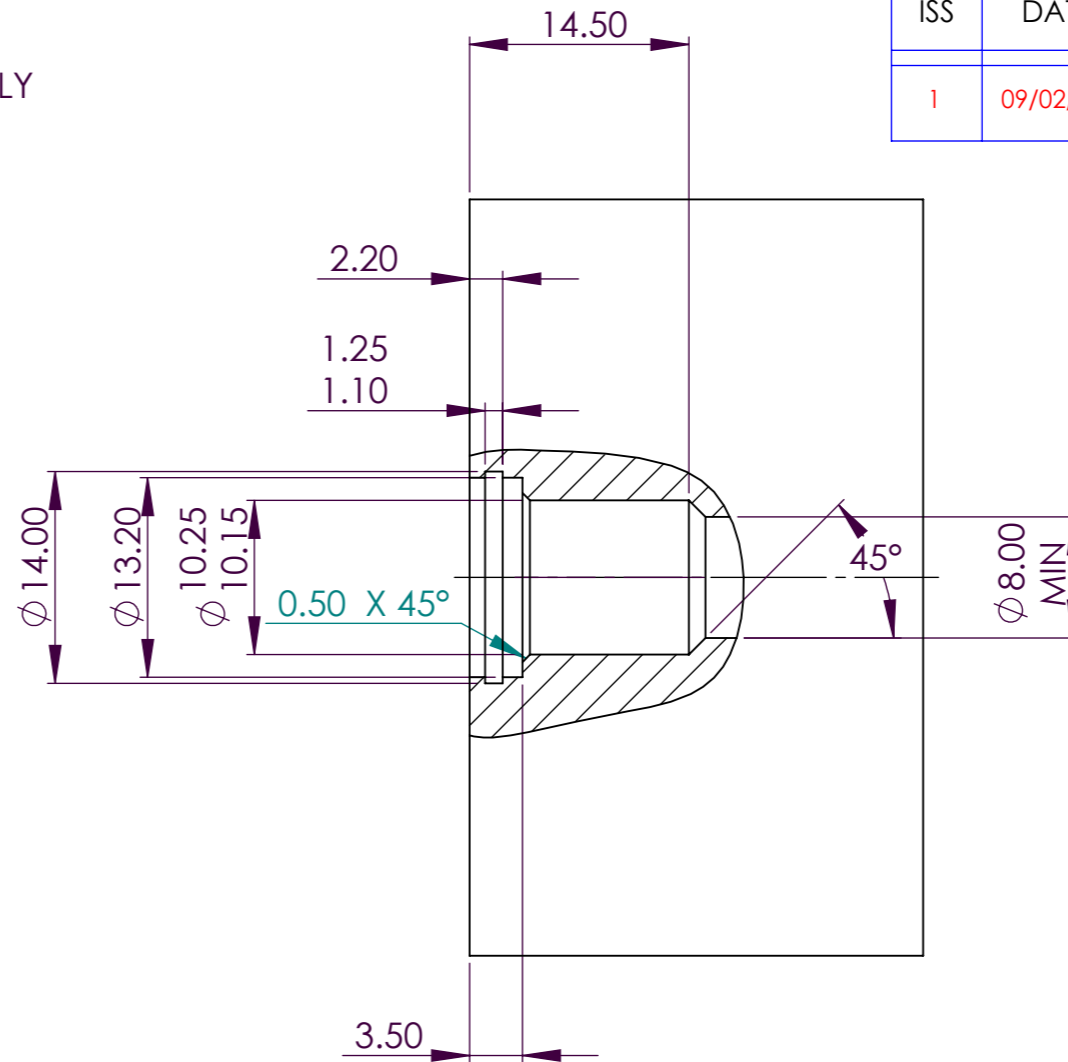
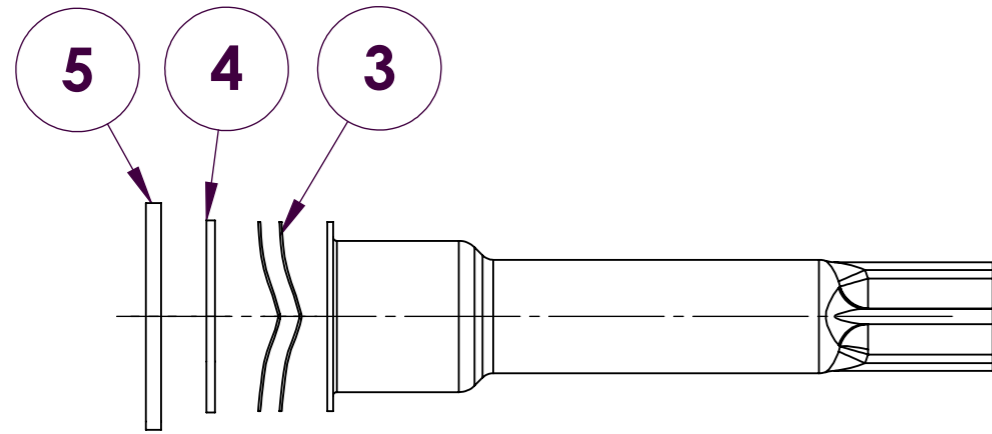
\* IF FACE OF PORT IS MACHINED DIMENSIONS  $\phi 16.00 \times 1.00 \text{ max}$  NEED NOT APPLY AS LONG AS R0.2/0.1 IS MAINTAINED TO AVOID DAMAGE TO O-RING DURING INSTALATION.

SCALE UNLESS STATED	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No. <b>ICT050</b>	MATERIAL	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES ( $\mu\text{m}$ ) TO BS1134:PT2. ALL MACHINED SURFACES TO BE $1.6$	TITLE <b>SUGGESTED ICT050 INSTALLATION DETAILS AND INSTALLATION KIT 'L' TEMP RANGE</b>	<b>PENNY + GILES</b>	A2
MASS (g)	VOL. (mm <sup>3</sup> )	REF. <b>AI56140</b>	FINISH	ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H ANGULAR $\pm 1^\circ$ LINEAR 0.0mm +/-0.5mm 0.0mm +/-0.2mm 0.00mm +/-0.1mm 0.000mm +/-0.01mm BREAK EDGE 0.05-0.15mm FILLET RADS 0.1-0.3mm UNLESS OTHERWISE STATED	<b>PART NUMBER: AI208549</b>	SHT 1 OF 2 SHTS	

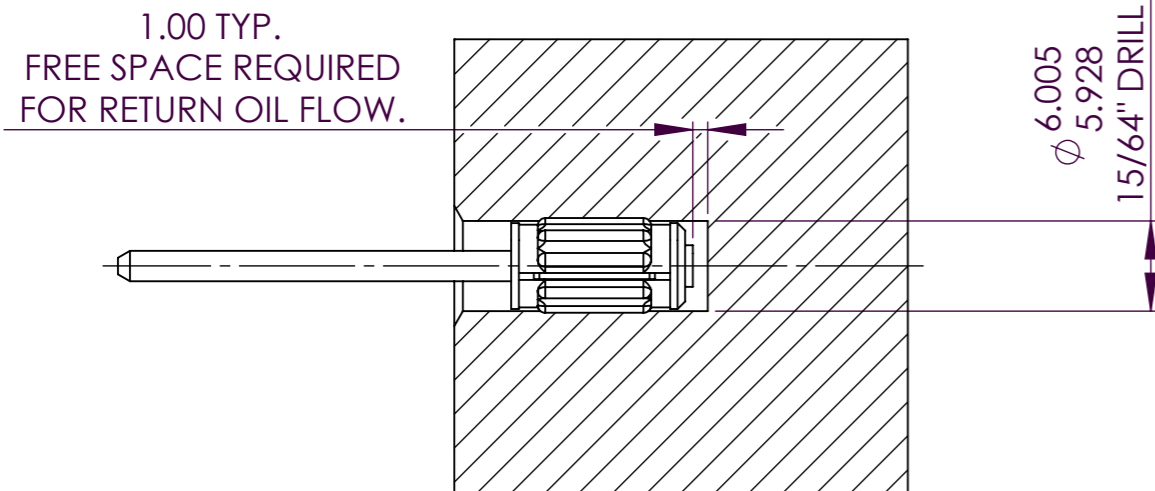
**METRIC**  
IF IN DOUBT ASK

ISS	DATE	DRAWN	ECR No.	CHK	APP
1	09/02/11	S COLE	10426/22	M BENTLEY	M BENTLEY

**SLEEVED CORE ASSEMBLY  
MACHINING DETAILS**



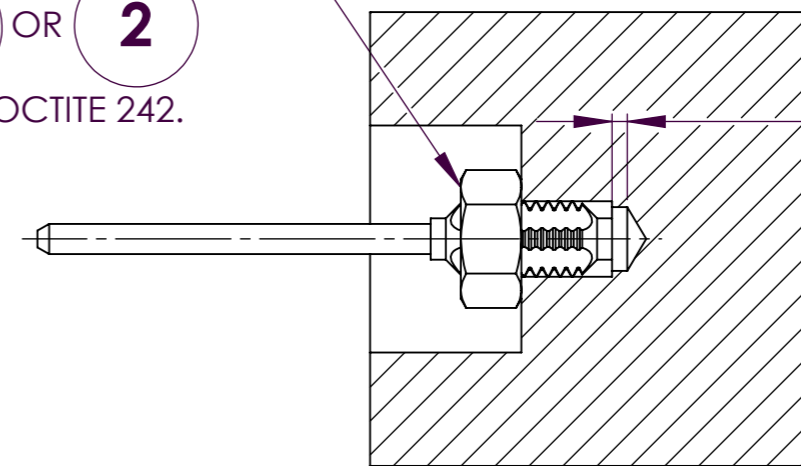
**FORCE FIT CORE  
MACHINING DETAILS**



NOTE- INSTALLATION TOOL  
REQUIRED SEE P&G DRAWING T56726

LOCK CORE ASSEMBLY  
WITH NUT  
**1** OR **2**  
AND LOCTITE 242.

THREADED CORE ASSEMBLY  
M5 x 0.8 OR 0.190-32 UNF



SCALE UNLESS STATED 	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No <b>ICT050</b>	MATERIAL	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES (µm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6 ✓ ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H	TITLE <b>SUGGESTED ICT050 INSTALLATION DETAILS AND INSTALLATION KIT 'L' TEMP RANGE</b>	<b>PENNY + GILES</b>	<b>A3</b>
THIRD ANGLE PROJECTION TO BS 8888	MASS (g) VOL. (mm <sup>3</sup> )	FIRST USED ON <b>AI56140</b>	FINISH	ANGULAR ± 1° LINEAR 0. mm +/- 0.5 mm 0.0 mm +/- 0.2 mm 0.00mm +/- 0.1mm 0.000mm +/- 0.01mm (MACHINING) BREAK EDGE 0.05 - 0.15mm FILLET RADS 0.1 - 0.3mm UNLESS OTHERWISE STATED		PART NUMBER: <b>AI208549</b>	SHT 2 OF 2 SHTS