

OPERATION & MAINTENANCE MANUAL

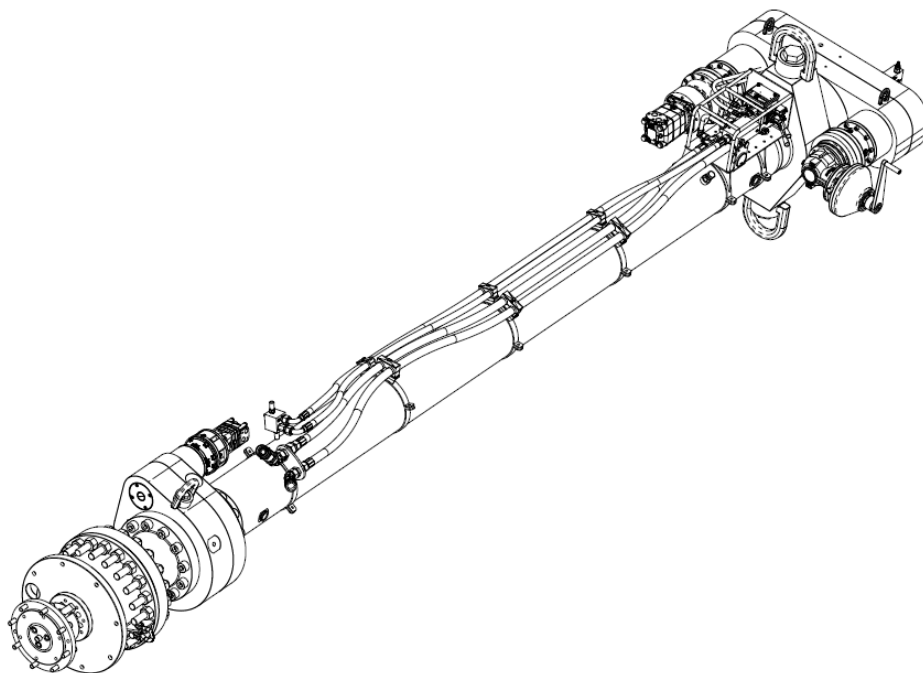
Enerpac MHT2460-H HOT TAPPING MACHINE

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To reduce the risk of injury, user must read and understand the document before use.

Version History

All Enerpac documentation is quality controlled and audited in accordance with **BS EN ISO 9001:2008**; the scope of which covers design, manufacture and repair of in-situ machine tools.

Version No.	Implemented By	Revision Date	Approved By	Approval Date	Comments
1	STH	13/01/2021	RH/JB	13/01/2021	Initial Issue
A	STH	26/09/2022	DC/JB	26/09/2022	Update to new design
B	SV	03/05/2023	DC	03/05/2023	GA Updated

Operation & Maintenance Manual Approval

The undersigned acknowledge they have reviewed the initial issue of this Machine Operation & Maintenance Manual and agree with the approach it presents. Changes to this Operation & Maintenance Manual will be coordinated with, and approved by, the undersigned or their designated representatives.

Approver 1

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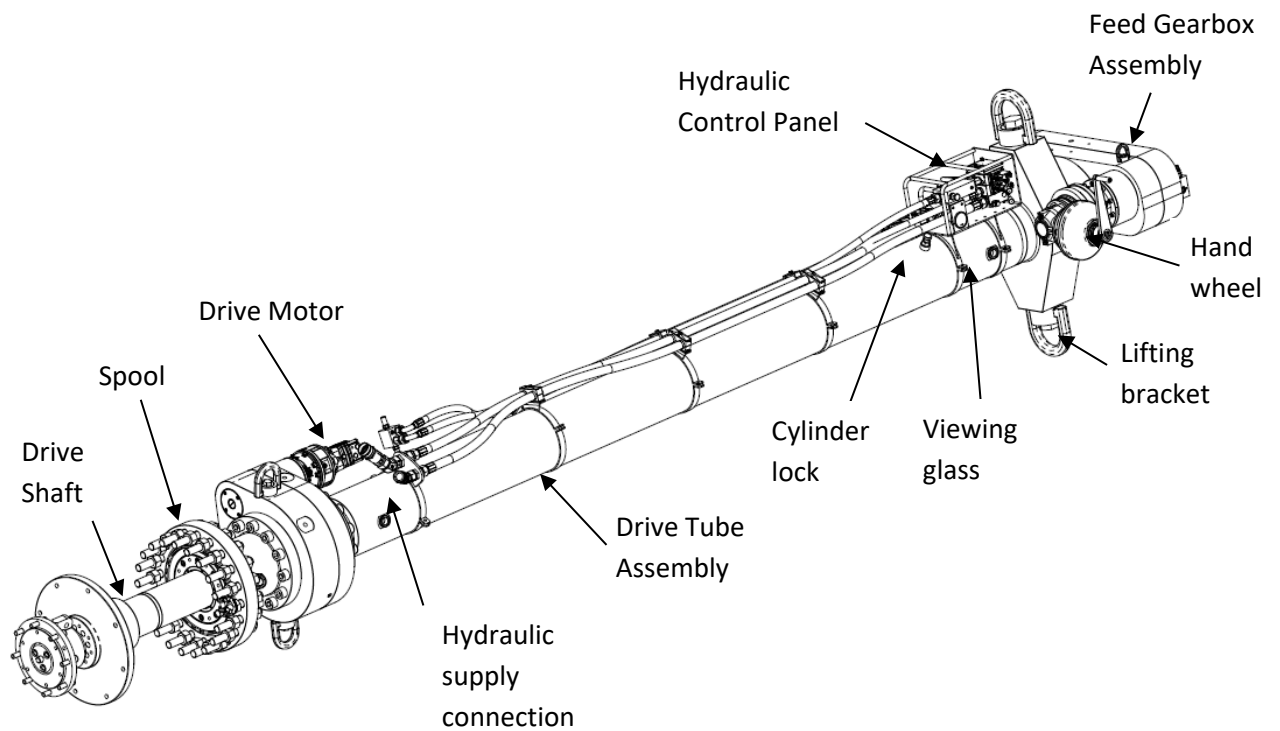
1. Introduction

1.1. Overall Equipment Description

The MHT2460 is a 150" stroke, hot tapping machine used to make connections & branches into pipelines without the need for a shutdown procedure.

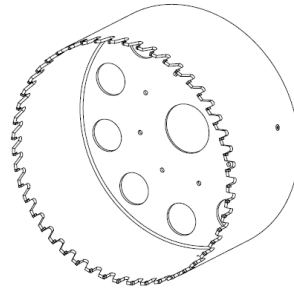
The MHT2460 has been designed to make Ø24" – Ø60" holes easily in various material pipelines & vessels. The machine has been designed to cut in the vertical orientation only.

It is hydraulically operated with industry standard drive shaft connection & a range of flange adapters to accept current hot tapping tooling. The machine will be supplied with the hydraulic control panel connected to the two motors and hydraulic supply to be connected by two quick release couplings at the drive motor end.

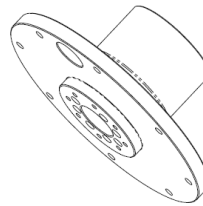


Other accessories include:

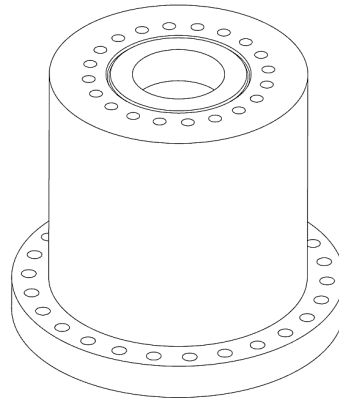
- The cutter. This is secured to the drive shaft, and is rotated by the drive motor. The Cutter is available in various sizes outlined in section 5.



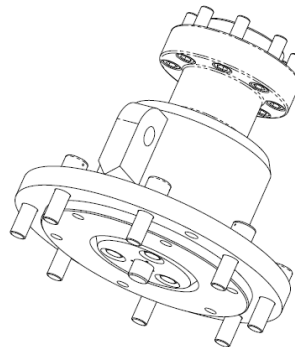
- A cutter holder will be needed to connect the cutter to the drive shaft.



- The Flange adapter (also known as the Cutter housing). This connects from the spool on the machine to the pipework. Various sizes can be supplied. Contact Enerpac for the range of sizes which can be supplied.



- Plug holder. Plug holders are used to connect the completion plug to the drive shaft.



2. Health and Safety

Enerpac has made every effort to ensure that the Information given in this Operation & Maintenance manual, and other publications relating to this machine is correct and understandable. However it is acknowledged that there may be errors or omissions in this publication.

The company also reserves the right not to provide updates, corrections or amendments to this publication but will endeavour to keep its customers up to date with all changes that may affect the machine operation or safety.

2.1. Mandatory Safety Signs (for the purpose of trials at Enerpac)

ISO 7010 SYMBOL	SAFETY DESCRIPTION
	WEAR EYE PROTECTION
	EAR PROTECTION MUST BE WORN
	HARD HATS MUST BE WORN
	PROTECTIVE GLOVES MUST BE WORN
	PROTECTIVE FOOTWEAR MUST BE WORN
	OVERALLS MUST BE WORN
	MACHINE GUARDS MUST BE USED

2.2. Machine Hazards Signs

ISO 7010 SYMBOL	HAZARD DESCRIPTION
	DANGER HIGH VOLTAGE
	WARNING MOVING MACHINERY
	CAUTION MOVING MACHINERY
	WARNING KEEP HANDS CLEAR

2.3. Safety Procedures

Detailed in this chapter is a list of good Health and Safety practices that Enerpac advise users to adhere to. Due to the nature of portable machine tools, not every eventuality can be catered for and the following is not exhaustive, as such Enerpac strongly advise that the user carries out their own risk assessments based on the machining and environment in which they intend to use the machinery.

2.3.1. Pre-Operational Safety Checks

1. Always read safety signs / labels
2. Ensure no slip / trip hazards are present in workspaces and walkways
3. Locate and ensure you are familiar with the operation of the ON / OFF starter and E-Stop (*if fitted*)
4. Do not leave equipment on top of the machine
5. Ensure each tool is in good condition and securely mounted
6. Secure / Remove loose items
7. Faulty equipment must not be used. **Immediately report any suspect machinery**

2.4. Operational Safety Checks

1. Operator is fully conversant and trained in use of equipment
2. Keep clear of moving machine parts
3. Never leave the machine running unattended
4. Follow correct clamping procedures - keep overhangs as small as possible and check work piece is secure
5. Set the correct speed to suit the tool, the depth of cut and the material
6. Before making adjustments and measurements or before cleaning swarf accumulations switch off and bring the machine to a complete standstill

2.4.1. Housekeeping

1. Switch off the machine
2. Remove milling cutters, drill attachments and tap attachments and store them safely (if applicable)
3. Leave the machine and work area in a safe, clean and tidy state

2.4.2. Potential Hazards

1. Sharp cutters
2. Moving components – hair / clothing entanglement
3. Eye injury
4. Skin irritation
5. Metal splinters and burrs
6. Flying debris
7. Hydraulic fluid under pressure

3. Handling

Customers, users and operators of the machines must be aware of the nature of the equipment supplied.

Although inherently robust, the machine is a precision tool and may be damaged by poor handling, tipping and falling, inadequate transport arrangements over e.g. rough terrain, misuse by operators and use outside its design specification.

Such poor handling may result in either broken or damaged parts or disturbance to fine settings resulting in an inability to meet the specified machining tolerances and capabilities.

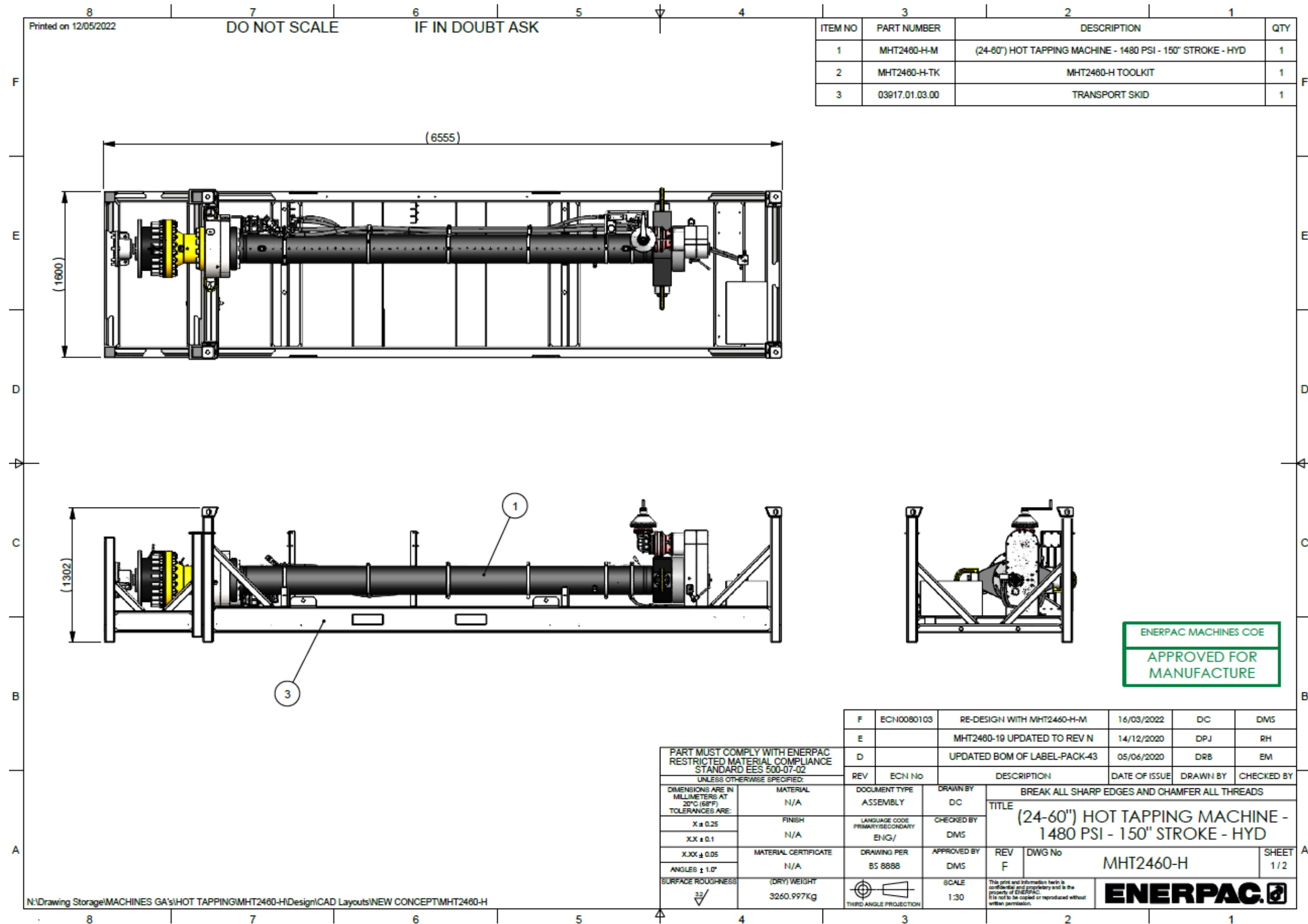
Ensure the operator knows how to operate the machine before installing

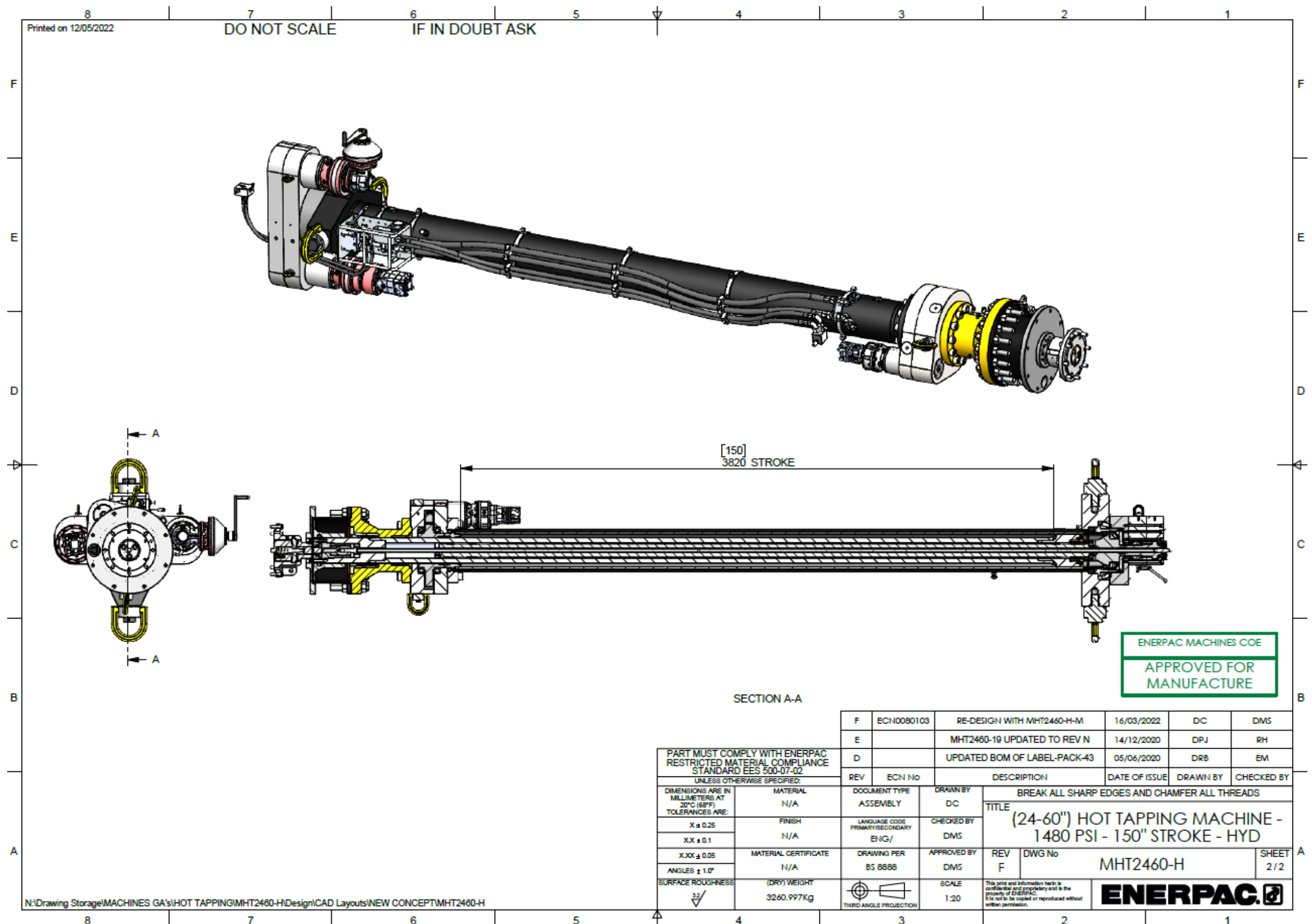
4. Machine Specification

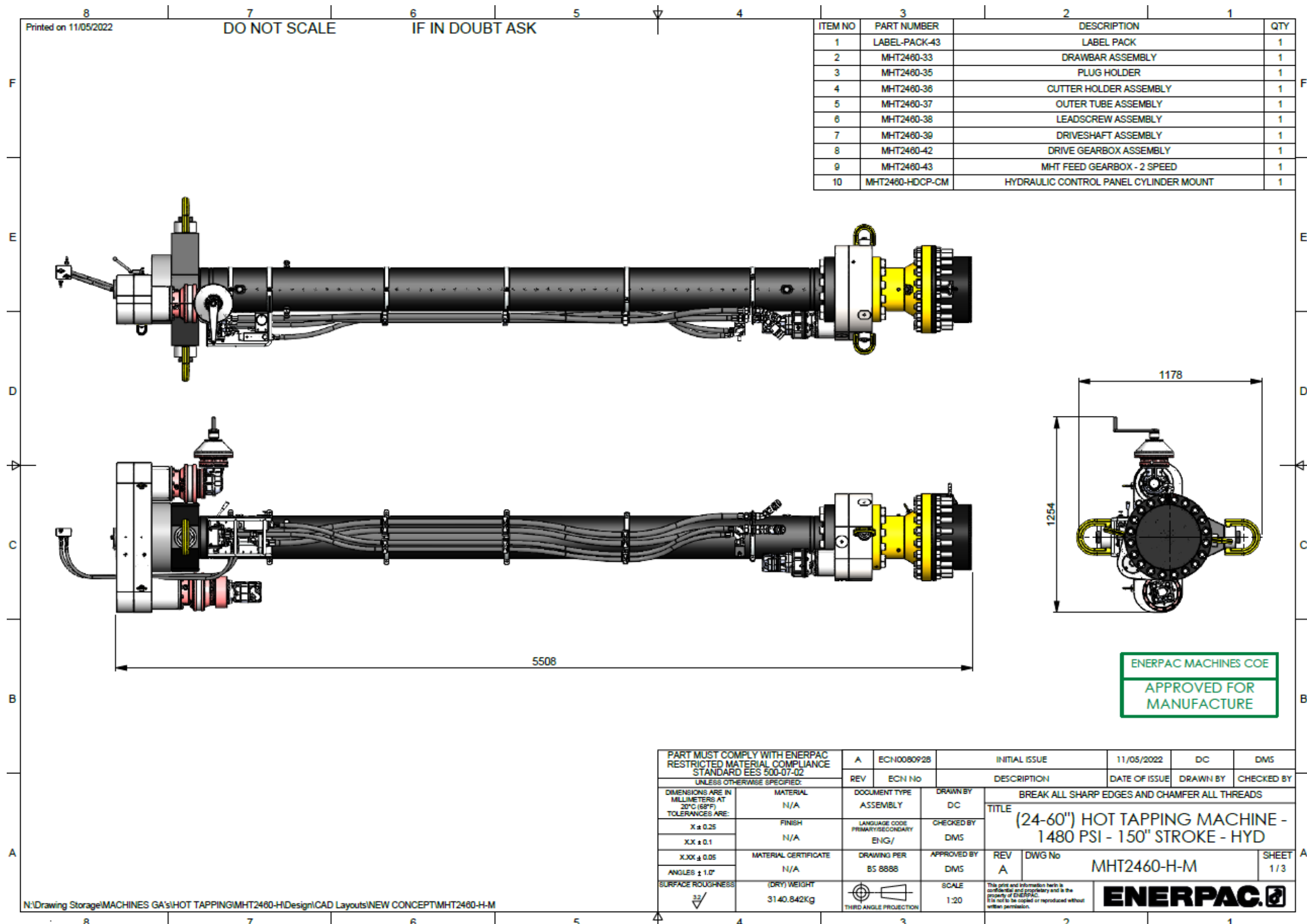
The Enerpac MHT2460 Hot Tapping Machine has been modularly designed for accurate in-situ machining of work surfaces, to this end the constituent parts are easily manipulated by hand or crane.

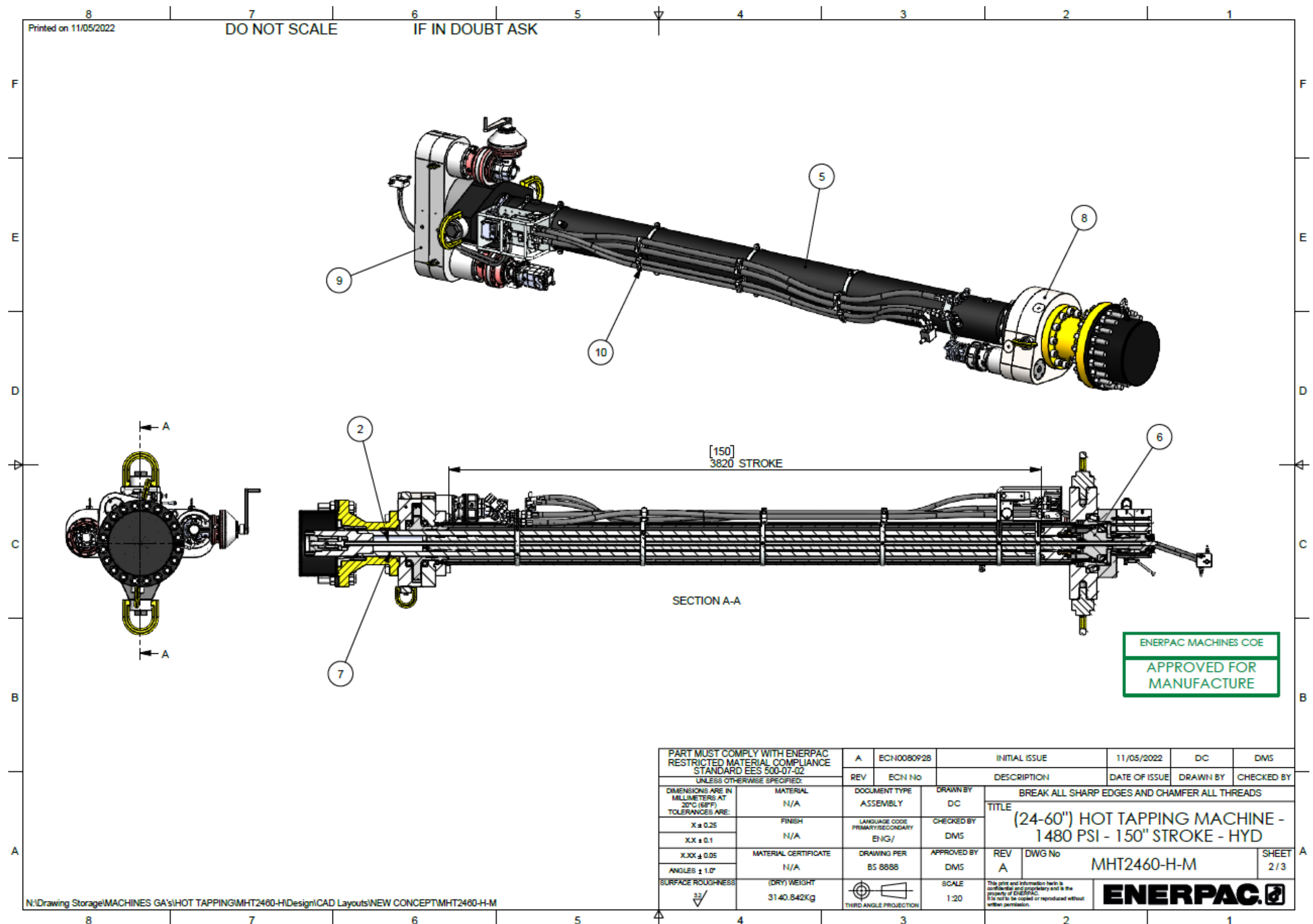
Description	Value	
Cutting Stroke	3810mm	150"
Cutting Tool Diameters	610 – 1524mm	24 – 60"
Max Working Pressure	102 bar	1480 psi
Max Operating Temperature	200°C	390°F
Min Operating Temperature	-20°C	-4°F
Drive shaft Diameter	165.1mm	6.5"
Cutter RPM Range	0-22 RPM	
Hydraulic Supply (<i>approx. max supply for 22 RPM</i>)	60 L/min at 170 bar	15Gal/min at 2465 PSI
Approx Drive Motor Output (<i>At 170 bar & 60L/min</i>)	13.5 Kw	18 Hp
Auto Feed Rate (<i>Single Speed</i>)	0.076mm/min	0.003"/min
Fast traverse Feed rate (<i>at 100L/min</i>)	220 mm/ min	8.66" /min
Hand Feed Rate (<i>approx. first two revs will be taking up the backlash in gearbox so will have no movement</i>)	0.1mm/ rev	0.004"
Approx. Machine Weight	1041 Kg	2295 Lbs
Designed For General Use		

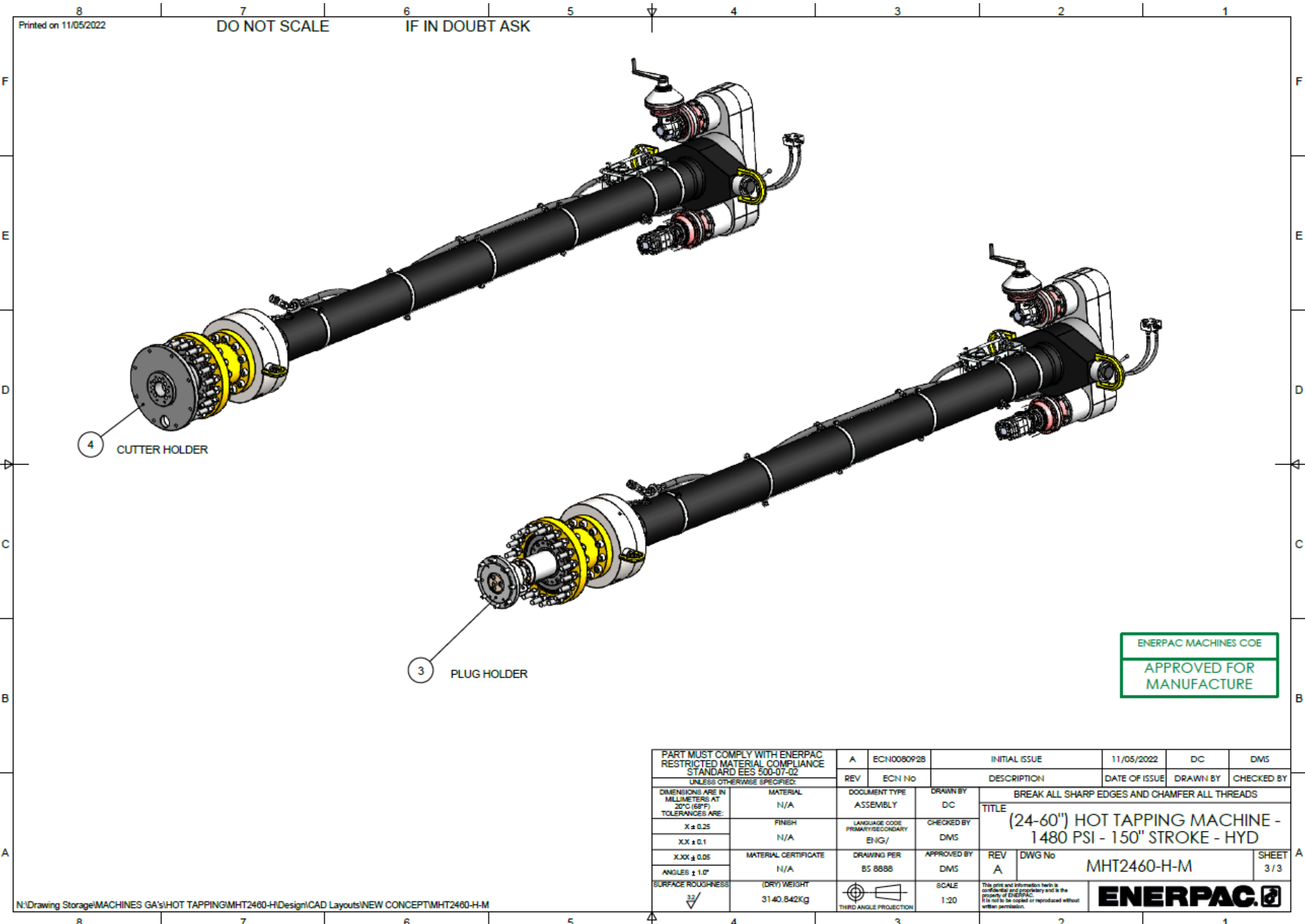
4.1. General Assembly Drawings

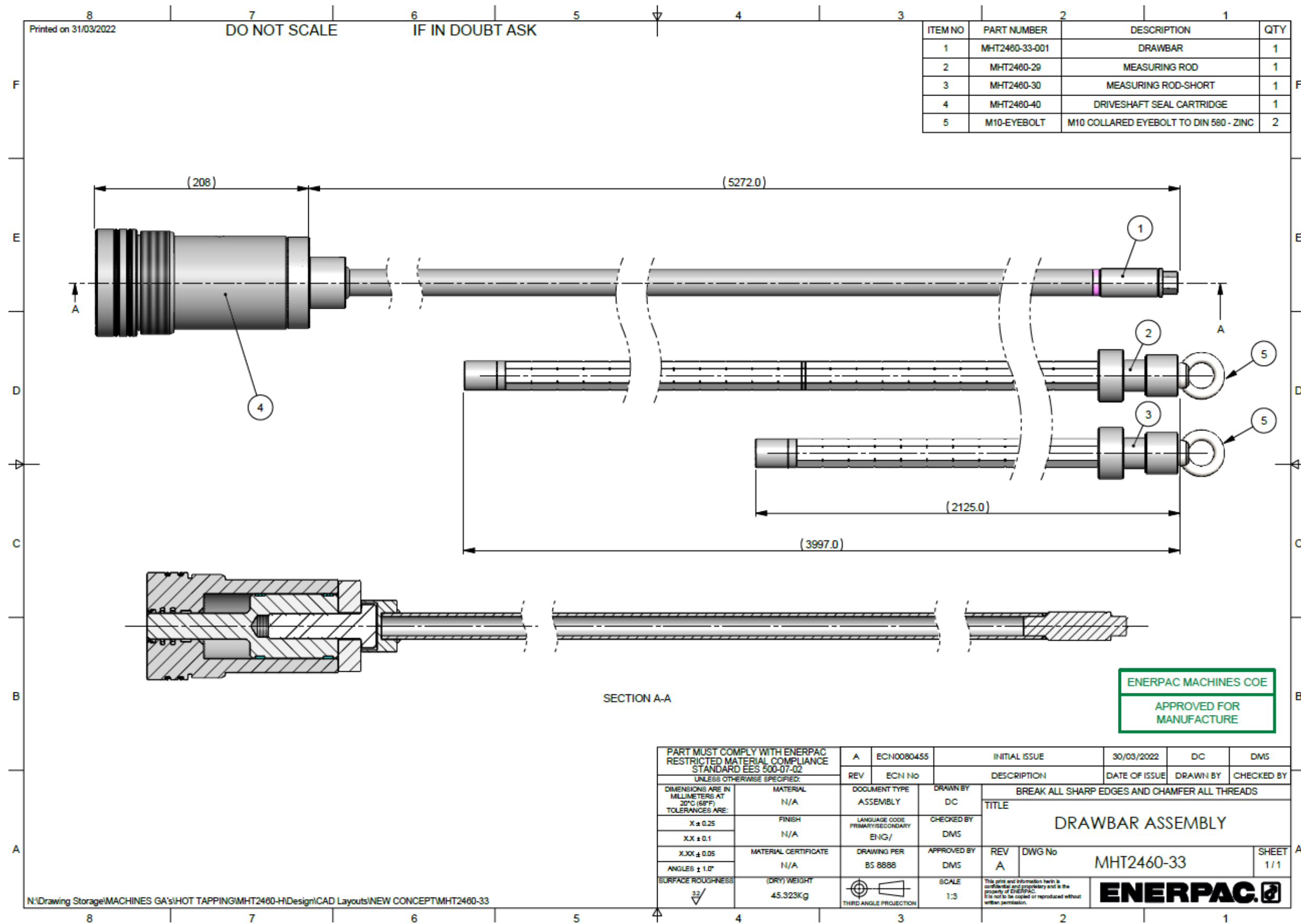


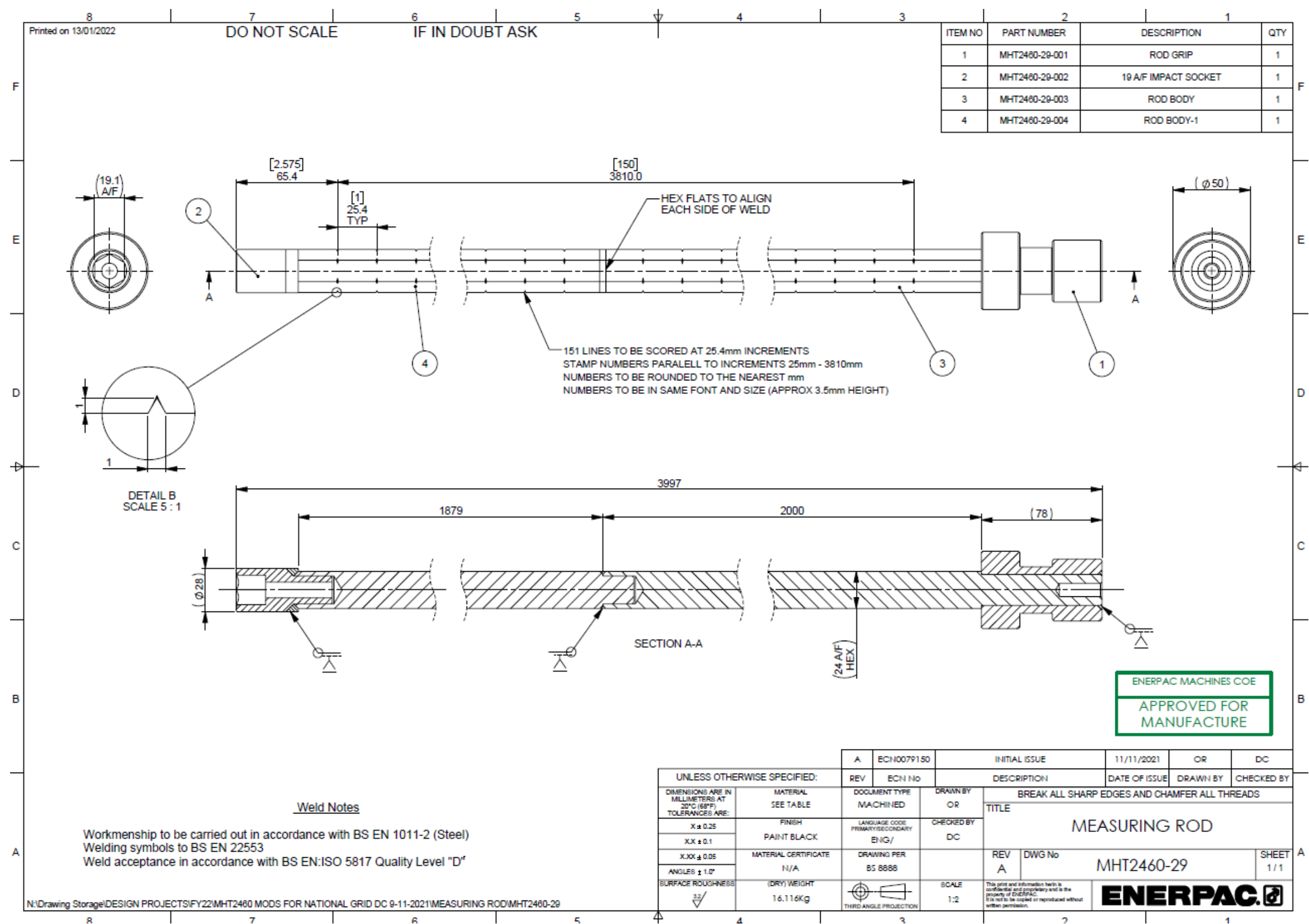


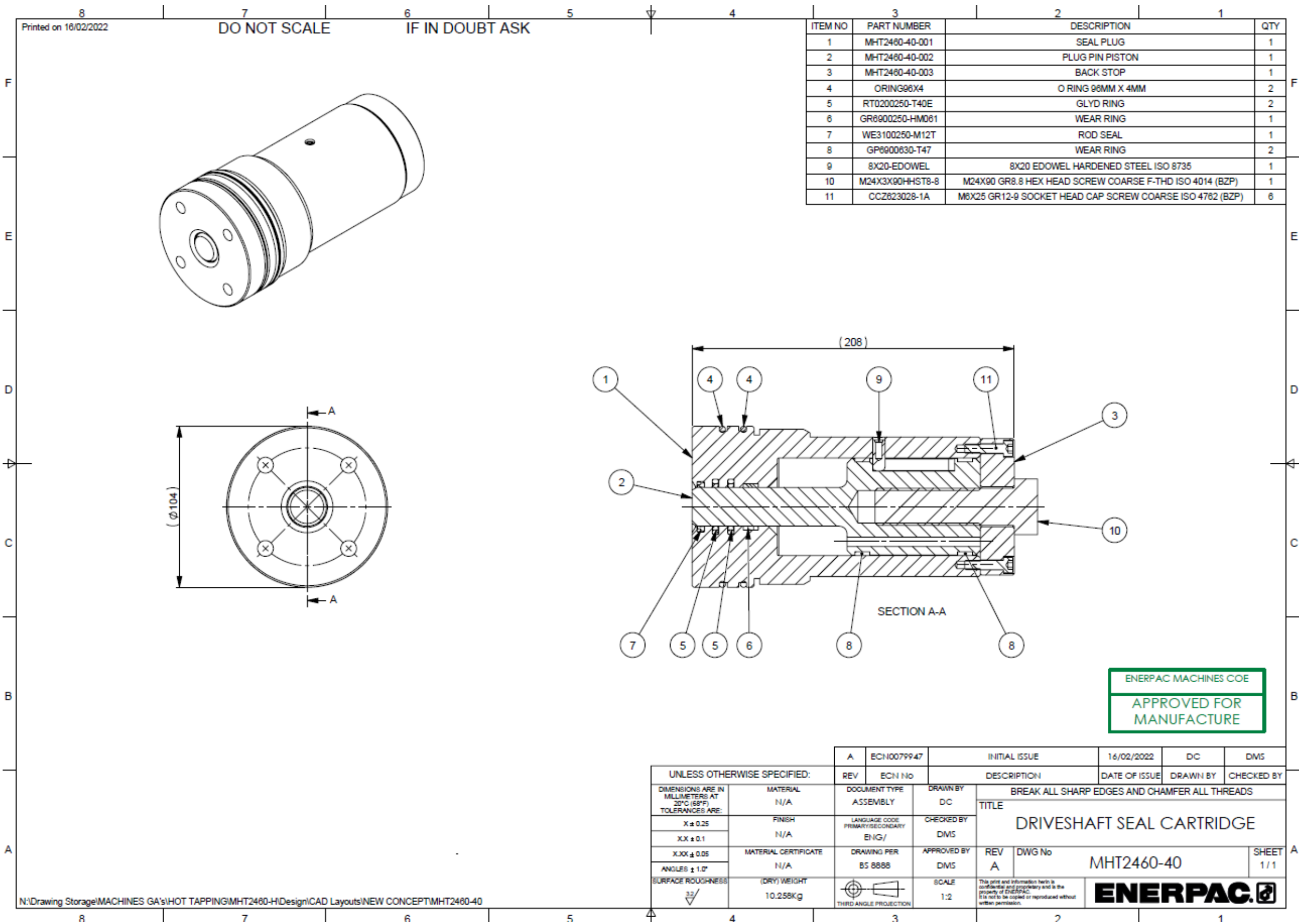


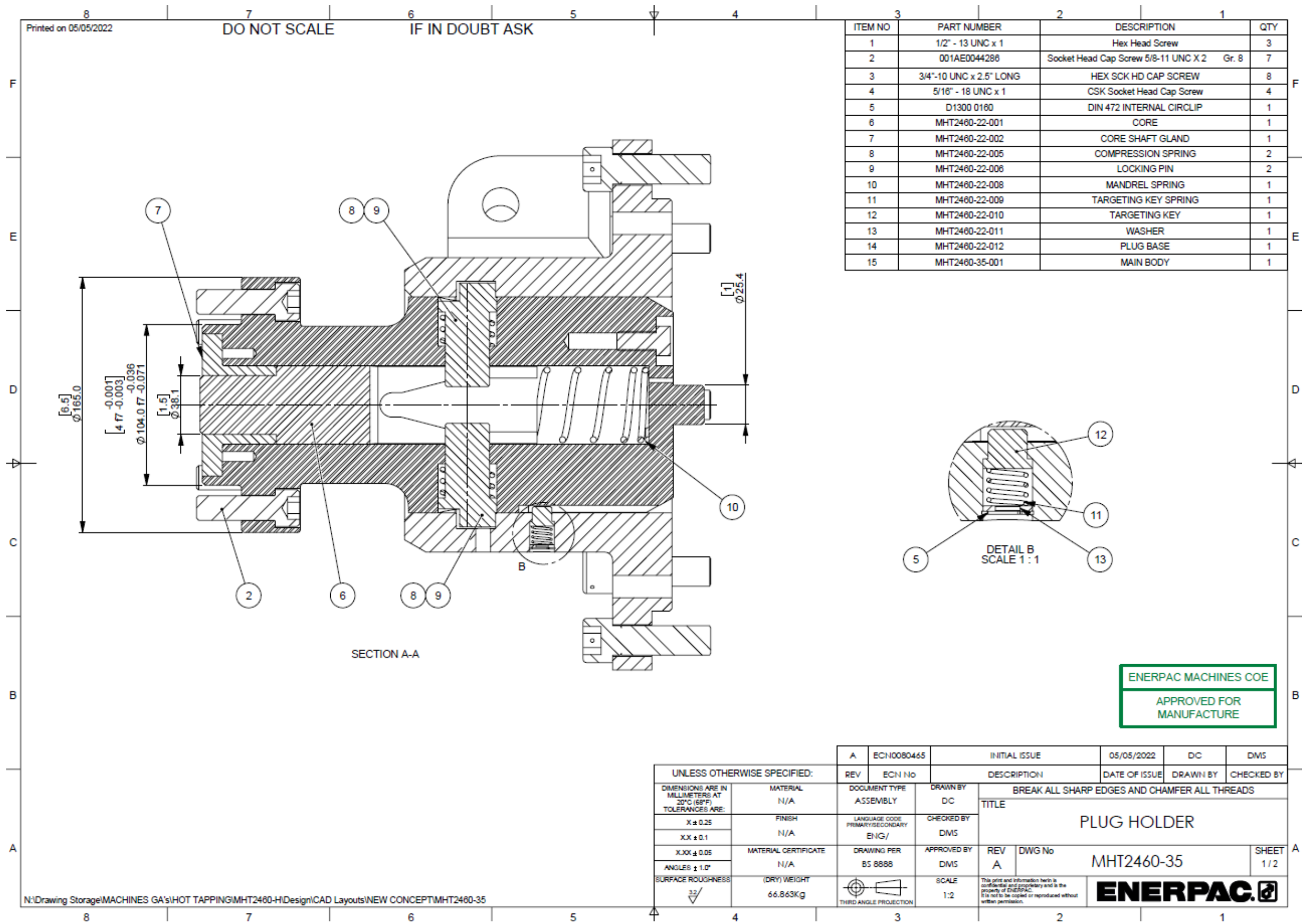


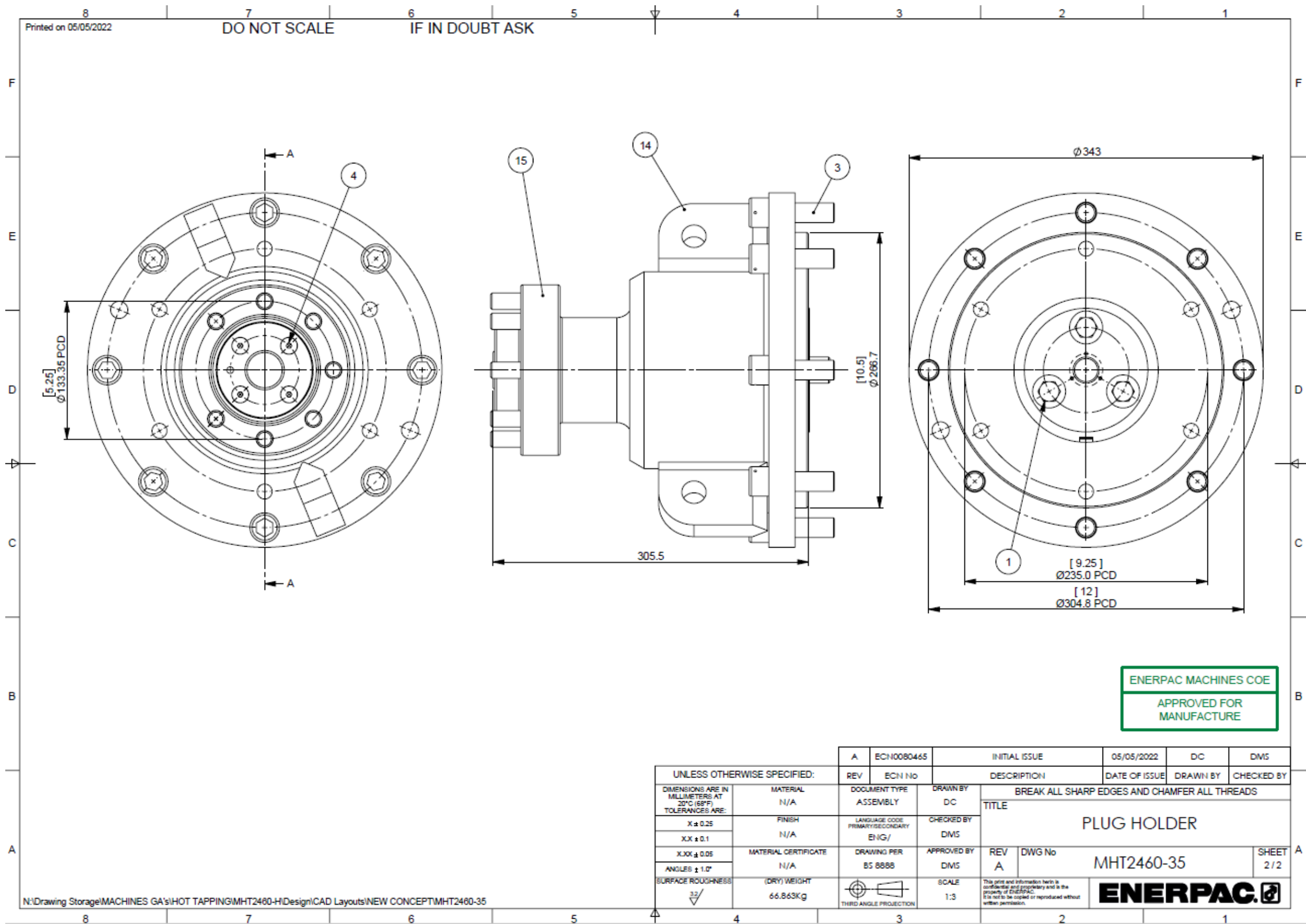


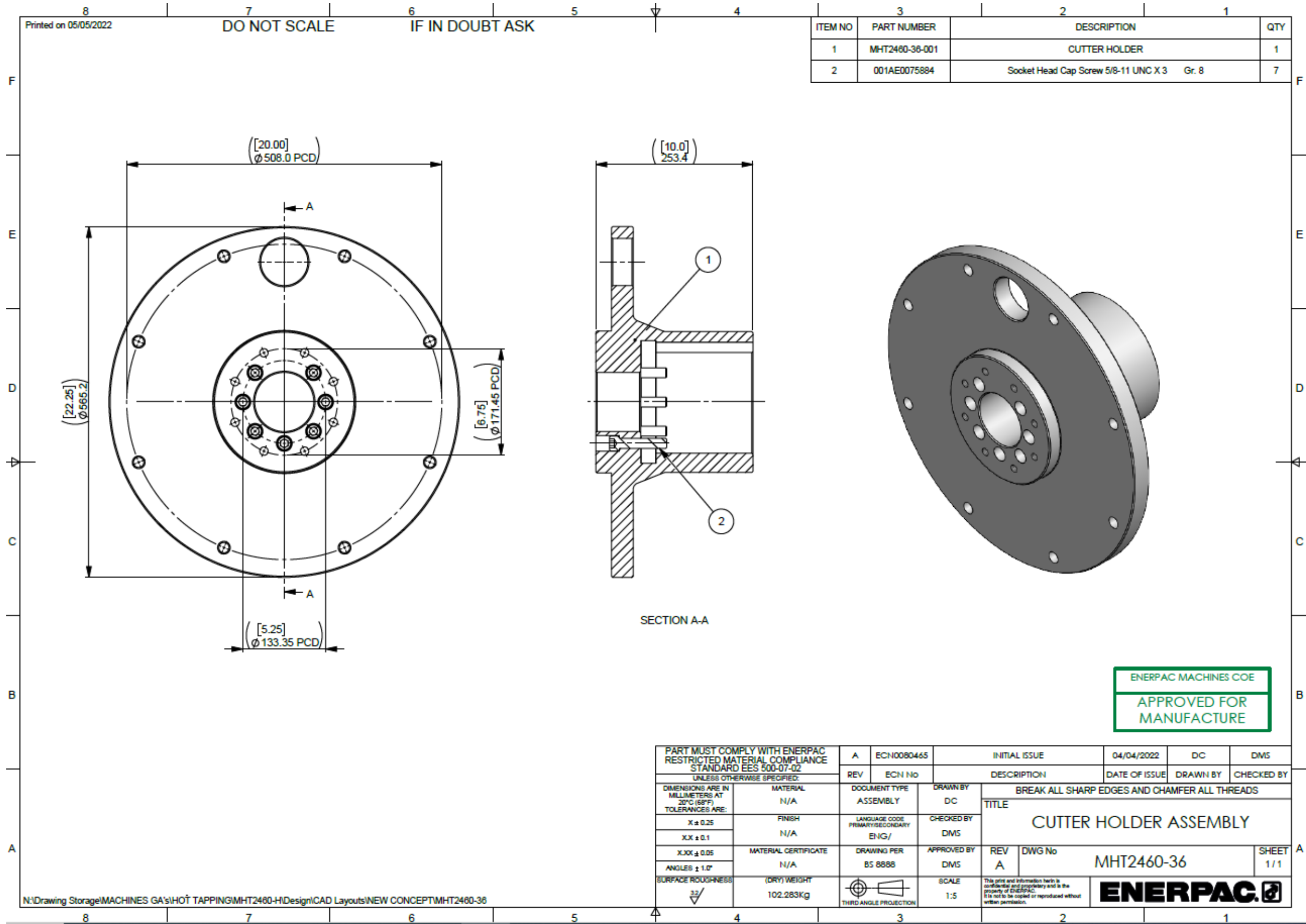


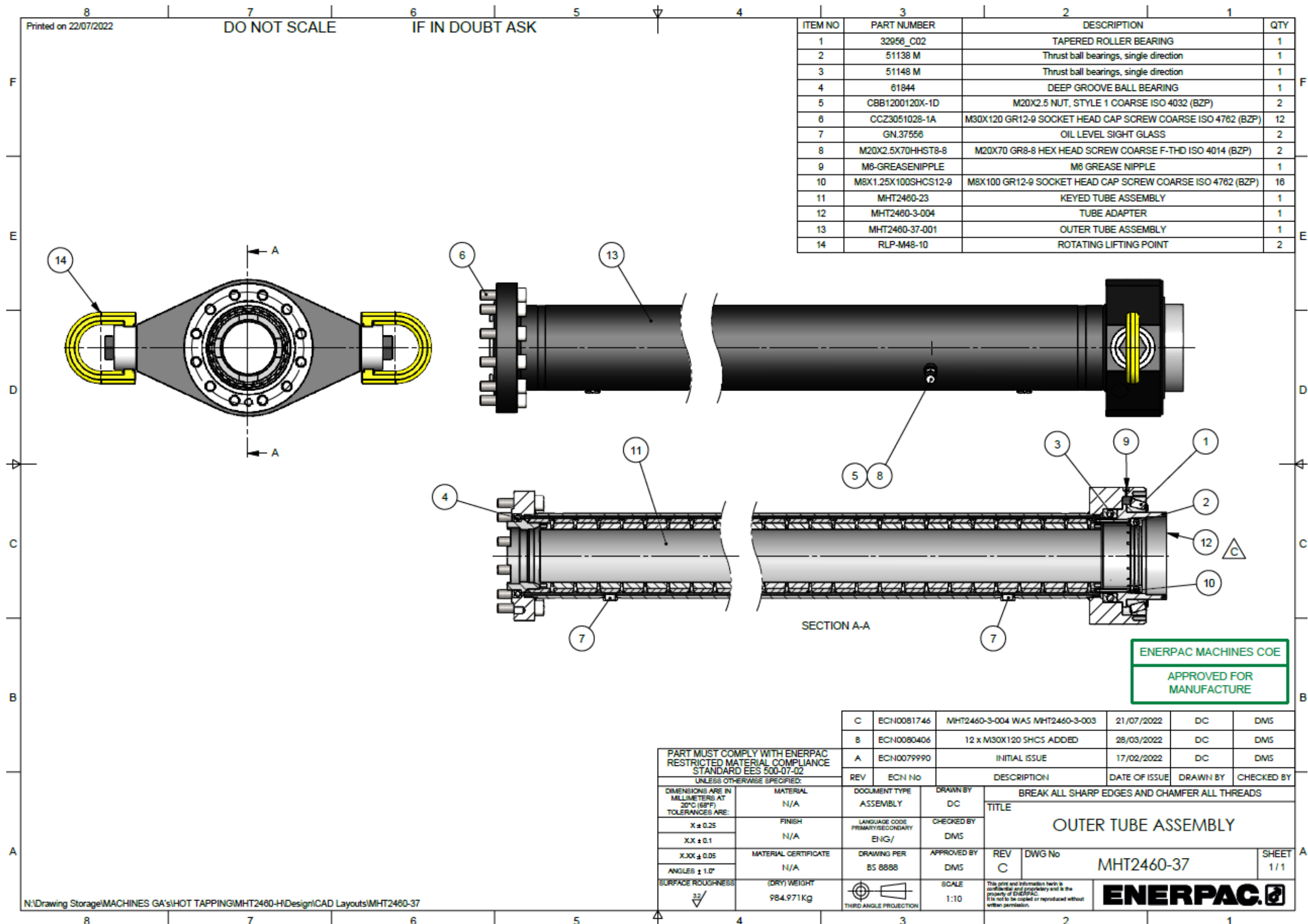


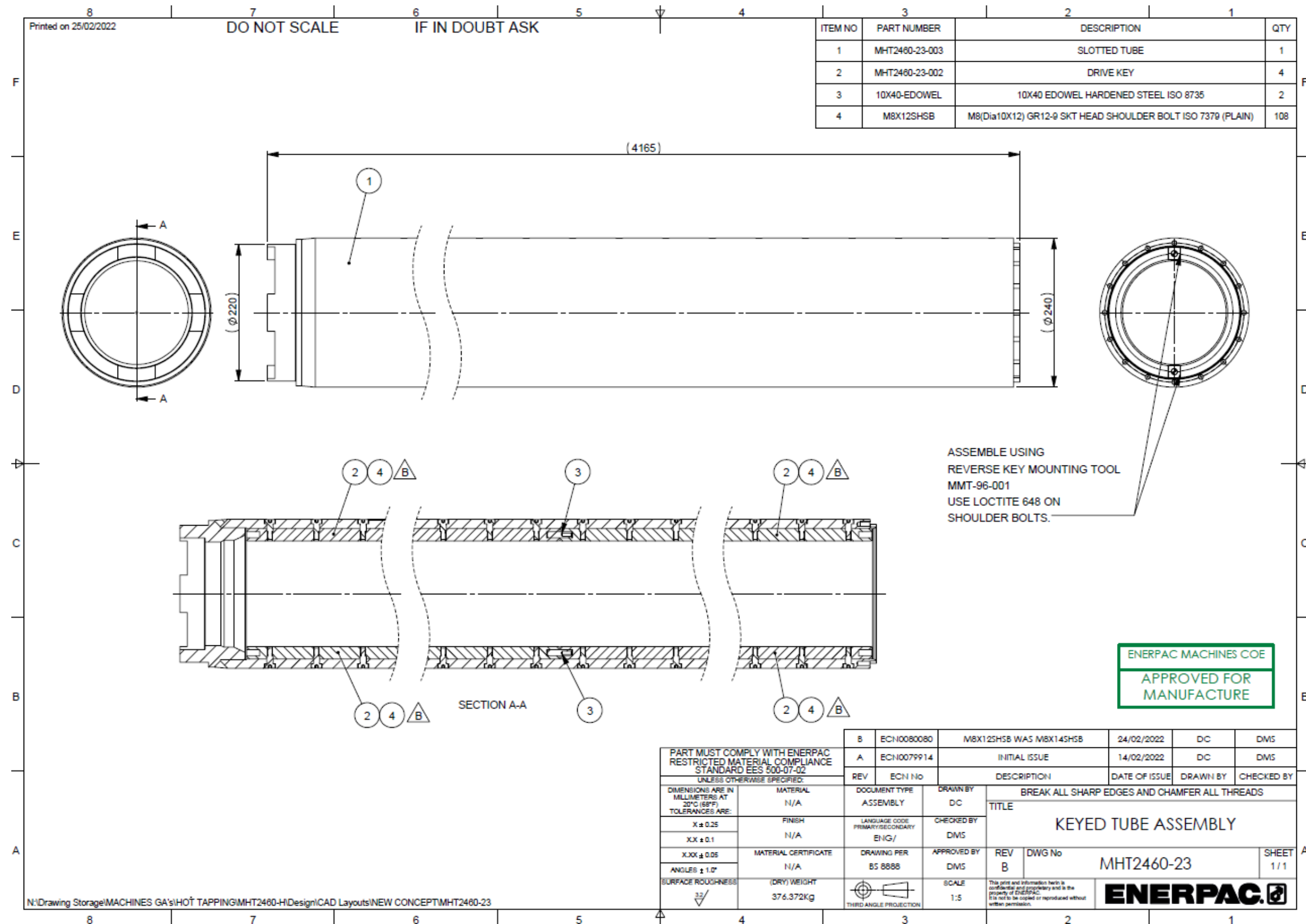


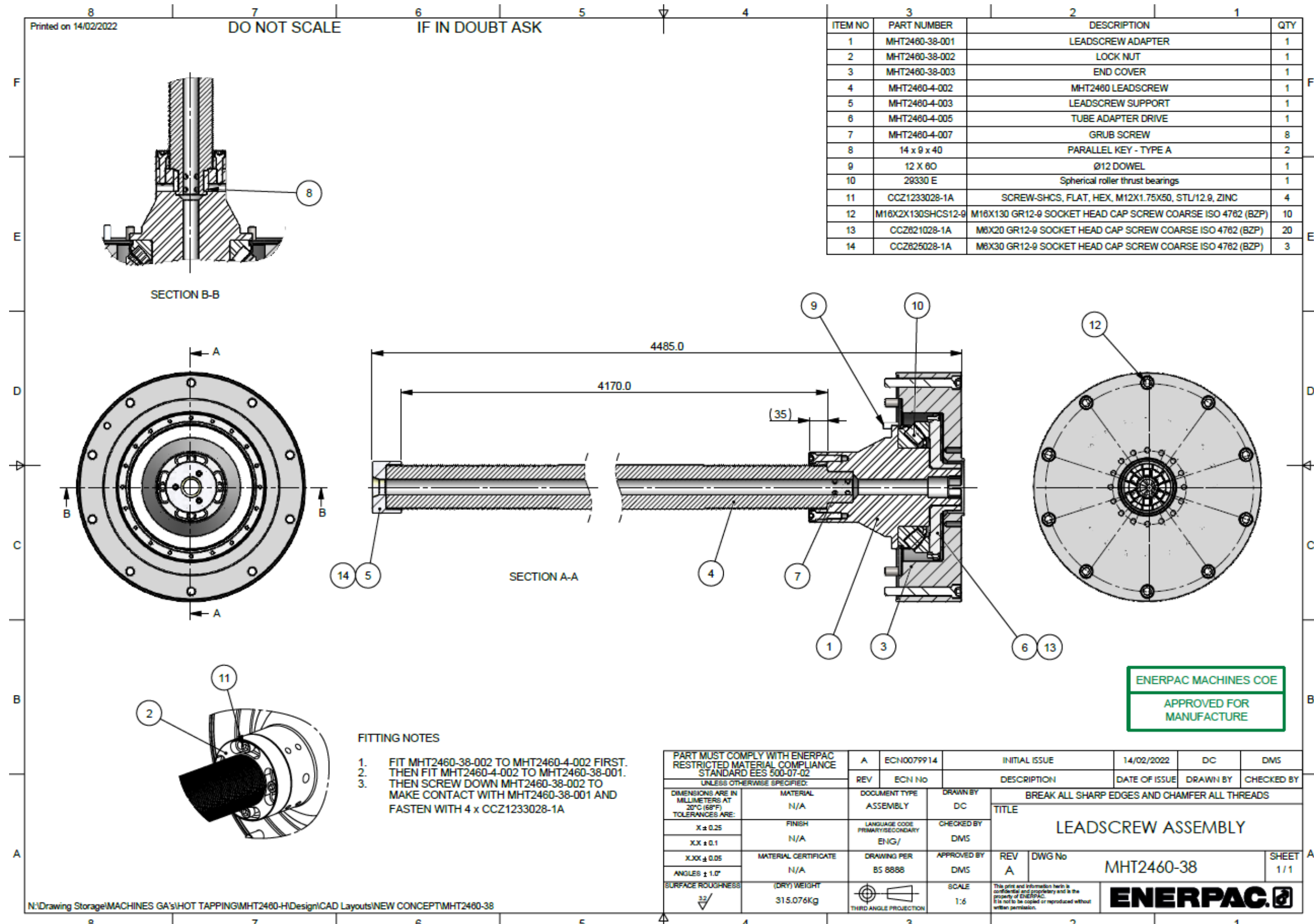


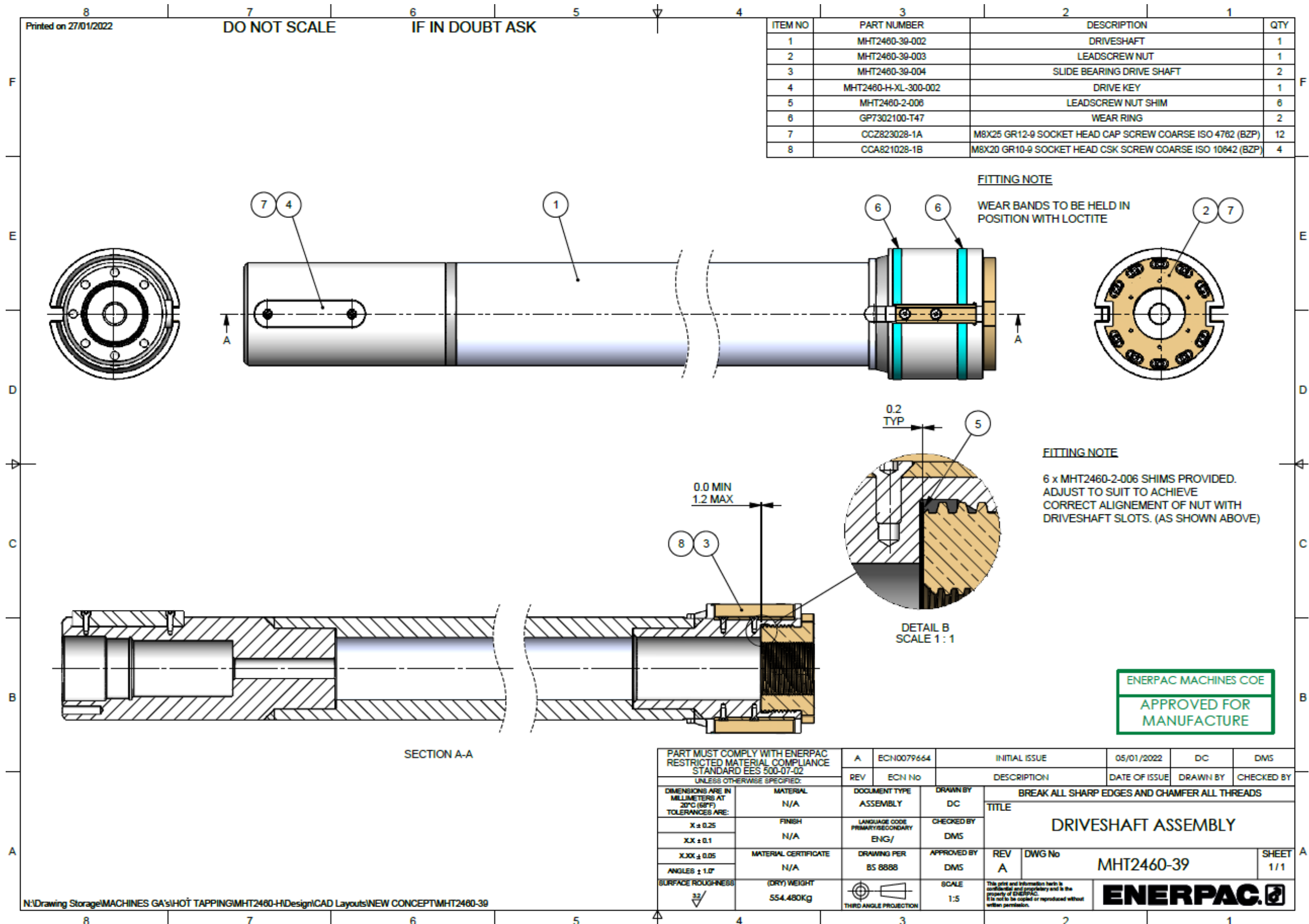


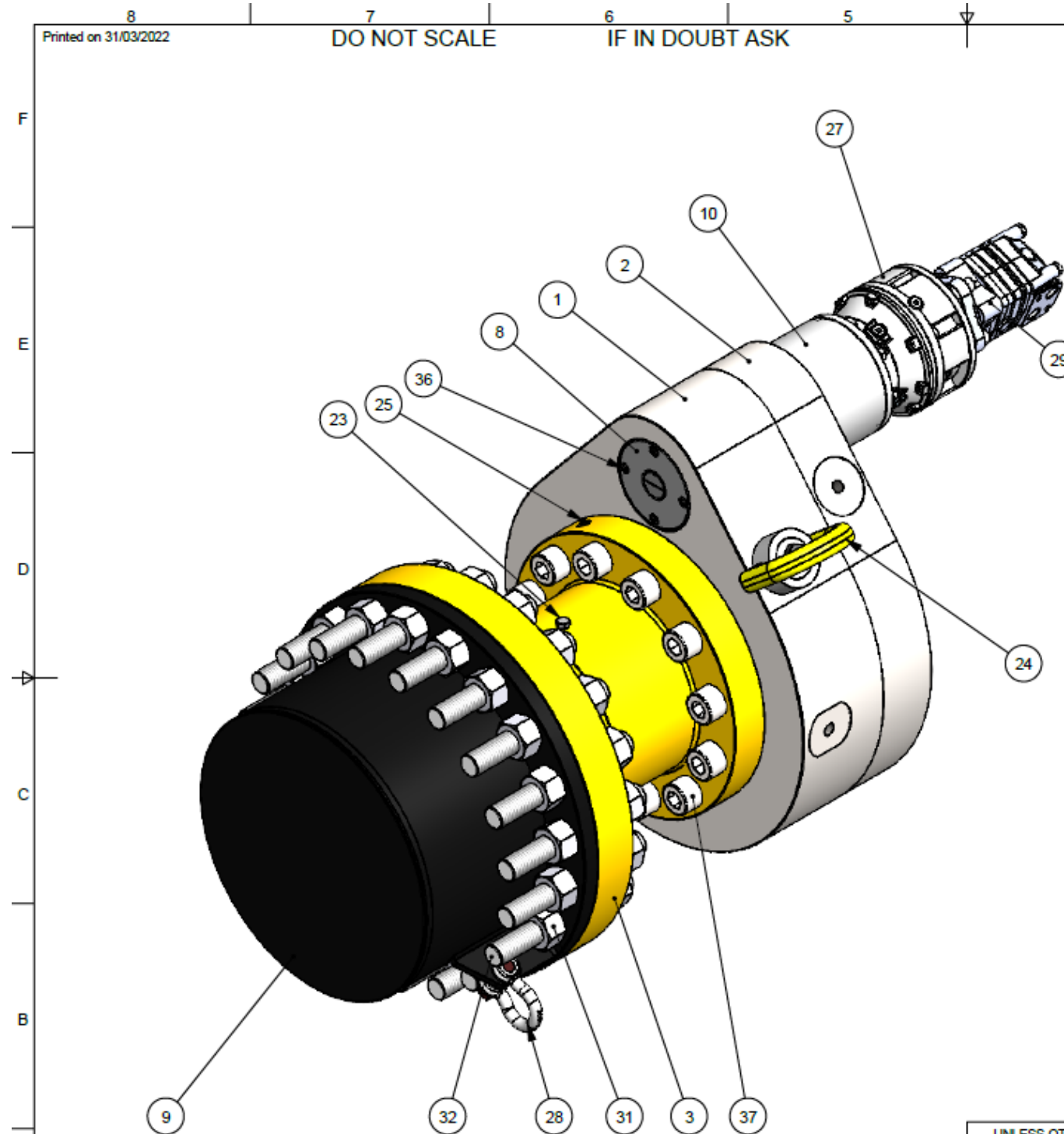








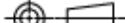




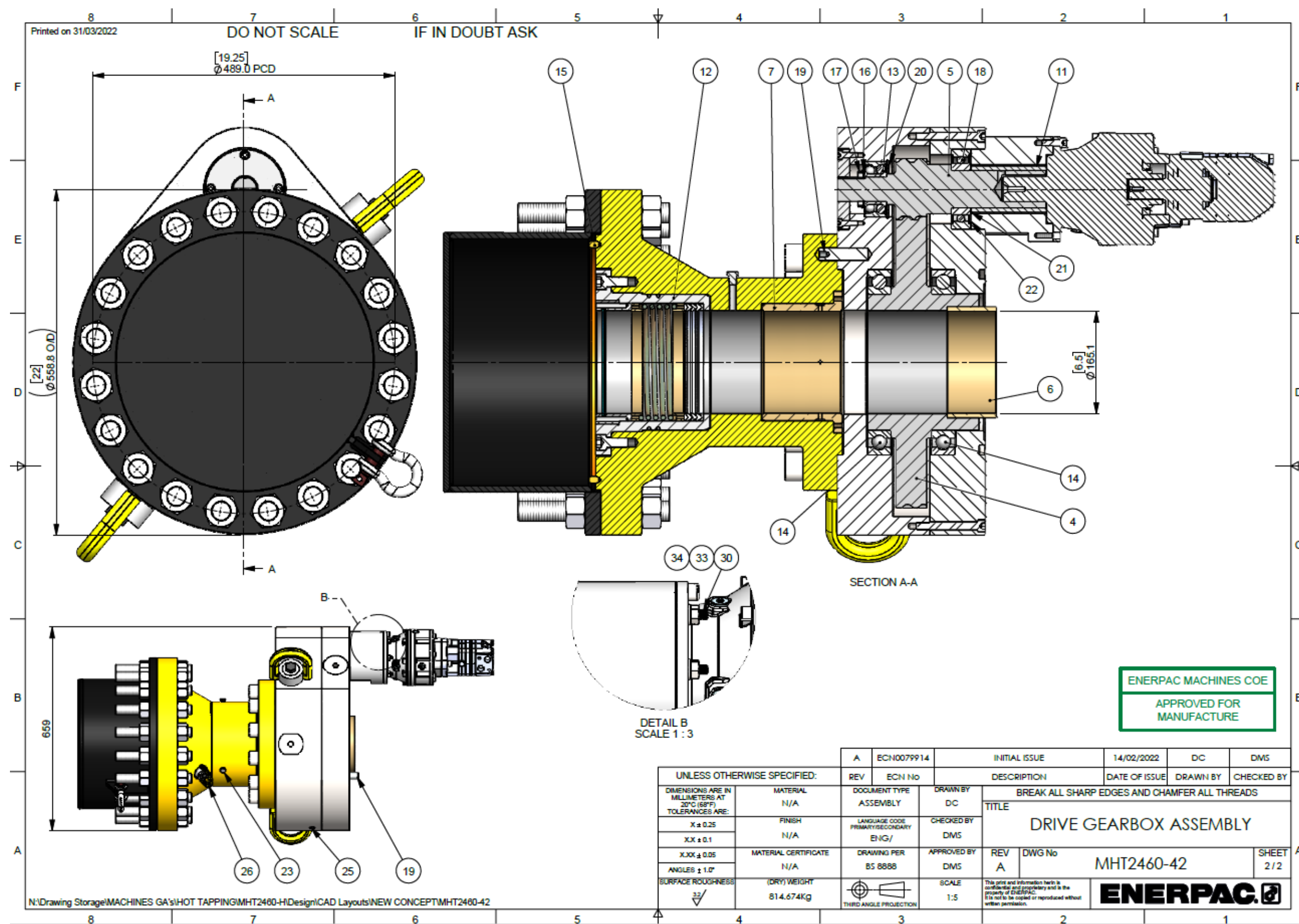
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1	MHT2460-1-001	GEARBOX HOUSING	1
2	MHT2460-1-002	GEARBOX LID	1
3	MHT2460-42-001	12" #800 SPOOL	1
4	MHT2460-1-004	10DP 175t R/H HELICAL GEAR	1
5	MHT2460-1-005	10DP 35t L/H HELICAL GEAR	1
6	MHT2460-1-006	BUSH	1
7	MHT2460-1-007	FLANGED SUPPORT BUSH	1
8	MHT2460-1-008	END CAP	1
9	MHT2460-1-009	BORING BAR PROTECTION COVER	1
10	MHT2460-1-013	MAIN GEARBOX MOUNTING ADAPTOR	1
11	MHT2460-1-014	SPACER	1
12	MHT2460-41	SPOOL SEAL CARTRIDGE	1
13	3308-2RS	ANGULAR CONTACT BEARING	1
14	61944 MA	SINGLE ROW DEEP GROOVE BALL BEARING	2
15	R57	RING TYPE GASKET	1
16	MB8	TAB WASHER	1
17	KM8	LOCK NUT M40X1.5	1
18	6312-2RS1	Deep groove ball bearings	1
19	P1212-20-80	Dowel Pin Extractable	2
20	D1300 0800	DIN 472 INTERNAL CIRCLIP	1
21	CPS80x75x0.5	PRECISION SHIM	1
22	CPS1051300.5	PRECISION SHIM	1
23	4513K322	1/4 HEX HEAD PLUG	2
24	RLP-M20-10	ROTATING LIFTING POINT	2
25	M8-GREASENIPPLE	M8 GREASE NIPPLE	2
26	RLP-M8-10	ROTATING LIFTING POINT	1
27	RR110L1MC4.94	RR110L1MC4.94 INLINE GEARBOX	1
28	A085416	BOW SHACKLE No 854	1
29	151F0501	HYDRAULIC MOTOR	1
30	21150.W0805	M10x160 - DIN 8379 STUD	6
31	1 1/4"-7UNC	HEAVY HEX NUT - 1 1/4"-7UNC - Gr 7	40
32	1 1/4"-7UNC x 9.75"	STUD - ASTM A193 L7	20
33	M10-WASHER	M10 FLAT WASHER FORM A BS 4320 (BZP)	6
34	CBB1100120X-1D	M10X1.5 NUT, STYLE 1 COARSE ISO 4032 (BZP)	6
35	CCZ1247028-1A	SCREW-SHCS, FLAT, HEX, M12X1.75X100, STL/12.9, ZINC	44
36	CCZ823028-1A	M8X25 GR12-9 SOCKET HEAD CAP SCREW COARSE ISO 4762 (BZP)	4
37	CCZ3049028-1A	M30X110 GR12-9 SOCKET HEAD CAP SCREW COARSE ISO 4762 (BZP)	12
38	CCZ1047028-1A	M10X100 GR12-9 SOCKET HEAD CAP SCREW COARSE ISO 4762 (BZP)	7
39	CCZ1025028-1A	M10X30 GR12-9 SOCKET HEAD CAP SCREW COARSE ISO 4762 (BZP)	2

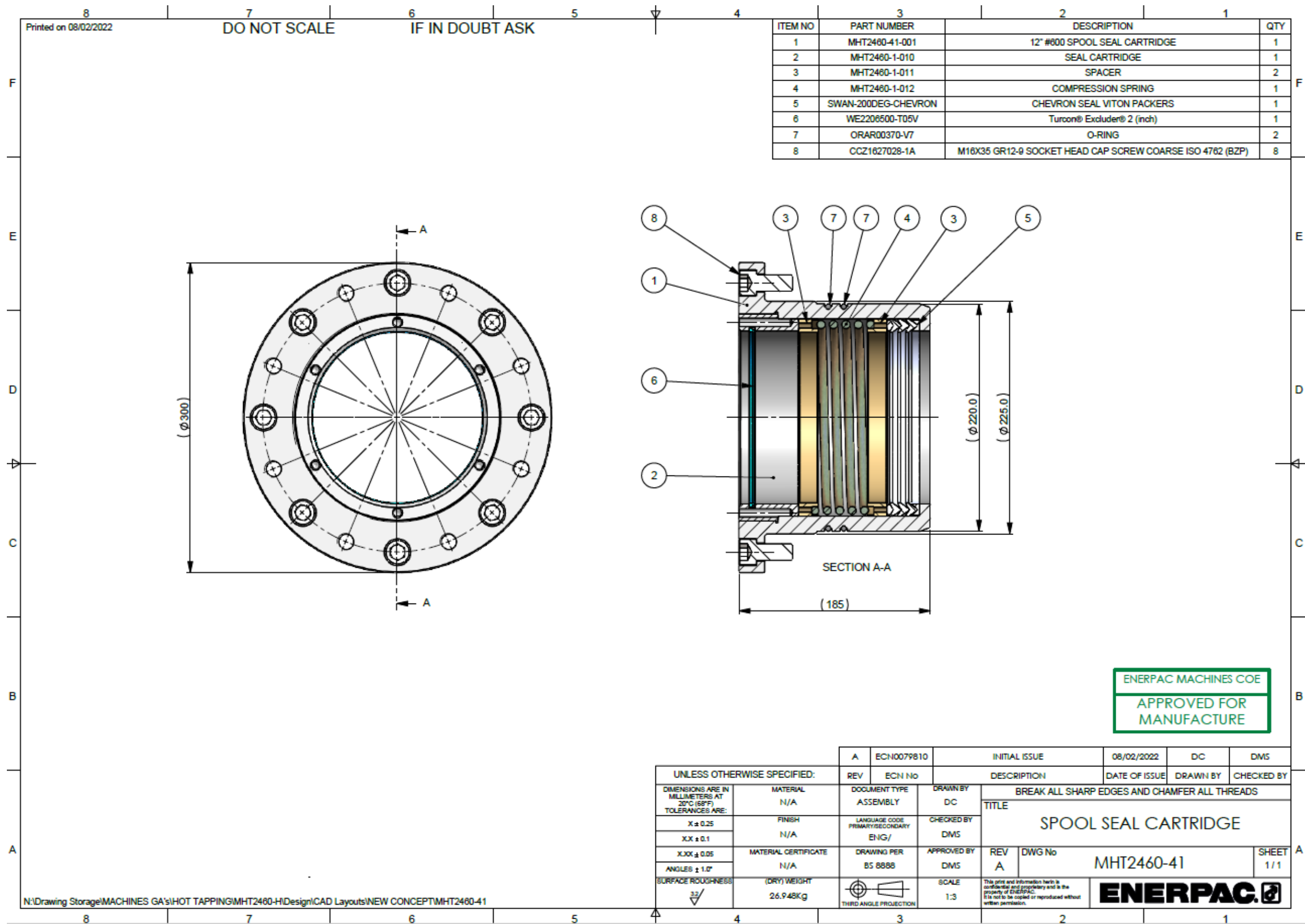
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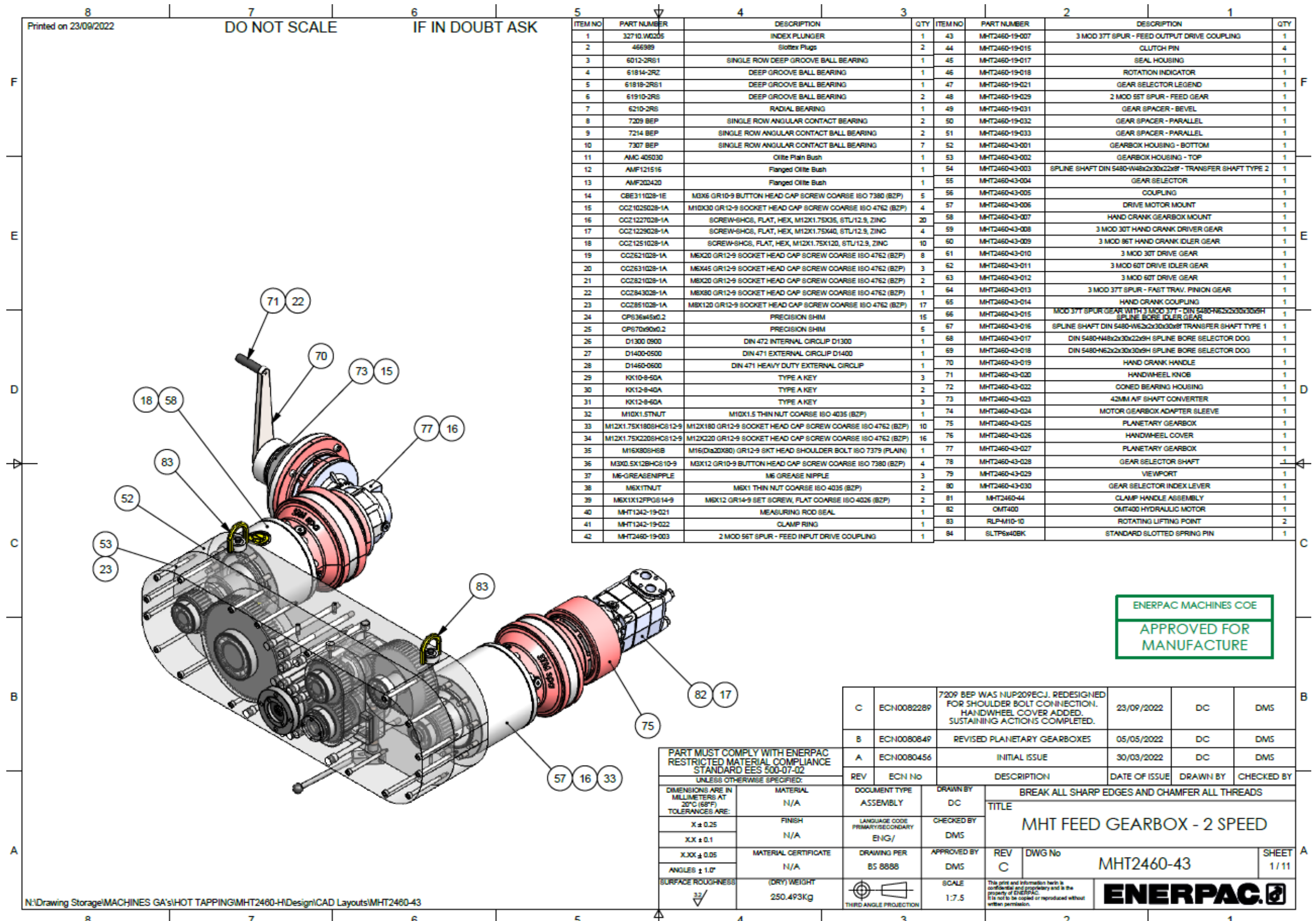
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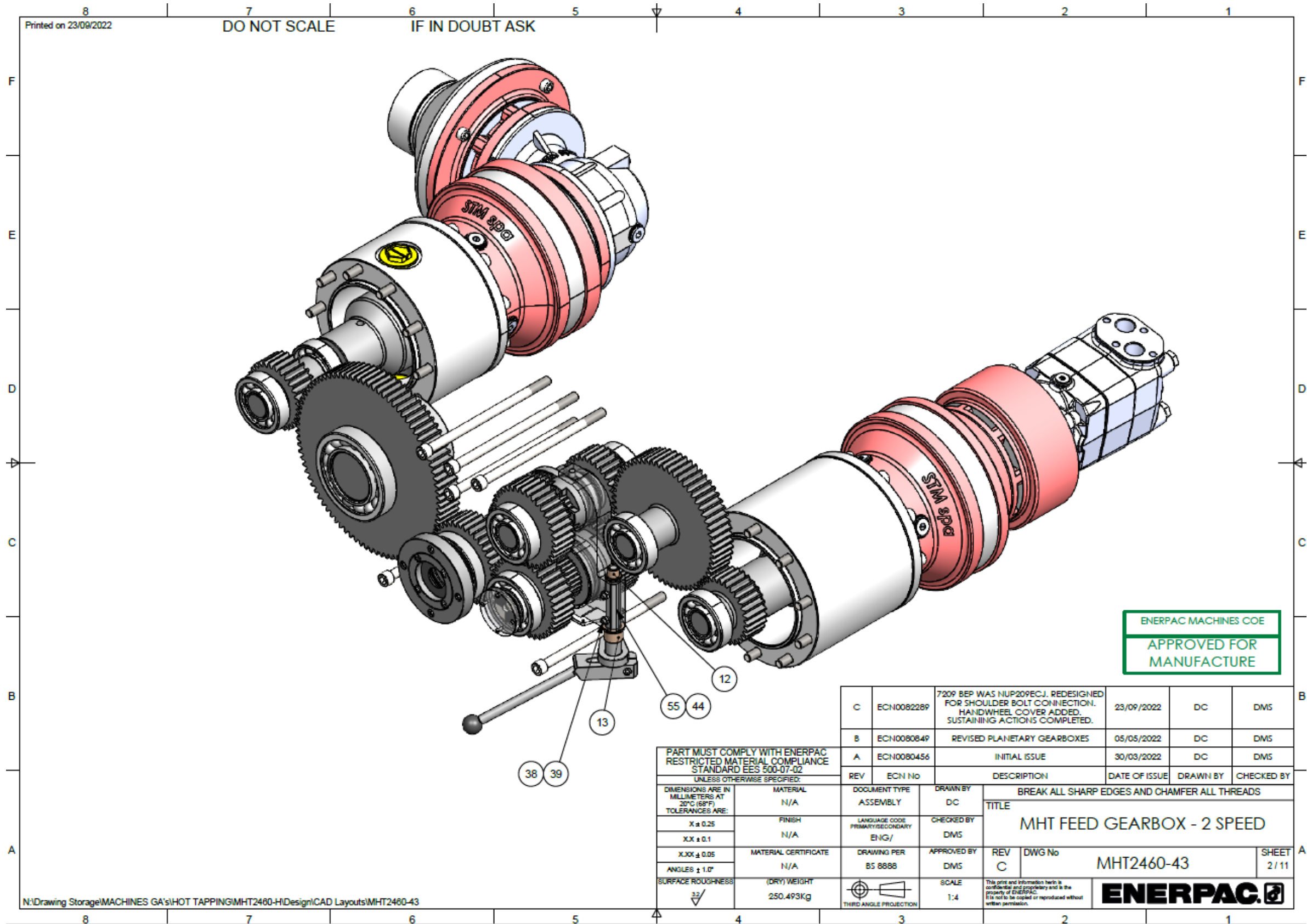
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	N/A	ASSEMBLY	DC	TITLE				
	FINISH	LANGUAGE CODE	CHECKED BY	DRIVE GEARBOX ASSEMBLY				
	N/A	PRIMARY/SECONDARY	DMS					
X ± 0.25	MATERIAL CERTIFICATE	DRAWING PER	APPROVED BY	REV	DWG No	MHT2460-42	SHEET	1/2
XX ± 0.1								
XXX ± 0.05								
ANGLES ± 1.0°	N/A	B5 8888	DMS	A				
SURFACE ROUGHNESS	(DRY) WEIGHT			SCALE				
3.2	814.674Kg	THIRD ANGLE PROJECTION		1:6				
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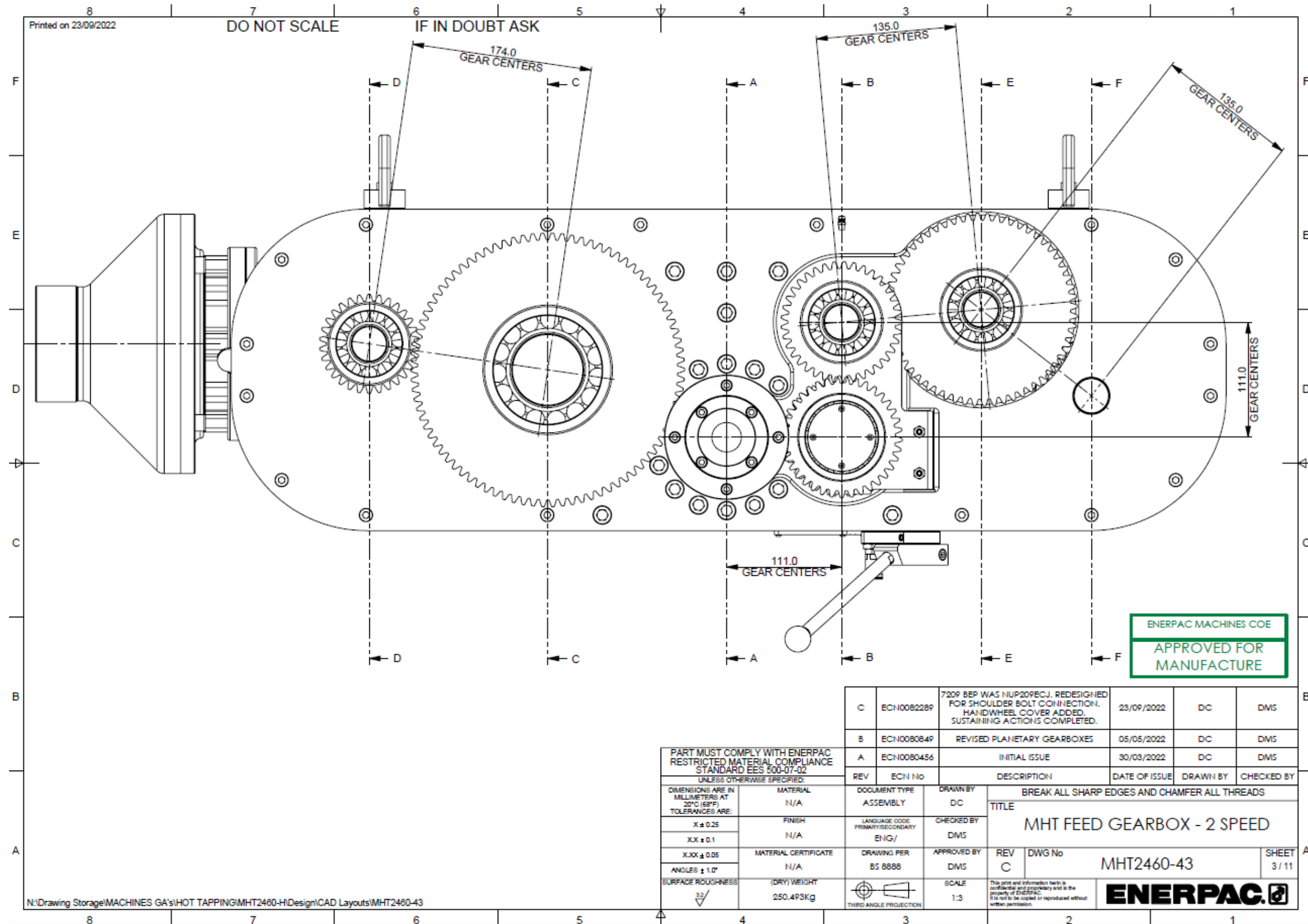
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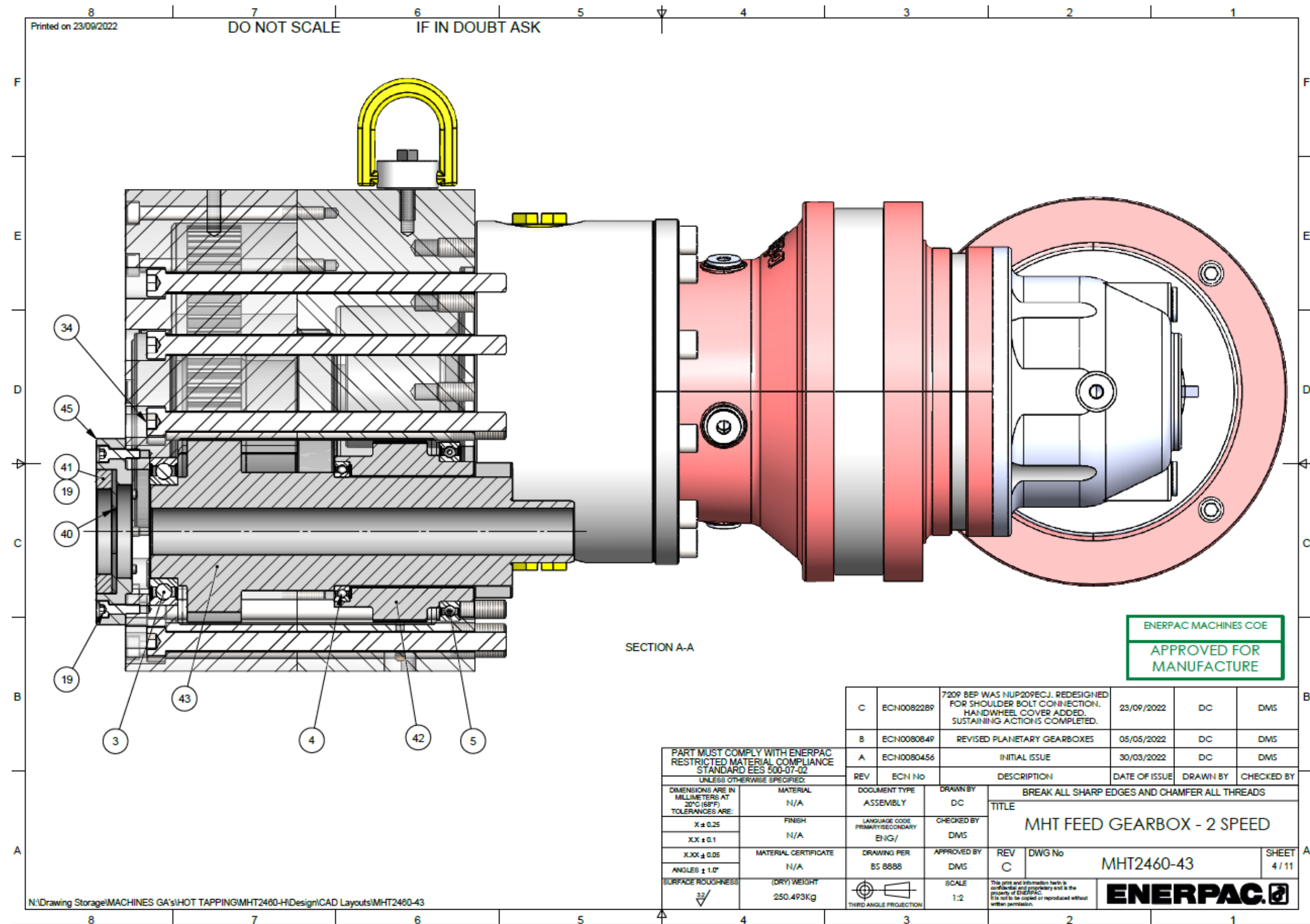


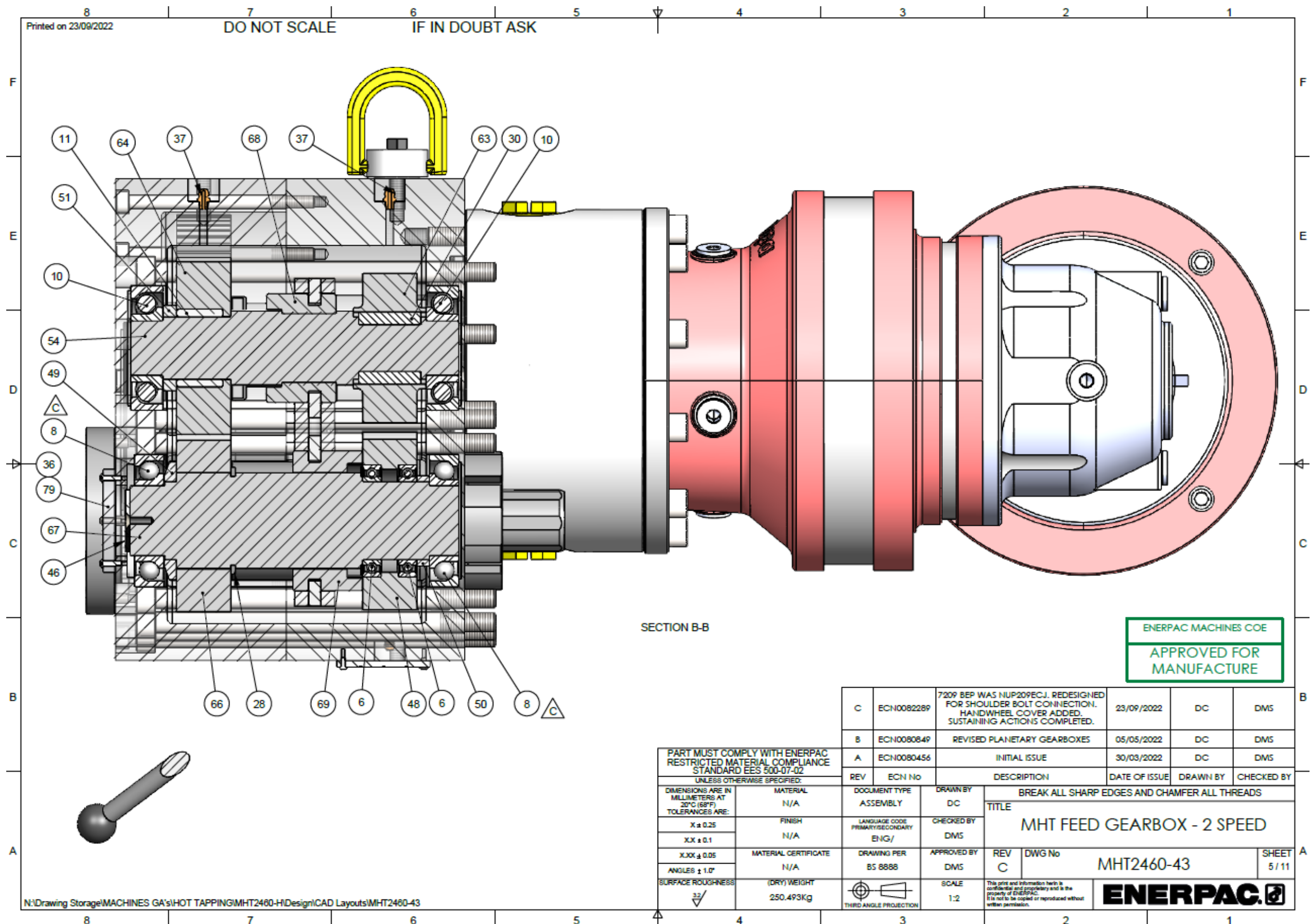


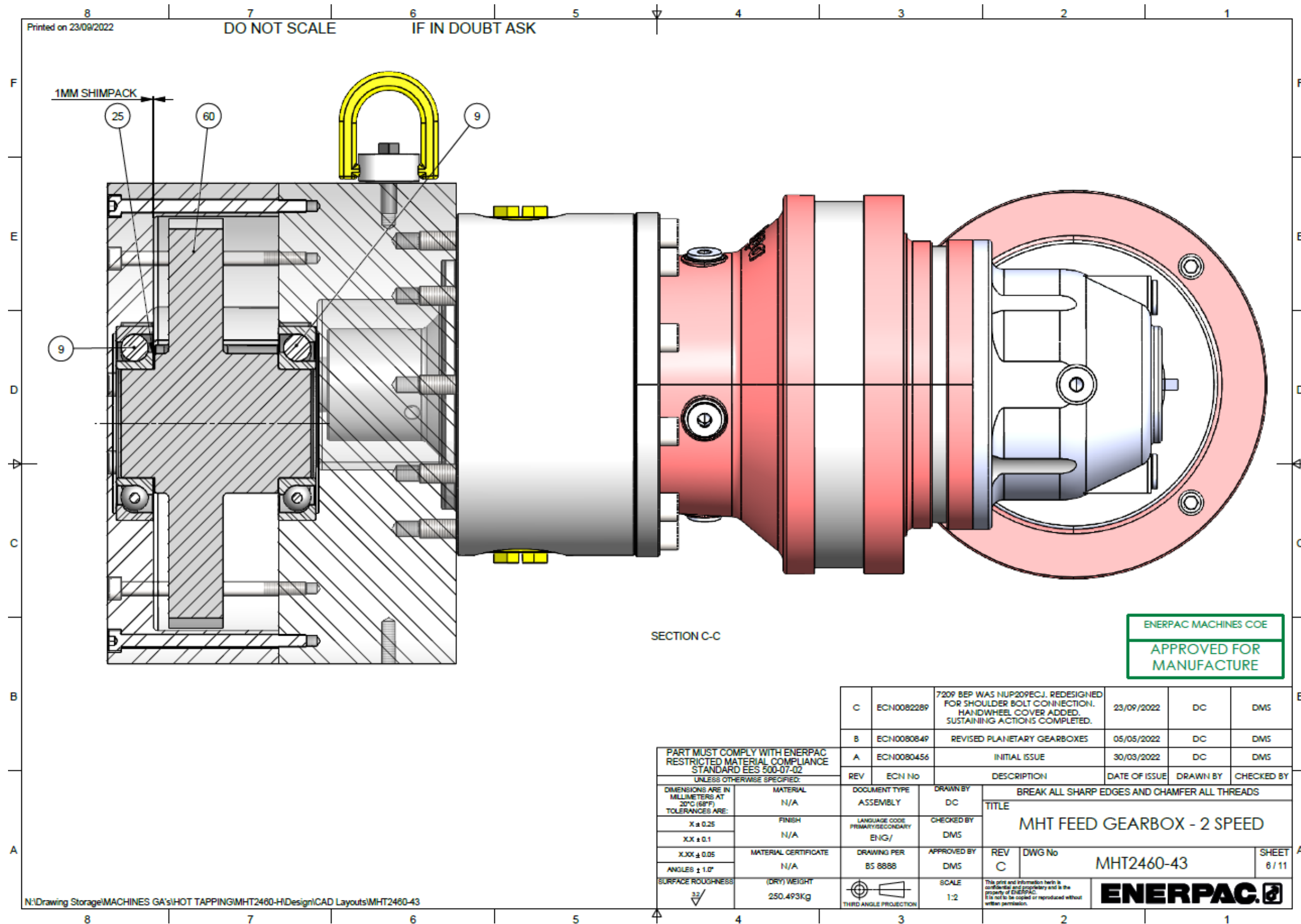


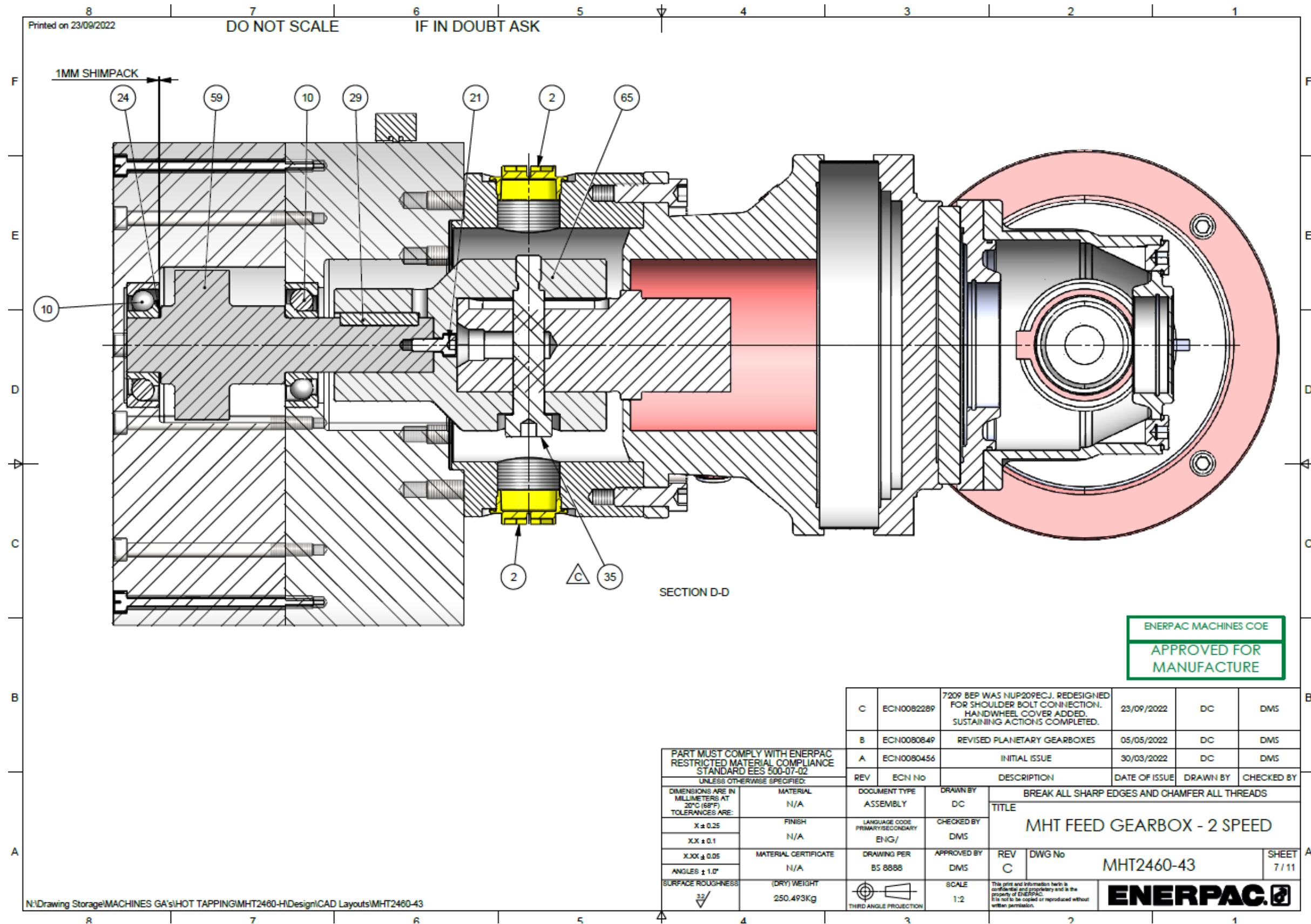


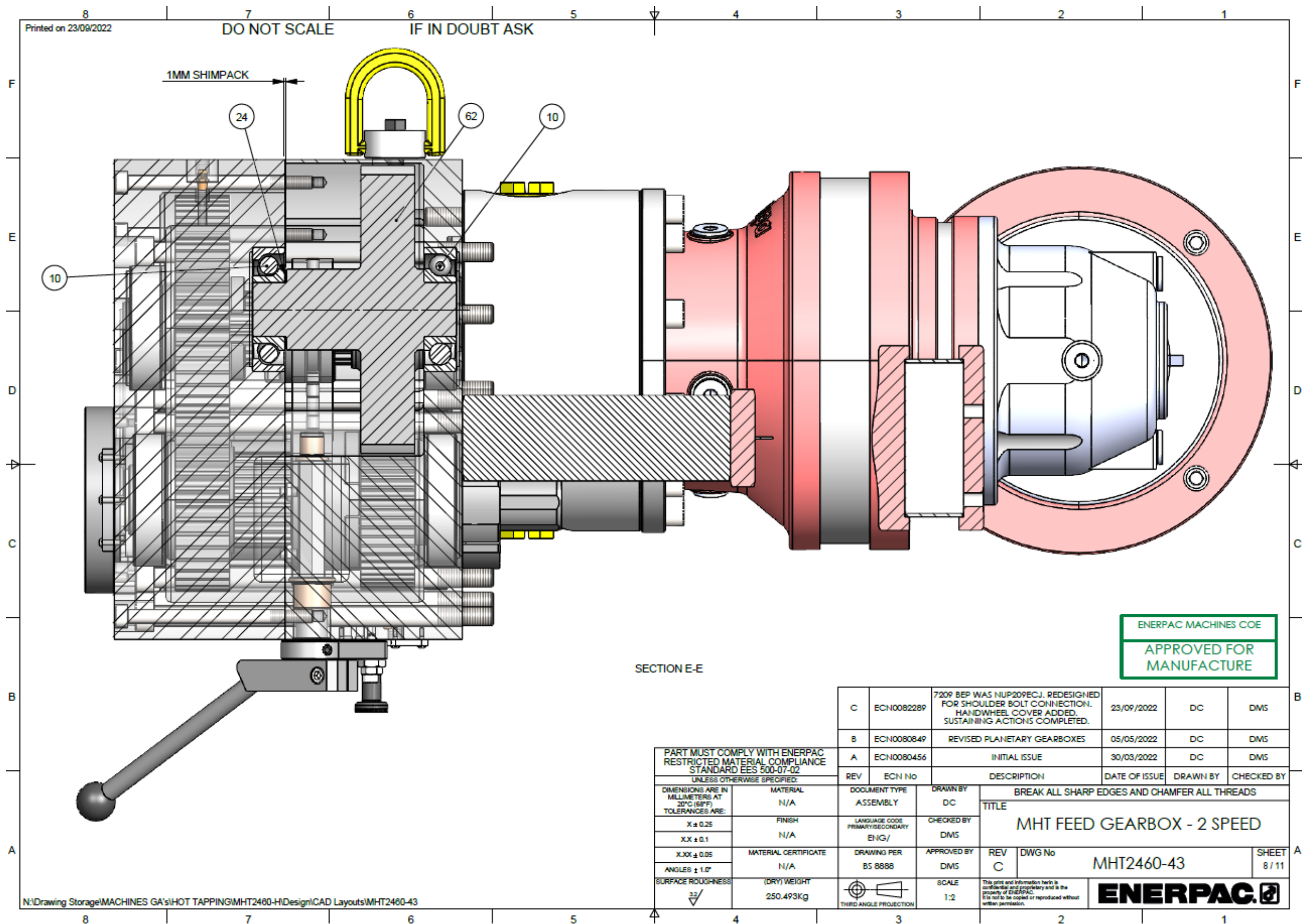


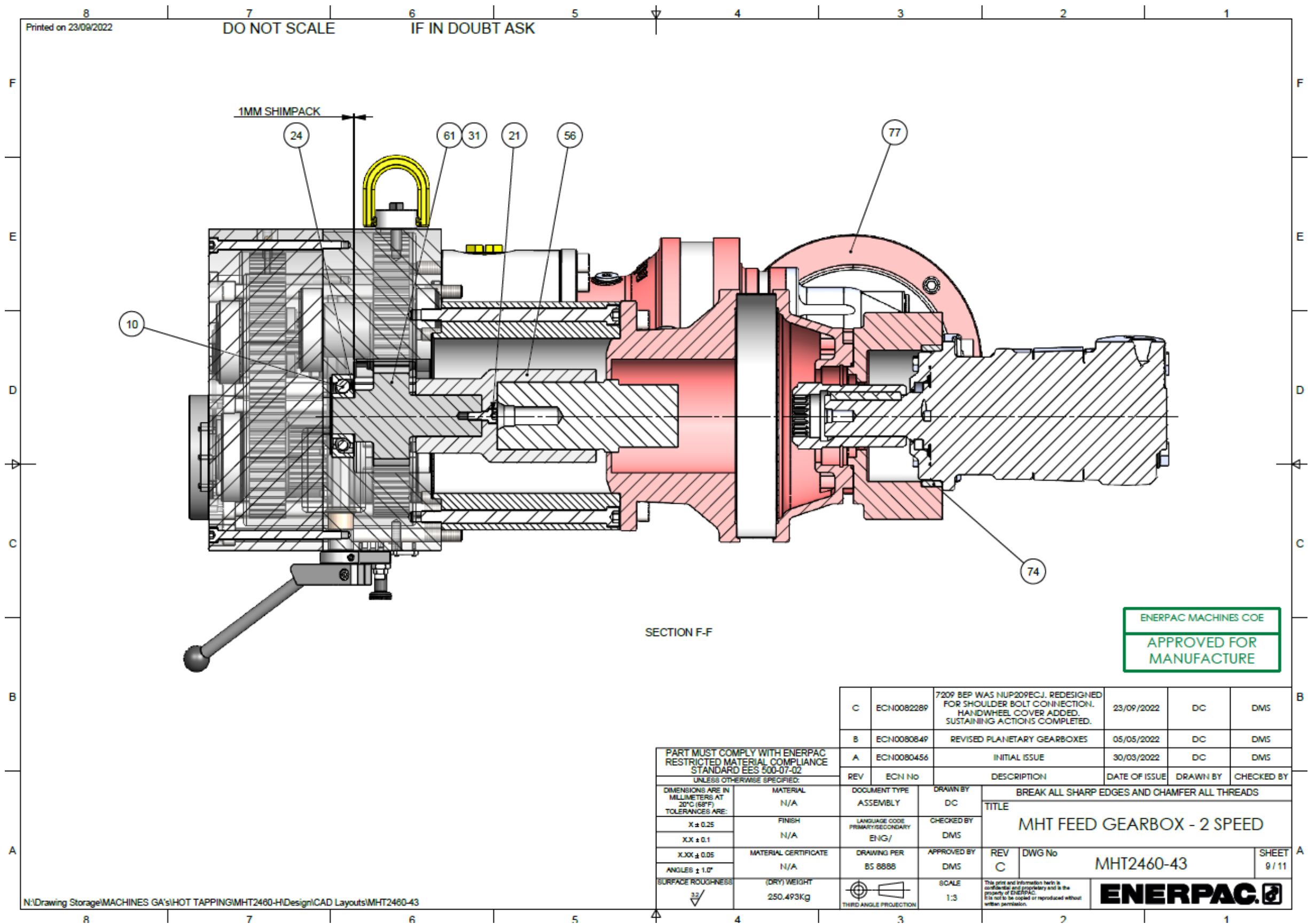


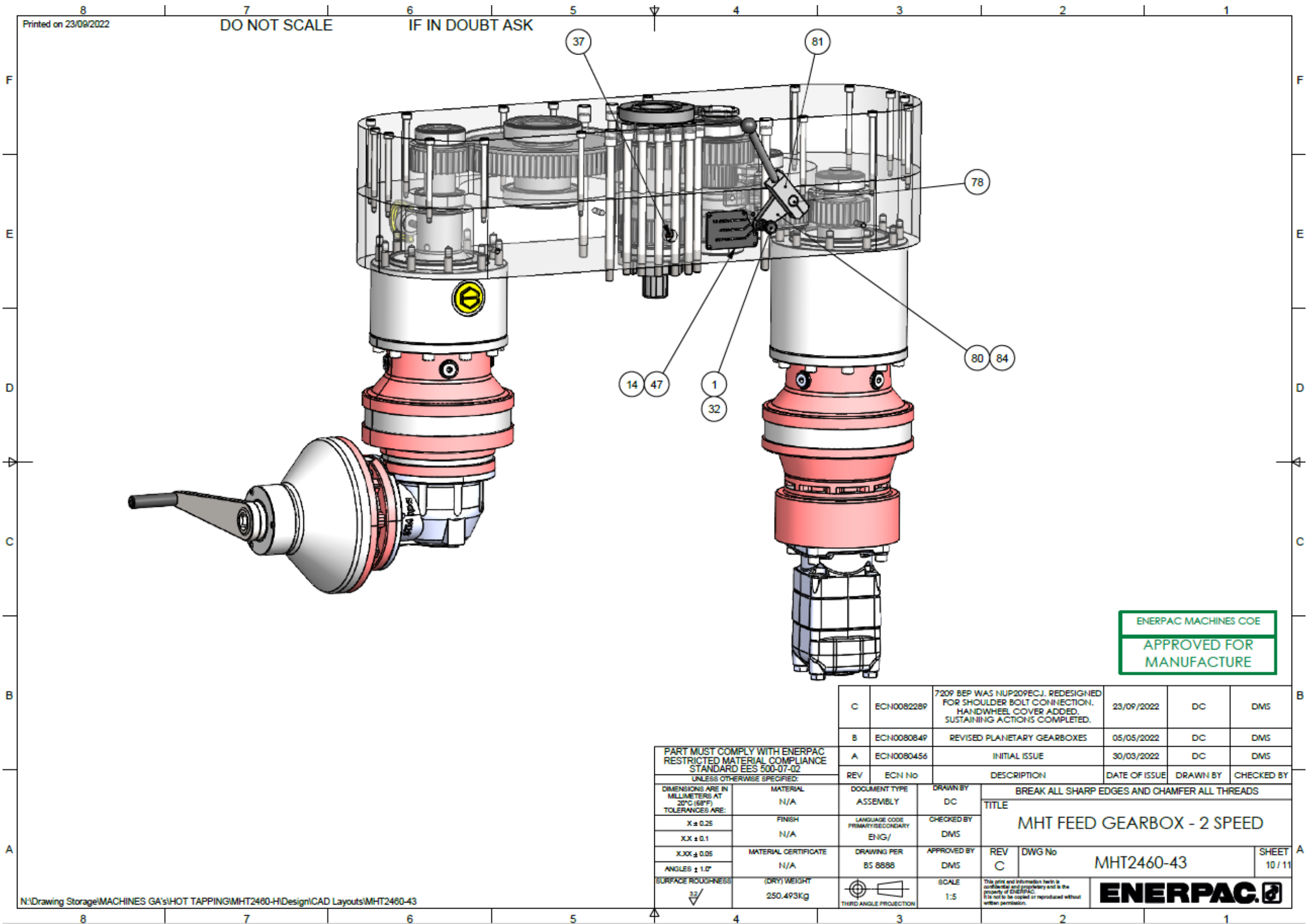


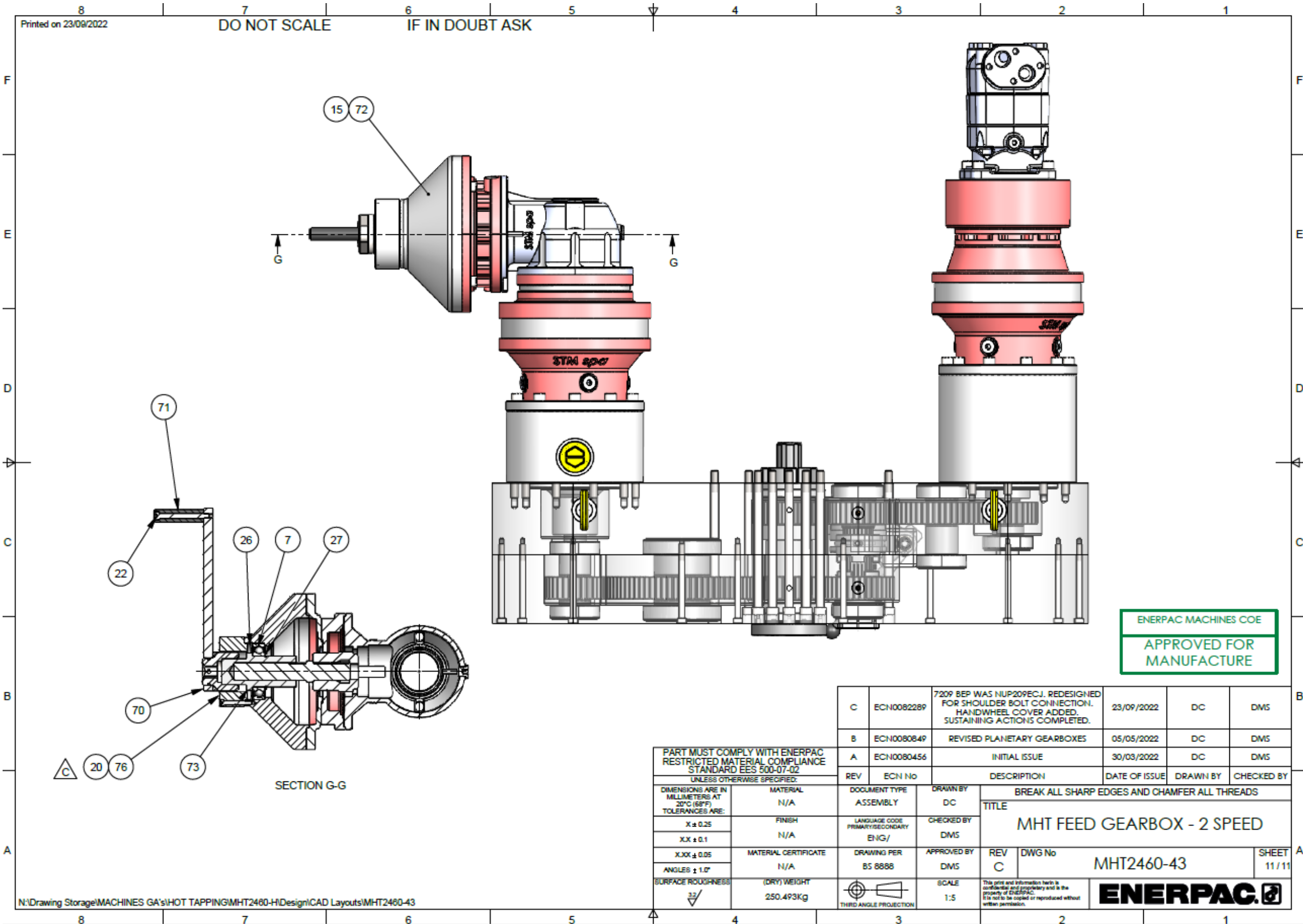


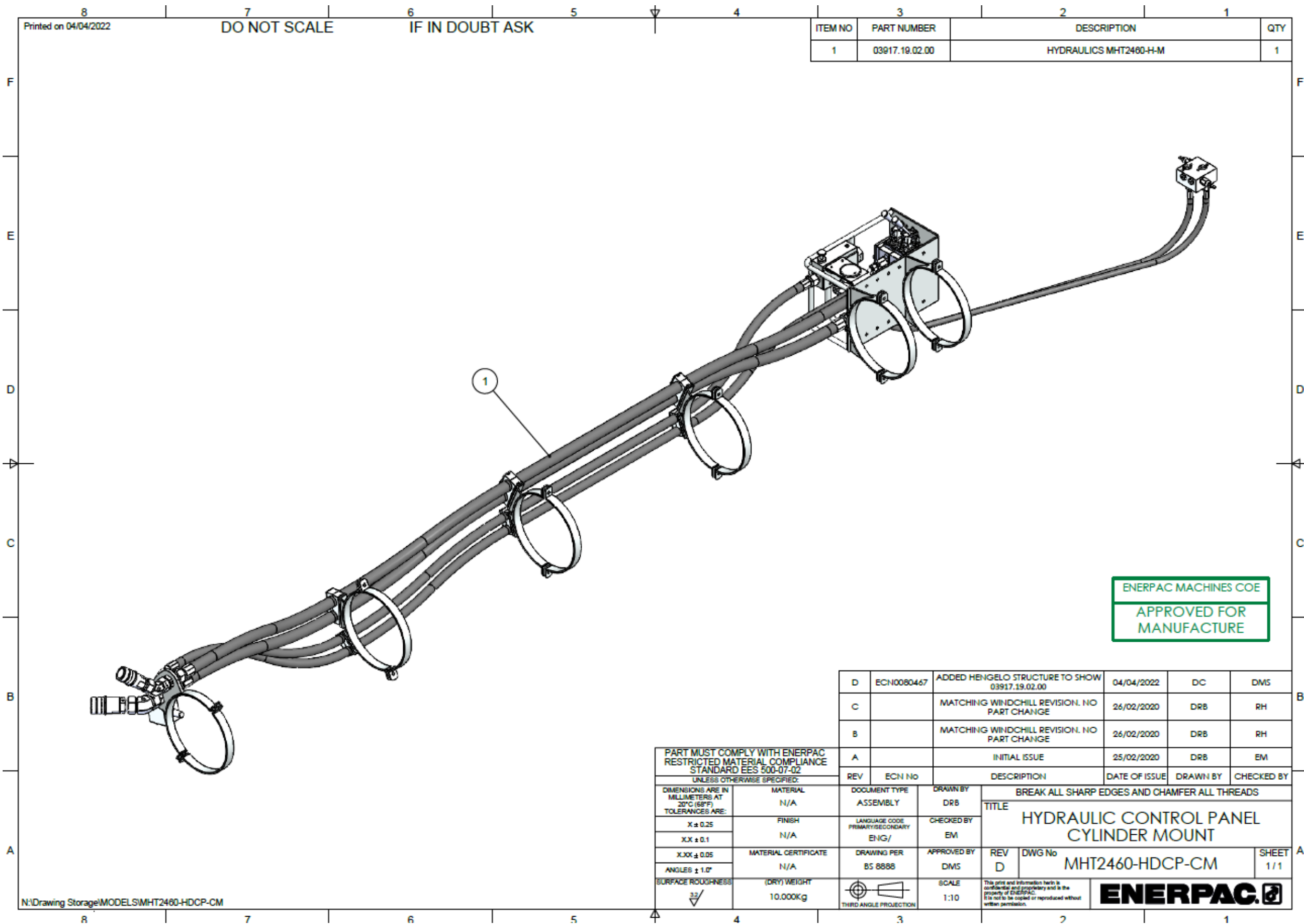


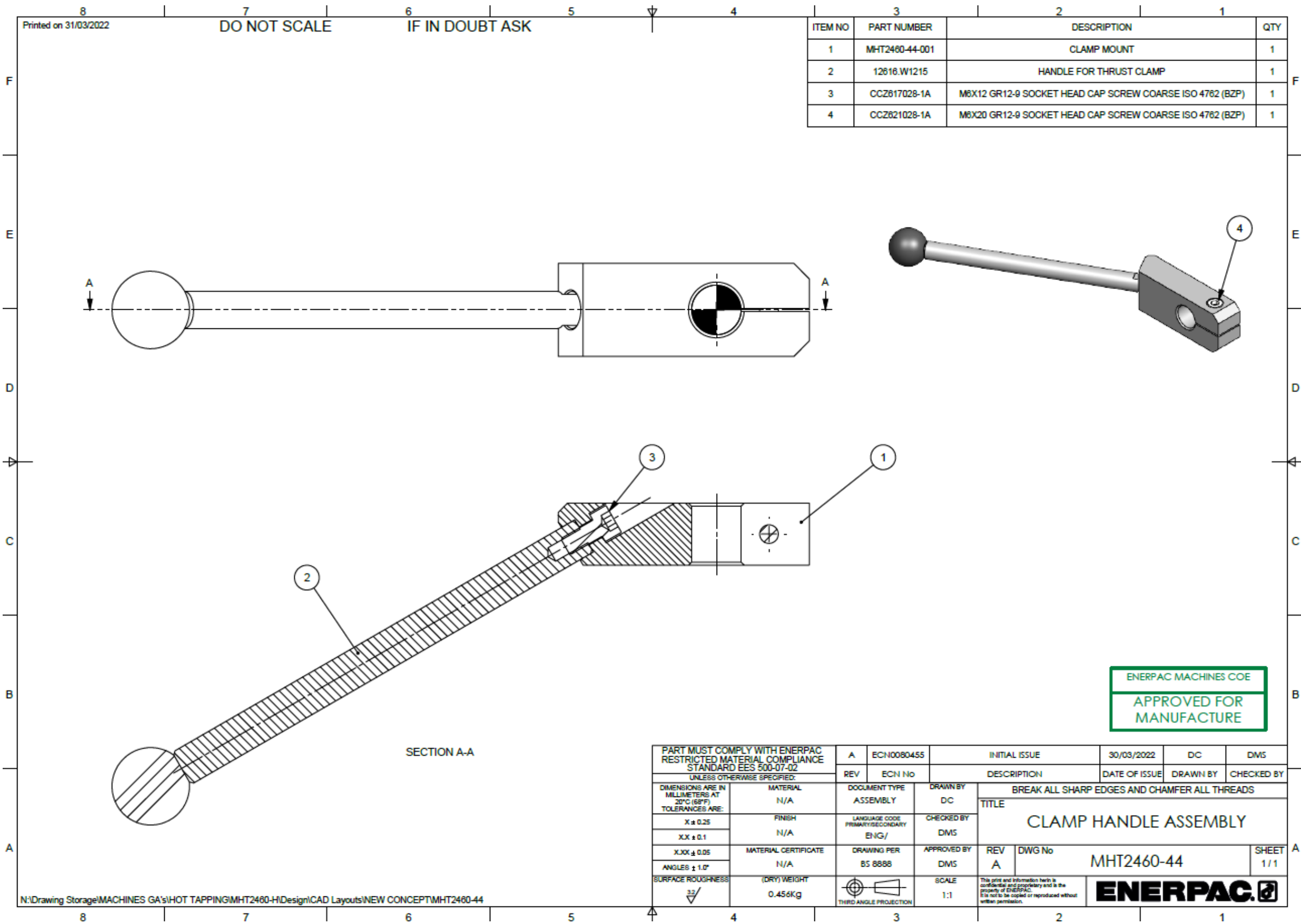








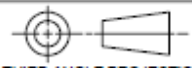




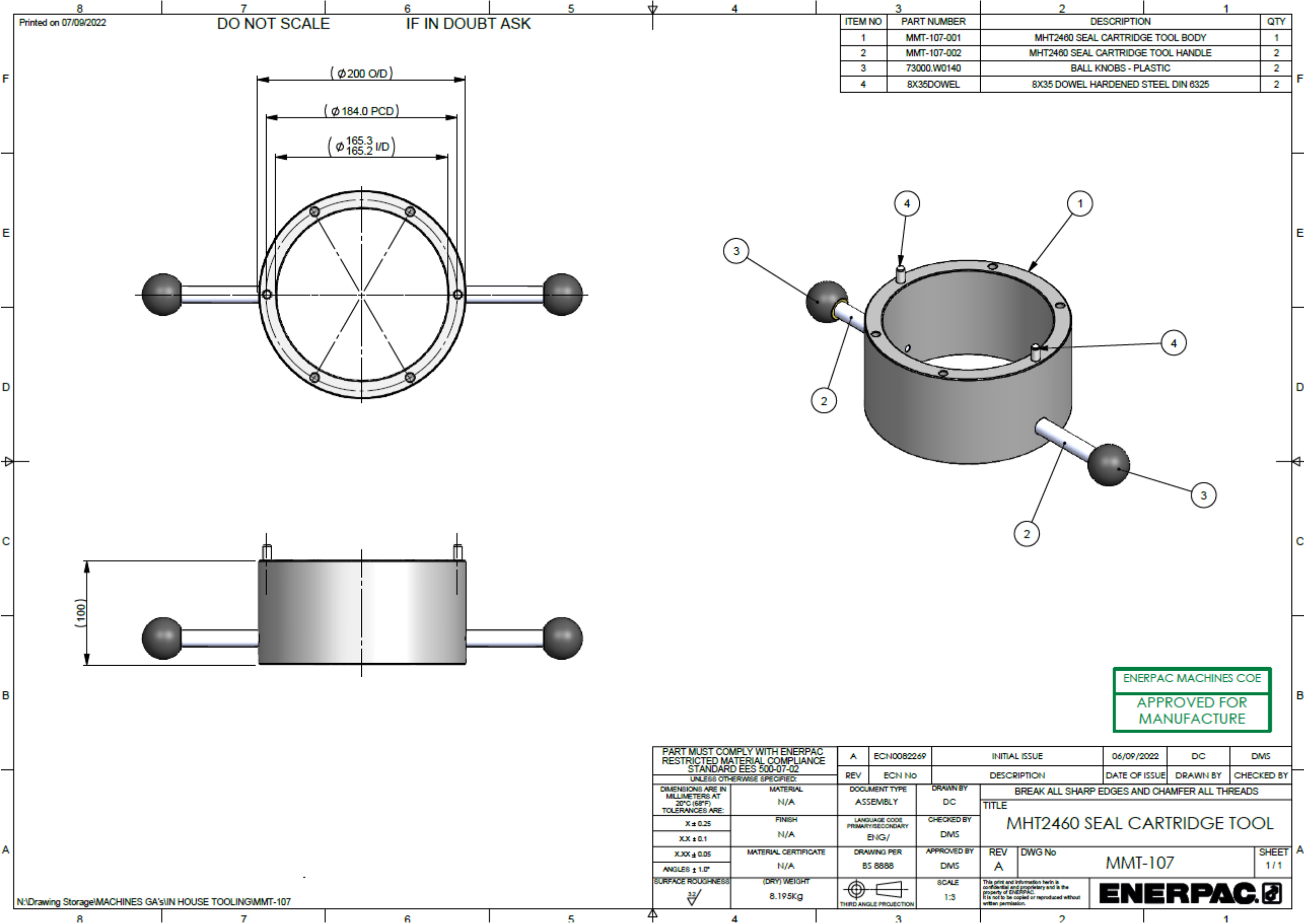
PART NO.	DESCRIPTION	QTY
KEN-602-2800K	BALL DRIVER "L" WRENCHES METRIC AND IMPERIAL	1
KEN-601-5220K	22mm ALLEN KEY LONG ARM	1
KEN-601-5140K	14mm ALLEN KEY LONG ARM	1
KEN-582-2690K	16mm COMBI SPANNER	1
KEN-582-2720K	19mm COMBI SPANNER	1
KEN-582-2840K	36mm COMBI SPANNER	1
KEN-582-2820K	30mm COMBI SPANNER	1
KEN-582-2580K	7mm COMBI SPANNER	1
KEN-582-2830K	32mm COMBI SPANNER	1
TOOLBOX-706-4701	TOOLBOX STANLEY FATMAX 1-95-615	1
KEN-580-7800K	3" A/F RING SLOGGING WRENCH	1
MMT-107	MHT2460 SEAL CARTRIDGE TOOL	1
MMT-56	MHT2460 SEAL PLUG BOSS TOOL	1

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C	ECN0082272	95350.W0707 REPLACED WITH MMT-107	07/09/2022	DC	DMS																														
B	ECN0080477	ADDED 95350.W0701 & MMT-56	01/04/2022	DC	DMS																														
A		Initial Windchill Release	19/02/2020	DRB	RH																														
REV	ECN No	DESCRIPTION	DATE OF ISSUE	DRAWN BY	CHECKED BY																														
PART MUST COMPLY WITH ENERPAC RESTRICTED MATERIAL COMPLIANCE STANDARD EES 500-07-02 UNLESS OTHERWISE SPECIFIED: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">DIMENSIONS ARE IN MILLIMETERS AT 20°C (68°F) TOLERANCES ARE:</td> <td style="width: 20%;">MATERIAL N/A</td> <td style="width: 20%;">DOCUMENT TYPE ASSEMBLY</td> <td style="width: 20%;">DRAWN BY DB</td> <td colspan="2" rowspan="4" style="text-align: center; vertical-align: middle;"> BREAK ALL SHARP EDGES AND CHAMFER ALL THREADS MHT2460-H TOOLKIT </td> </tr> <tr> <td>X ± 0.25</td> <td>FINISH N/A</td> <td>LANGUAGE CODE PRIMARY/SECONDARY ENG/</td> <td>CHECKED BY DC</td> </tr> <tr> <td>X.X ± 0.1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>X.XX ± 0.05</td> <td>MATERIAL CERTIFICATE N/A</td> <td>DRAWING PER BS 8888</td> <td>APPROVED BY</td> </tr> <tr> <td>ANGLES ± 1.0°</td> <td></td> <td></td> <td></td> <td>REV C</td> <td>DWG No MHT2460-H-TK</td> </tr> <tr> <td colspan="2">SURFACE ROUGHNESS 3.2</td> <td>(DRY) WEIGHT 0.000Kg</td> <td>SCALE 1:1</td> <td colspan="2">SHEET 1 / 1</td> </tr> </table>  THIRD ANGLE PROJECTION						DIMENSIONS ARE IN MILLIMETERS AT 20°C (68°F) TOLERANCES ARE:	MATERIAL N/A	DOCUMENT TYPE ASSEMBLY	DRAWN BY DB	BREAK ALL SHARP EDGES AND CHAMFER ALL THREADS MHT2460-H TOOLKIT		X ± 0.25	FINISH N/A	LANGUAGE CODE PRIMARY/SECONDARY ENG/	CHECKED BY DC	X.X ± 0.1				X.XX ± 0.05	MATERIAL CERTIFICATE N/A	DRAWING PER BS 8888	APPROVED BY	ANGLES ± 1.0°				REV C	DWG No MHT2460-H-TK	SURFACE ROUGHNESS 3.2		(DRY) WEIGHT 0.000Kg	SCALE 1:1	SHEET 1 / 1	
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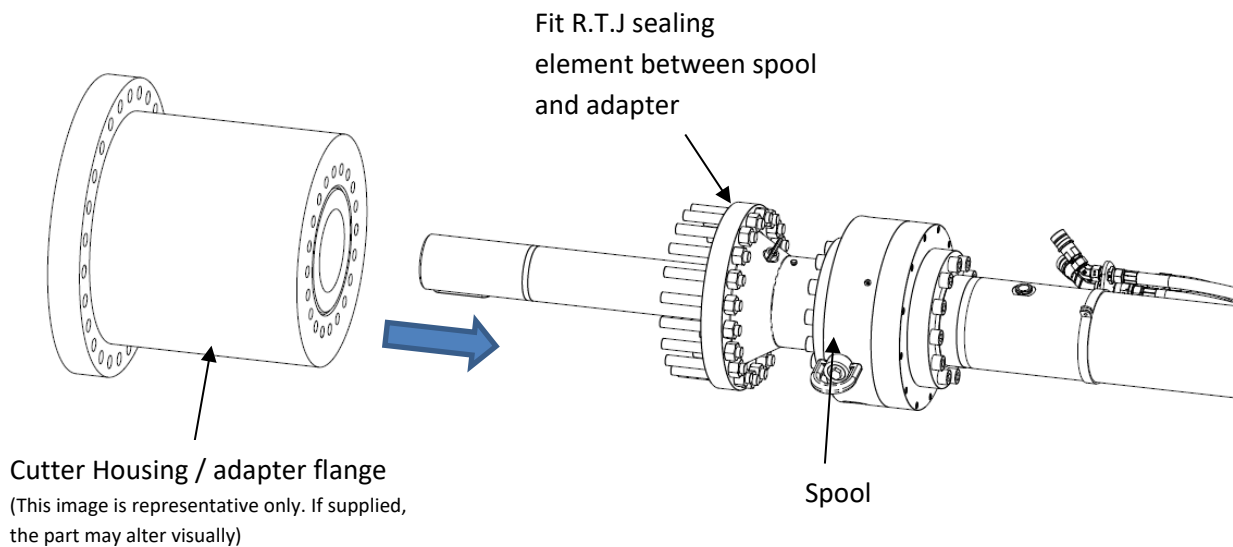
5. Installation

5.1. Fitting Cutters & Pilot Drills

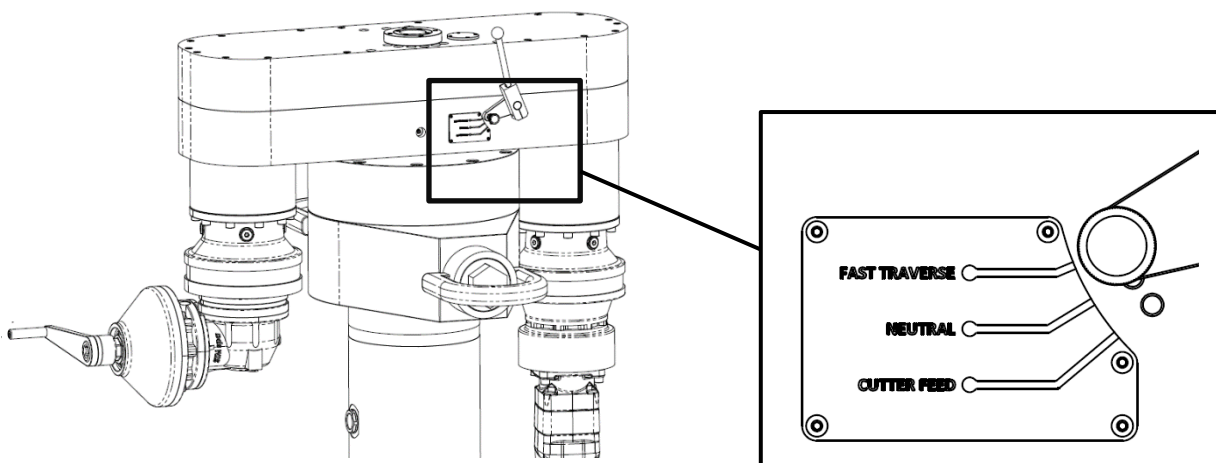
The MHT2460-H comes with a cutter holder (MHT2460-36) which is used for cutter diameters of between 24 to 48 inches. The cutters and pilot drills are optional accessories.

The procedures below show representational images for the cutter housing, cutter and pilot drills for the purpose of showing the method of assembly. The provision of these parts is dependent on specific order requirements.

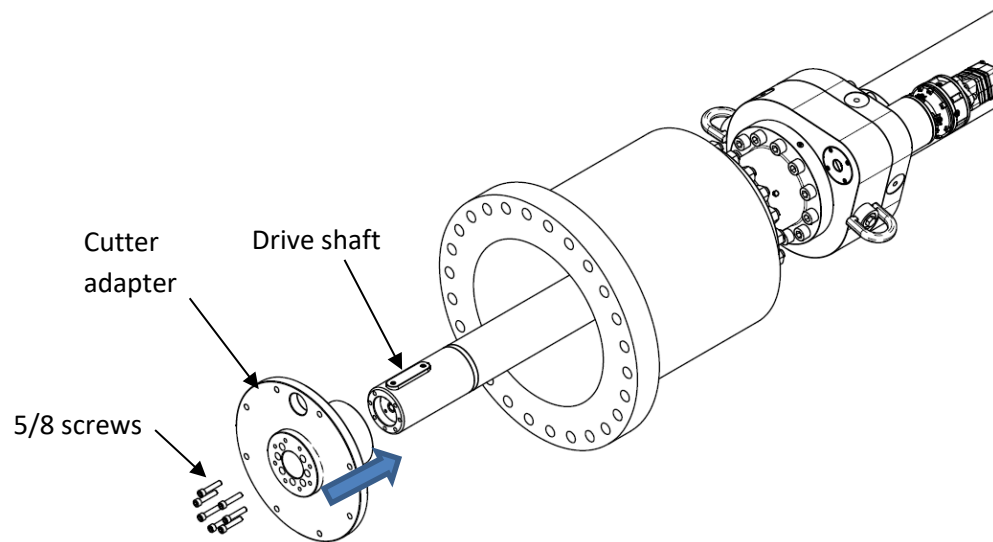
A 'cutter housing' or 'adapter flange' is fitted before the cutter itself. This acts as an adapter between the hot tapping machine & the 'Gate Valve' as well as housing the cutter assembly. Be sure to fit a new R.T.J sealing element (R57) between the 'cutter housing' & MHT Hot tapping Machine.



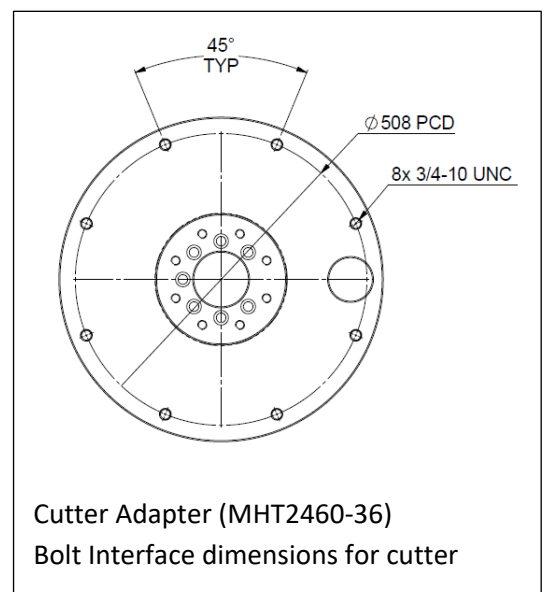
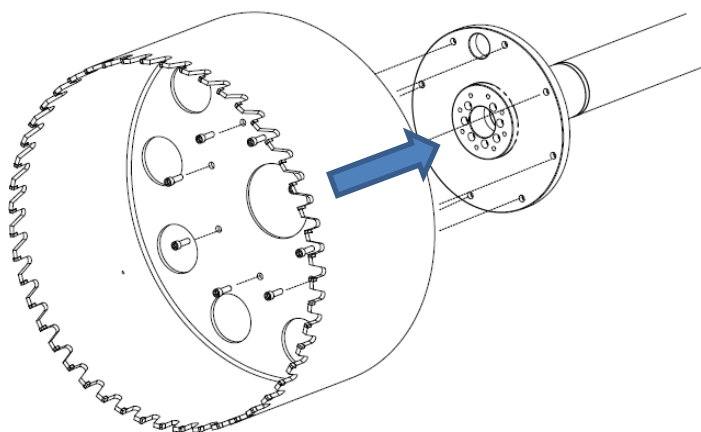
1. Extend the Drive Shaft to allow the cutter adapter to be fitted easily. Engage the motor to set the gearbox to fast traverse and extend drive shaft. Refer to section 6.1 for gearbox operation details.



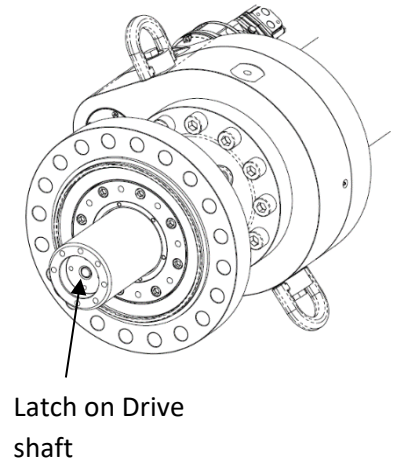
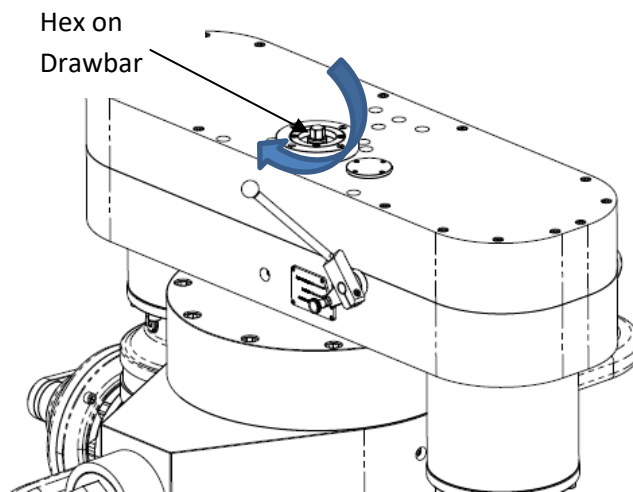
2. To install cutter adapter, align the slot in the cutter adapter to the key on the drive shaft and install adapter into the end of the drive shaft. Secure the cutter adapter to the drive shaft using 7x 5/8-11 UNC Socket Head Cap Screws.



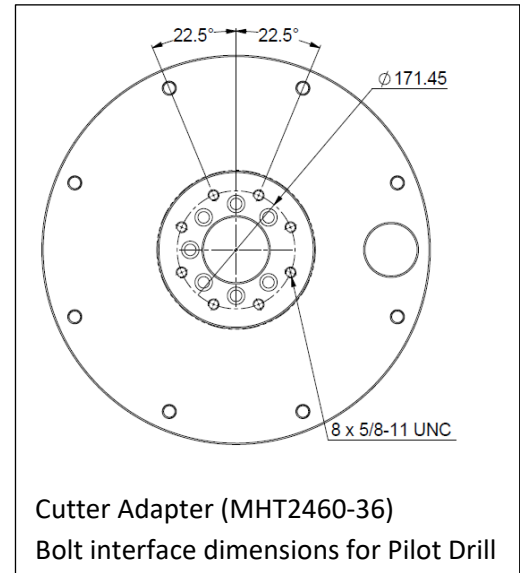
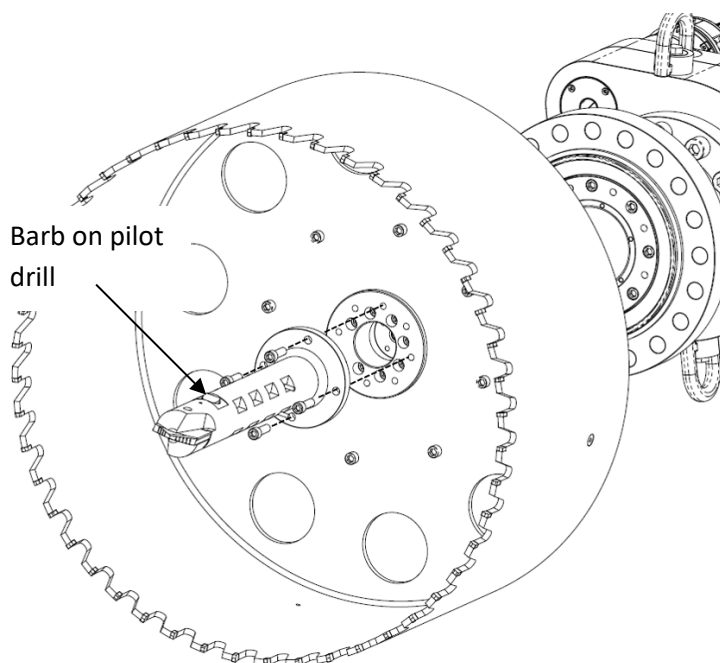
3. To fit cutter, install onto central spigot of cutter adapter, rotate until the eight holes align & secure using 8 x 3/4-10 screws.



- Before installing the pilot drill, ensure the latch pin on the driveshaft is fully retracted. This is done by rotating the Hex on the drawbar until the drawbar cannot be rotated any further.



- To fit the pilot drill, fit its spigot into the central bore of the cutter to locate and then install 4 x 5/8-11 bolts and 5/8" spring washers, and tighten equally to ensure pilot drill is as concentric to the cutter as possible. When fitting the pilot retaining bolts using Thread lock / retaining compound should be considered.



- Once the pilot drill has been secured to the drive shaft, rotate the drawbar hex to a hard stop. This will extend the latch pin and the barbs on the pilot drill will retract.

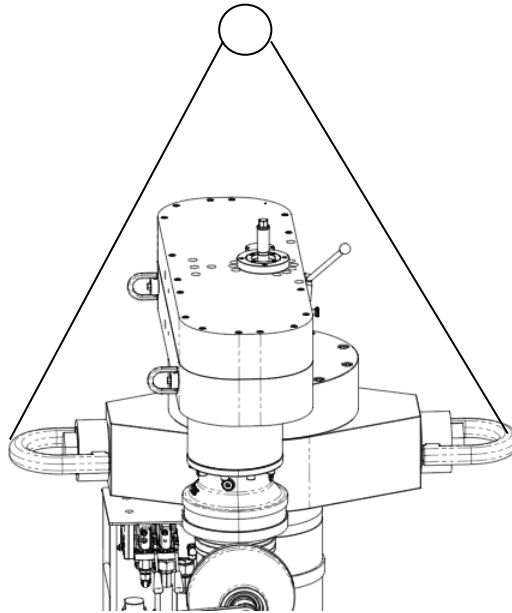


Make a note of the number of rotations and direction needed to extend and retract the barbs. This will be required during operation.

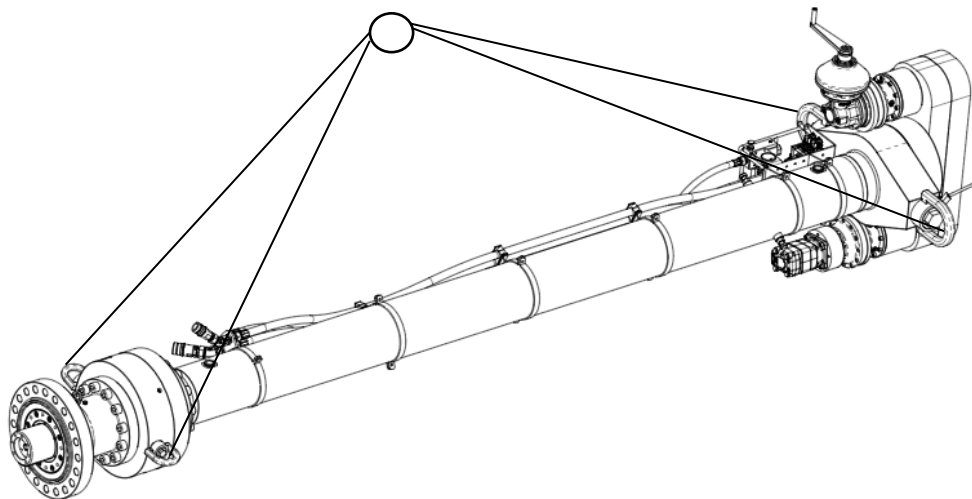
5.2. Lifting

The MHT2460-H is lifted & installed using a combination of four Lift Points mounted along the body of the machine as can be seen below.

If lifting the machine in a **vertical arrangement**, with the nose of the machine pointing downwards then only use the rearward mounted lifting points with suitable lifting equipment i.e. overhead crane as shown above.



If lifting the MHT2460-H in a **horizontal arrangement**, the two lifting points along the body of the machine should be used, along with suitable lifting equipment i.e. overhead crane as shown above.



5.3. Securing to pipeline.

The MHT2460-H is mounted to a live pipeline via a pre-installed 'Gate Valve'. The 'Adapter Flange' on the MHT2460-H is secured to the 'Gate Valve' by a series of bolts or studs.

Before making any attempt to secure the MHT2460-H to a 'Gate Valve', measurements should be taken to predict how far the cutter should be fed until it has completely cut through one side of the pipe wall. Use the 'Hot Tapping Data Sheet' in the back of this manual to record such measurements.

1. Retract the cutter into the 'Cutter Housing' to prevent it clashing with any of the pipeline assembly whilst lifting the hot tapping machine into place.
2. Fit a new sealing element between the 'Cutter Housing' & the 'Gate Valve'.
3. Safely lift & manoeuvre the MHT hot tapping machine until the 'Cutter Housing' is roughly aligned with the 'Gate Valve'.
4. Ensure that before securing the MHT to the pipeline, it is orientated such that the gearbox controls will be easily accessible when the machine is in place.
5. Align the corresponding holes between the 'Cutter Housing' & 'Gate Valve', insert appropriate studs & nuts & tighten equally using a calibrated torque wrench to the correct torque figure.
6. The MHT2460-H is now properly installed & the Motor hoses can now be connected.

5.4. Service and Supplies

5.4.1. Personnel

As a specialist portable machine the minimum standard for an operator is to be:

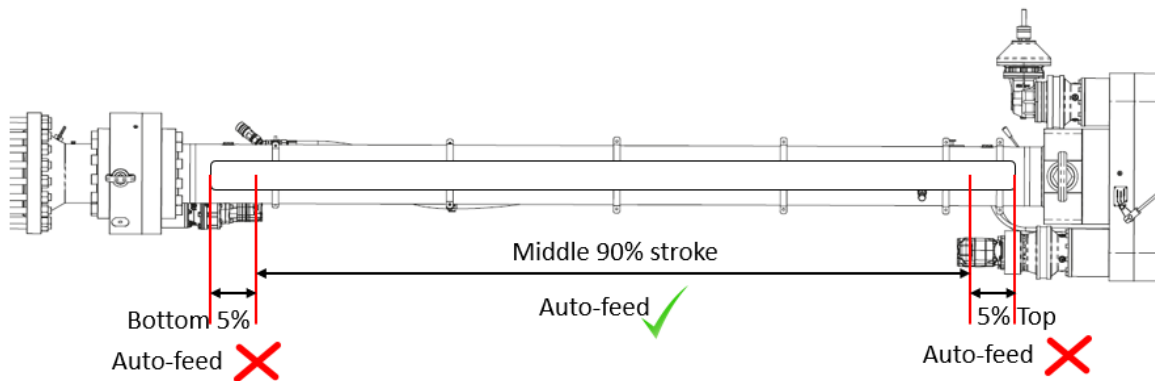
- The operator must be trained and conversant with the Enerpac MHT2460-H machine.
- The operator to be able to identify the correct and incorrect use of static or portable machines
- Comply with all local and internationally recognised safe use of powered machines

6. Machine Operation



WARNINGS

- Note:** Before turning the hydraulic motor on ensure the 'Crank Handle' is removed or the gear lever is in the neutral position otherwise this will rotate when the motor is turned on.
- Note:** The automatic feed options should only be used in the middle 90% of the machine stroke. The manual feed **MUST** be used for the top and bottom 5% of the stroke. Failure to stop the automatic feed will result in **DAMAGE** to the machine. The machine stroke is specified in section 4.



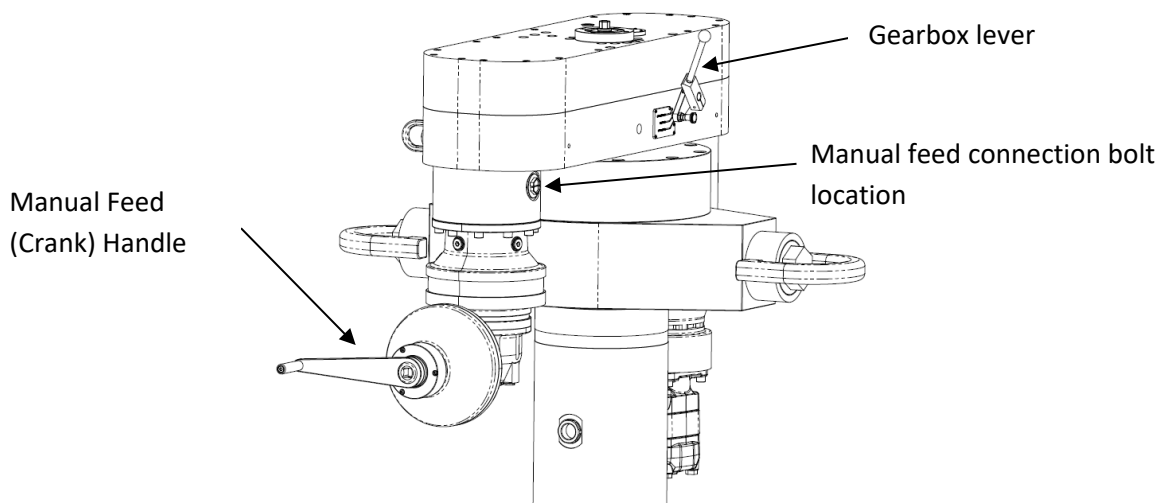
6.1. Machine Features

Manual Feed Handle

The manual feed handle is located on the feed gearbox at the top of the machine.



Note: The gearbox lever must be set into **NEUTRAL** before using the manual handwheel.

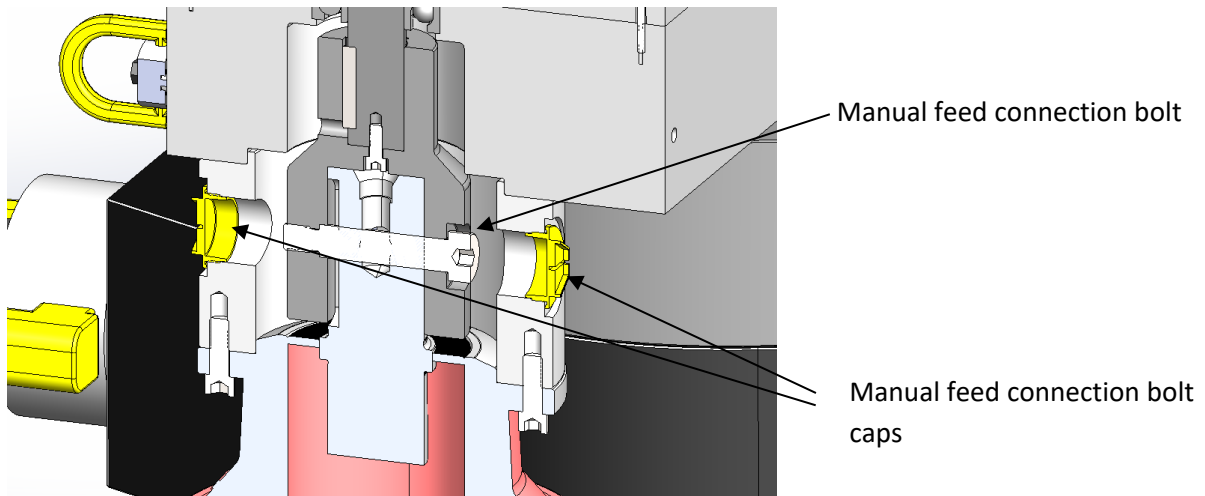


Simply pull off the manual feed (crank) handle for removal. Push on the handle to install.

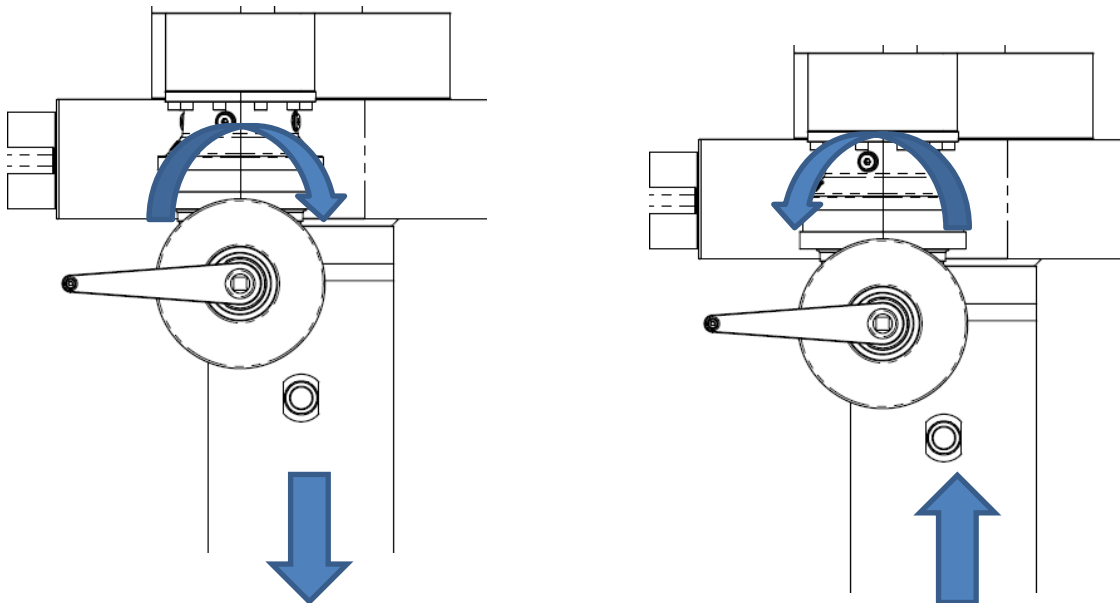


Note: To use the manual feed, the bolt connecting the gearbox to the manual feed handle must be installed.

To install the bolt, remove the cap and screw in the bolt. Replace the cap.



To move the cutter down, rotate the handle clockwise.
To move the cutter up, rotate the handle anticlockwise.



Refer to the specification table for the feed rate per revolution.



WARNING

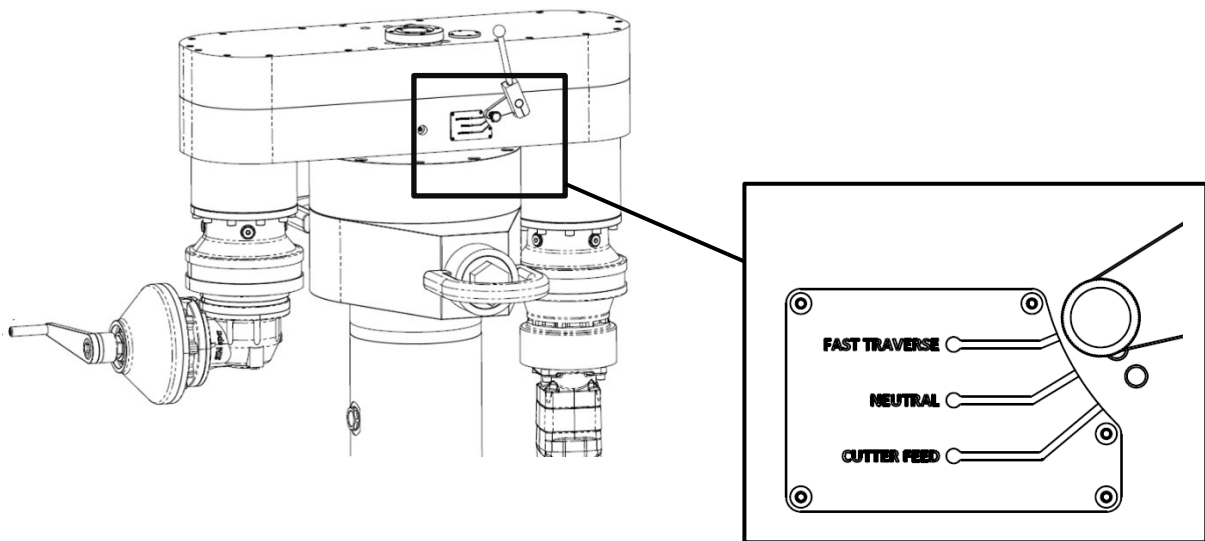
- **REMOVE the manual feed connection bolt when manual crank is not in use. Failure to disconnect the manual feed cause the driveshaft to advance in neutral gear.**
- **REMOVE the manual feed handle when not in use. If the handle is left engaged, it will spin causing a hazard.**

Auto Feed

The lever on the gearbox allows the user to select two options for feeding the driveshaft, the Fast Traverse option for moving the shaft large distances more quickly, and the Cutter Feed option, for moving the driveshaft at a slower rate for during cutting. Neutral should be selected when not moving the driveshaft, or if using the manual feed.



Note: When changing gears, a constant pressure to the gear lever in one direction is required until the gears have engaged. This may take several minutes. Once engaged re-apply the plunger to lock gear in position.



WARNING

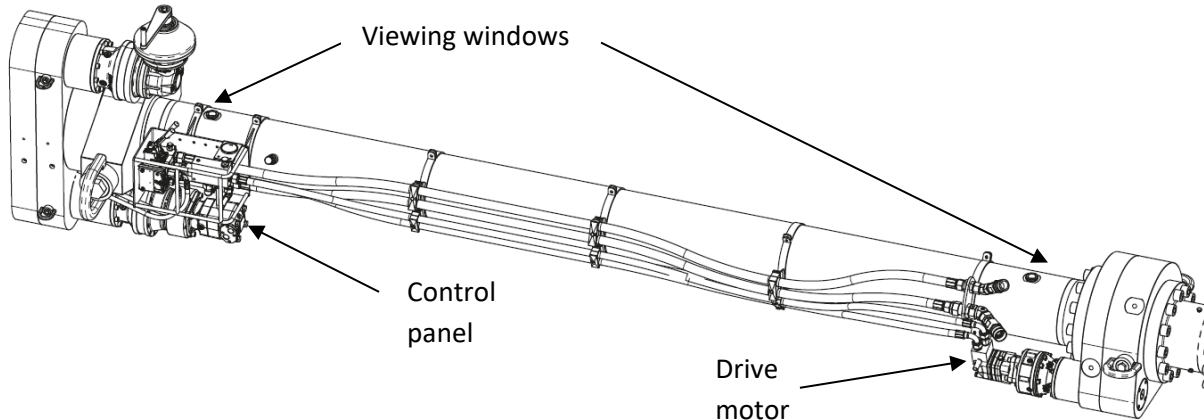
Before using the Auto feed, check that the manual feed has been disconnected. (Refer to previous page.)

- **REMOVE the manual feed connection bolt when manual crank is not in use. Failure to disconnect the manual feed cause the driveshaft to advance in neutral gear.**
- **REMOVE the manual feed handle when not in use. If the handle is left engaged, it will spin causing a hazard.**

To disconnect the handfeed, remove the manual feed connection bolt by removing the caps, and unscrewing the bolt. The bolt will need to be pushed from the opposite side until the bolt protrudes from the hand crank gearbox mount. Fully remove the bolt and replace the caps.

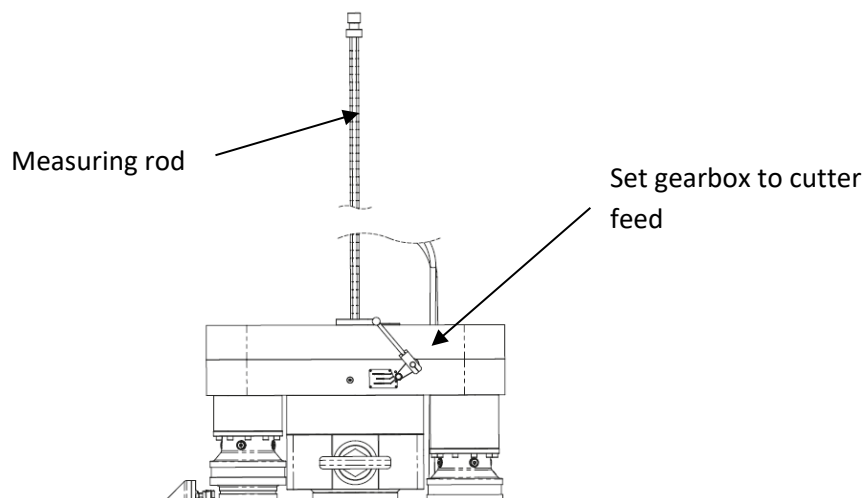
6.2. General cutting operation procedure

1. Set the position of the cutter within the piping gate valve, and **carefully** advance the drive end until the pilot drill is within 5mm of the pipe.
2. Position the gear lever into 'Neutral' to ensure the cutter does not feed forwards when the hydraulic motor is turned on.
3. Start the cutter rotation by engaging the drive motor using the control panel. The cutter will now be rotating but not feeding towards the pipe.

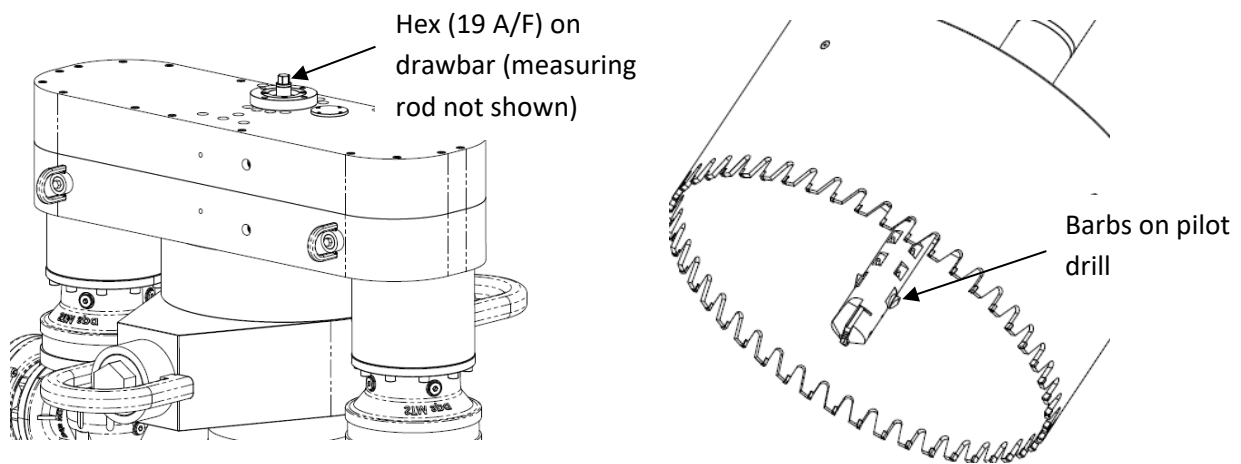


The cutter speed and direction can be monitored by using either viewing window located in the machine cylinder. A white mark will be painted on the inner tubing to assess the speed by counting the revolutions per minute. Alternatively mark the measuring rod and this can be used to assess the speed and cutter direction.

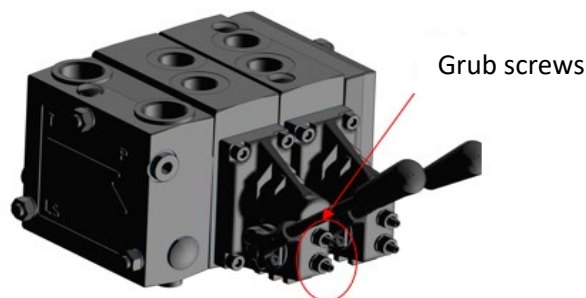
4. Make a note of where the measuring rod is sitting at the back of the gearbox, this is marked at 25.4mm (1") increments. Use this along with pre-cut data that should have been recorded on the 'Hot Tapping Data Sheet' at the back of this manual as a guide for how far the cutter needs to be advanced.
5. To start feeding the cutter towards the pipe, push the gear lever to 'cutter feed'. The hydraulic motor can be slowed momentarily to make the gear selection easier, return motor to operational speed afterwards.



6. Using the Measuring Rod & pre-cut data (which should have been recorded on the 'Hot Tapping Data Sheet' at the back of this manual) continue to feed the cutter into the pipeline until it has made a complete cut through one side of the pipe.
7. Once the pilot drill is at a position where the barbs are through the hole, the barbs on the pilot drill should now be extended out so that the coupon is retained on the drill. Extending the barbs is done by manually rotating the drawbar hex. The measuring rod can be used to turn the hex.



8. Continue to feed the cutter into the pipeline until it has made a complete cut through one side of the pipe.
9. Stop the cutter from feeding by returning the gear lever to the 'neutral' position & turn the drive motor off to stop the cutter from rotating.
10. Confirm cut is complete by manually advancing the cutter slightly to ensure it is free of obstruction. If there is resistance, the cut may not be fully complete at this point. To ensure a seal element can pass through, the full O/D needs to be cleared.
11. Retract the cutter by turning the Manual Feed Handle. The pipeline coupon will be retained by the pilot drill, this can be recovered later when the machine is removed from the pipeline.
12. To quickly return the assembly, engage the fast traverse. It may be necessary to power the motor at low speeds to engage the gears. Ensure that the cutter is not spinning during fast traverse by hydraulically locking the feed motor. Note that the hydraulic controls for the drive motor have grub screws which prevent the use of the drive motor to reverse the cutter out – this is to stop the cutter tips from being stripped from the cutter.
13. The hydraulic controls have grub screws which can be set to prevent the use of the drive motor to reverse the cutter out – this is to stop the cutter tips from being stripped from the cutter.



7. Completion Plug Installation Guidance

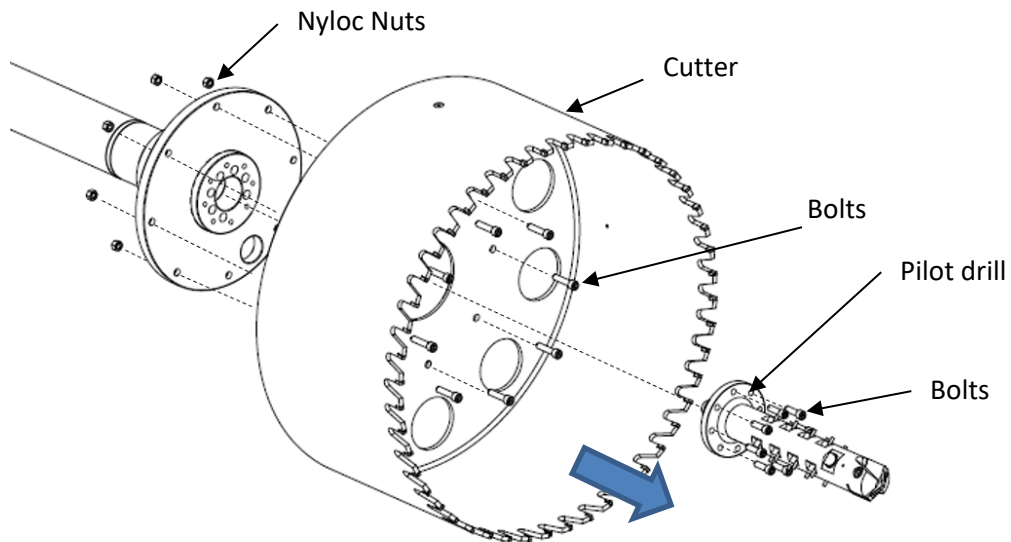
The MHT2460-H can be used to install a completion plug which is used to seal the opening branch in the pipeline used by the cutting operation of the hot tapping machine.

WARNING

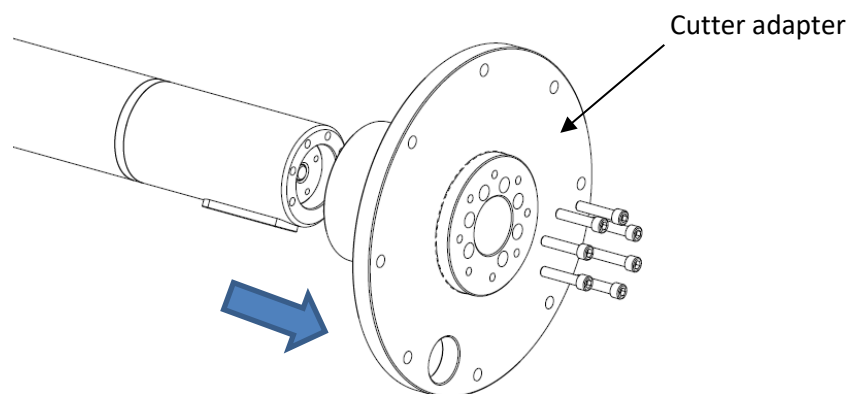


Machine adjustments should not be made while the machine is connected to any power source. Disconnect the hydraulic supply before making adjustments.

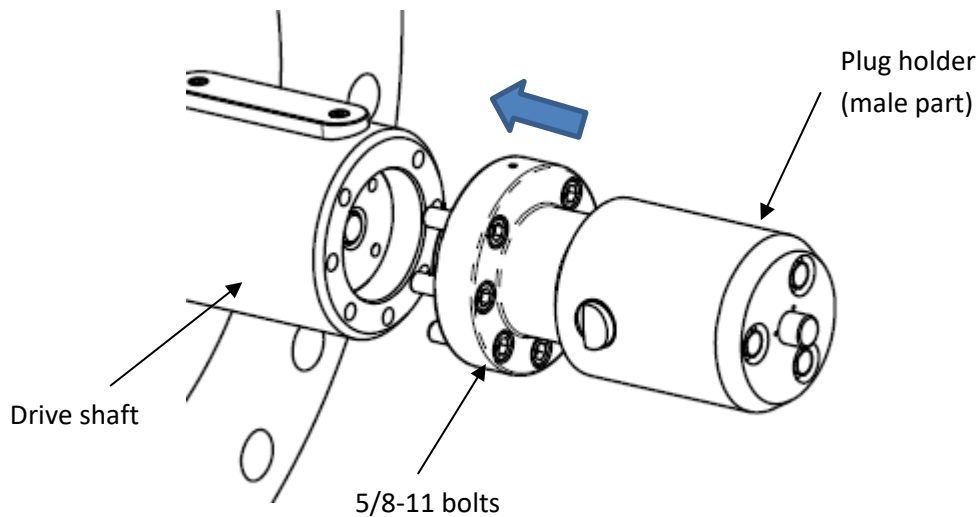
1. To install the plug to the hot tapping machine, the cutter and adapter must first be removed.
2. The cutter and pilot drill is removed from the cutter adapter by unscrewing the bolts and Nyloc nuts.



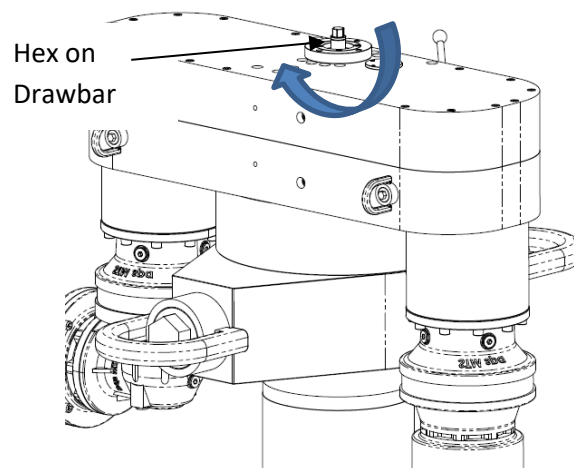
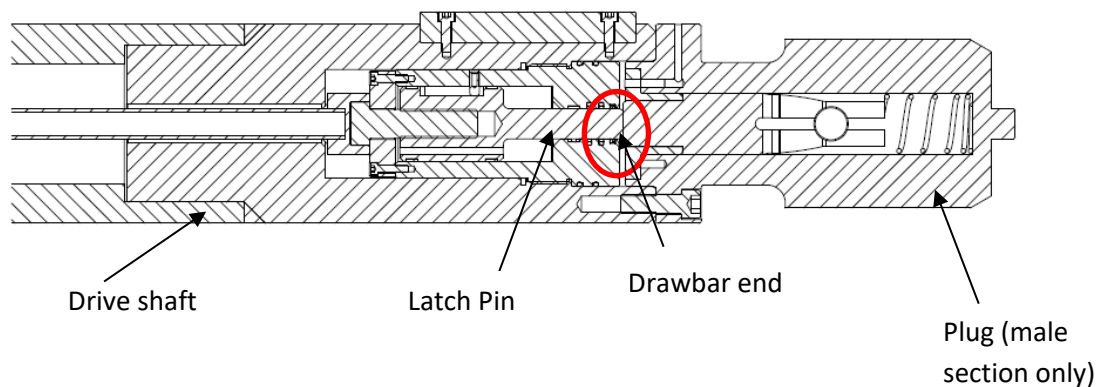
3. The cutter adapter should then be detached by removing the 7x 5/8-11 UNC socket head cap screws.



4. Fit the required size flange adapter to the spool end, if not already fitted. See section 5.1 for further details.
5. Ensure the draw bar is fully retracted before fitting the plug adaptor (male section).
6. Install the plug adapter (male section only) to the drive shaft using four 5/8-11 bolts.

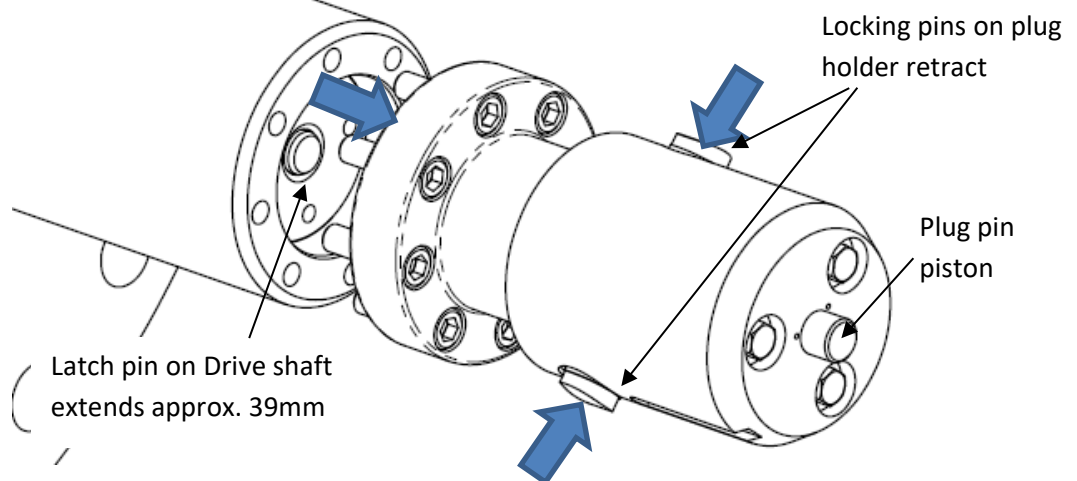


7. Make sure the drawbar is seated firmly against the plug pin piston (as highlighted below) by rotating the drawbar. The drawbar is rotated using the Hex (19A/F).



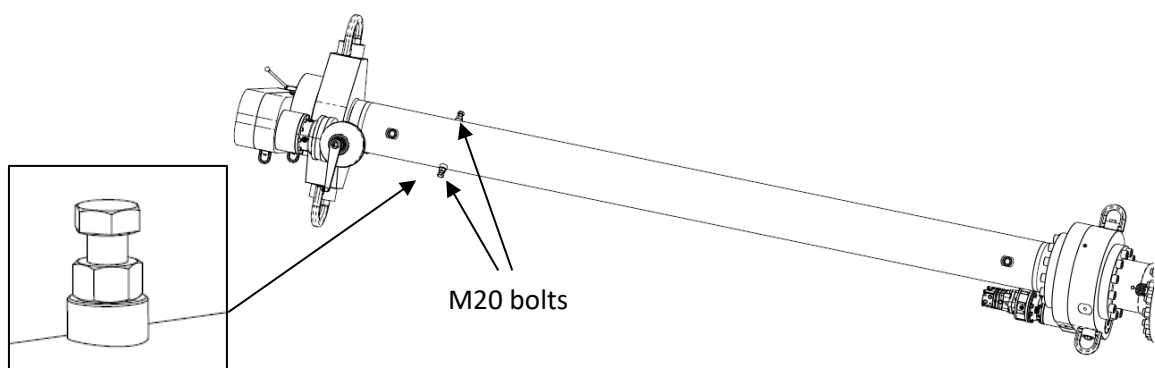
8. Advance the Drawbar to fully activate the latch mechanism. To advance the latch pin, rotate the 19mm (AF) hex feature at the end of the drawbar clockwise by approximately 15 full turns, with a suitable wrench.
9. Check that both locking pins have retracted fully into the main body.

Plug holder is shown disconnected to the drive shaft for visual purposes only. At this stage, the drive shaft and the plug holder would be connected.

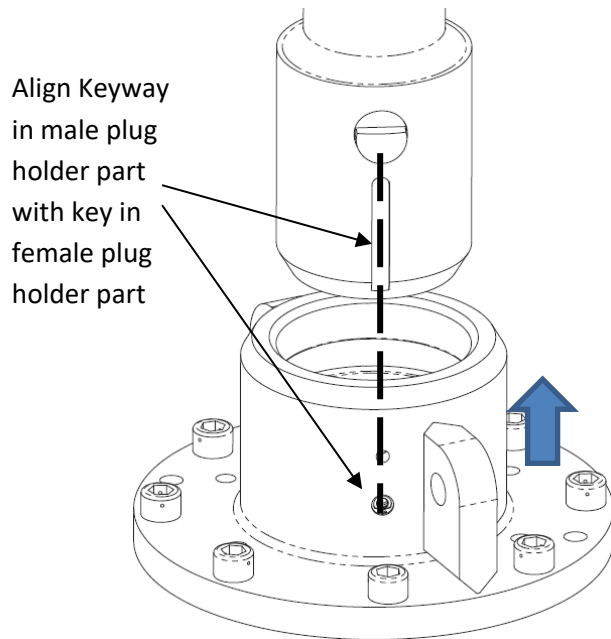


Check and make a note of the number of rotations required to retract the locking pins . This will be required during the operation.

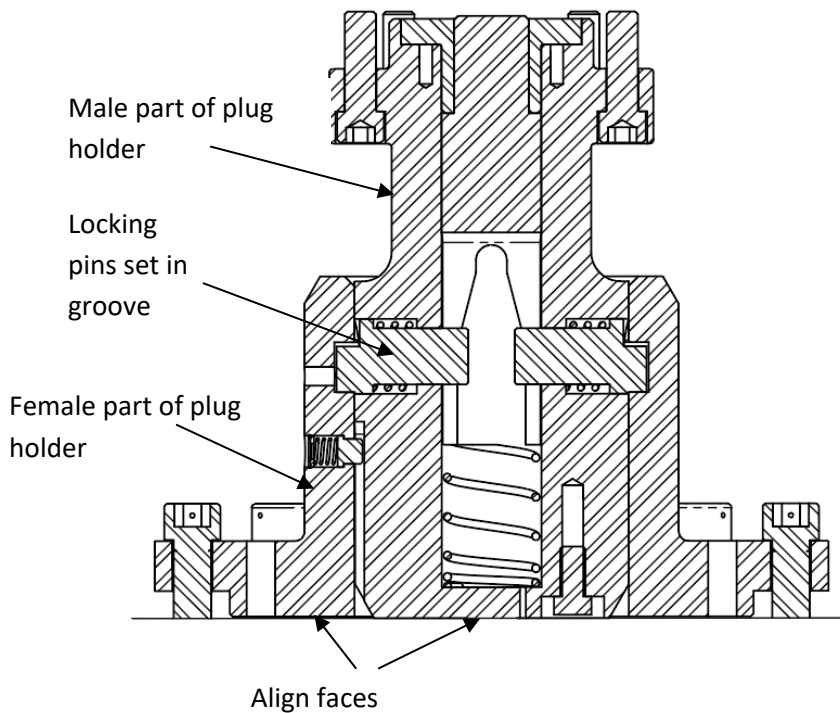
10. With the pins retracted, check that the female component easily slides on and off and there are no sticking points.
11. To complete the testing, Retract the latch pin by rotating the Hex end on the draw bar (as shown in step 7) anti-clockwise, by 15 full turns (or by the number of turns identified in step 9). Check the Locking pins have extended back out.
12. To ensure that the cylinder does not rotate when traversing the plug to position, lock 2 x M20 bolts. Each should be tightened by loosening the locknut, then tightening the bolt to the cylinder, and finally re-tightening the lock nut.



13. Align the completion plug to the plug adapter and retract plug pins by turning the hex clockwise. (Latch pin on draw bar extends, causing the plug pins to retract)

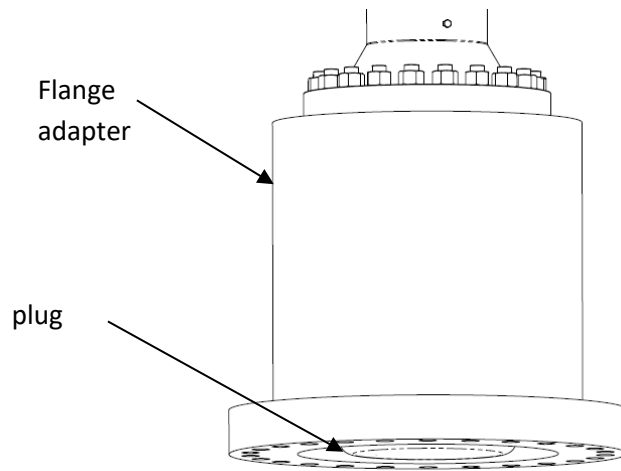


14. Align the two faces of the plug adapter as shown in step 13.



15. Retract latch pin ensuring the male plug part is located and locked into the female plug part.

16. Set the plug flush with the end of the flange adapter



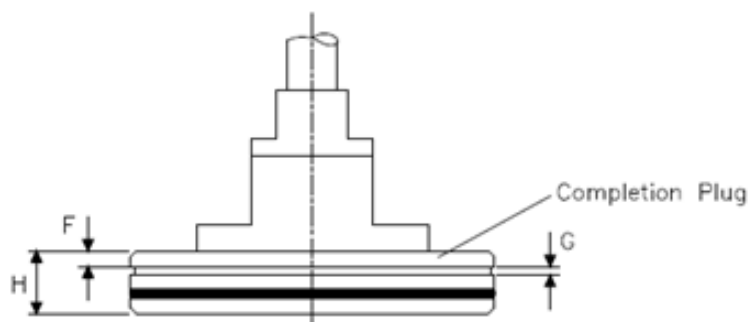
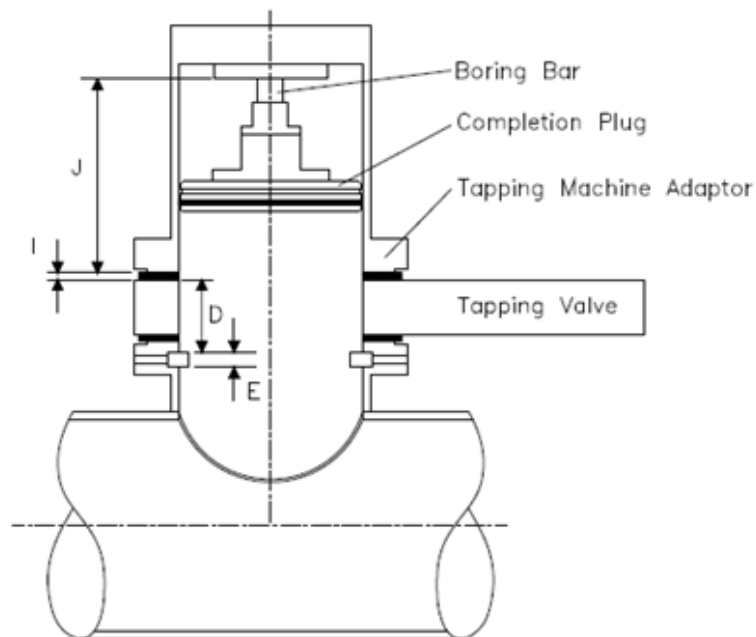
17. Confirm measurements and distance plug is required to travel.

Accurate measurement is of vital importance for the successful installation of a completion plug. Make the following measurements:

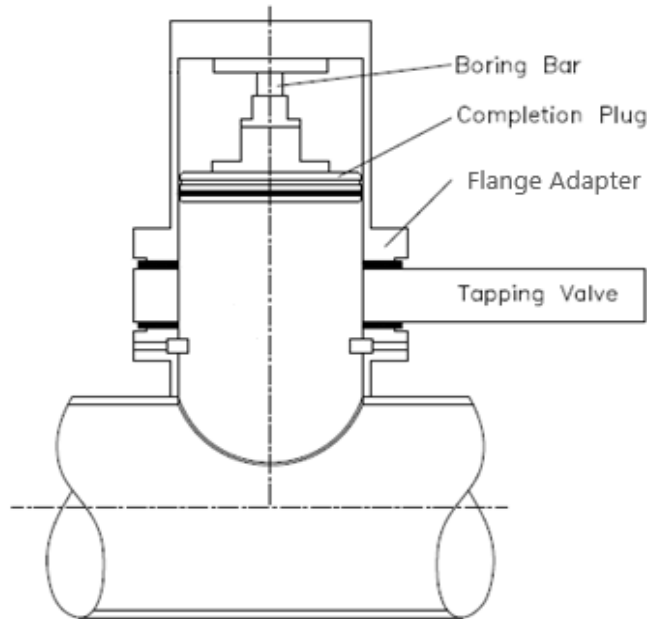
Dimension F	Top of Completion Plug to top of segment groove
Dimension G	Width of segment groove in Closure plug
Dimension H	Thickness of Completion Plug
Dimension I	Thickness of gasket between tapping adapter flange and tapping valve. In the case of ring type joints, measure the distance between the raised faces when the joint is made.
Dimension J	Raised face of tapping adapter flange to bottom face of support ring inside the tapping adapter.

Prior to hot tapping, measurements D and E should have been made. If this is not the case, then measurement K is required.

Dimension K	Raised face of tapping valve to centre of segment drive screw in Closure flange
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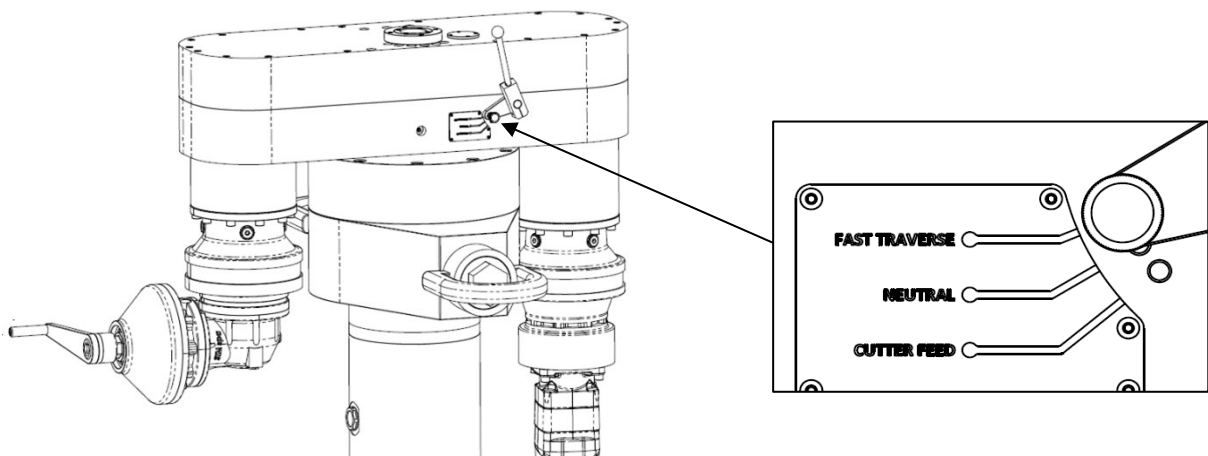
18. Securely remount machine to the gate valve (The machine should not be connected to the hydraulic supply at this stage).



19. The fast traverse must be used to position the plug into the gate valve branch.

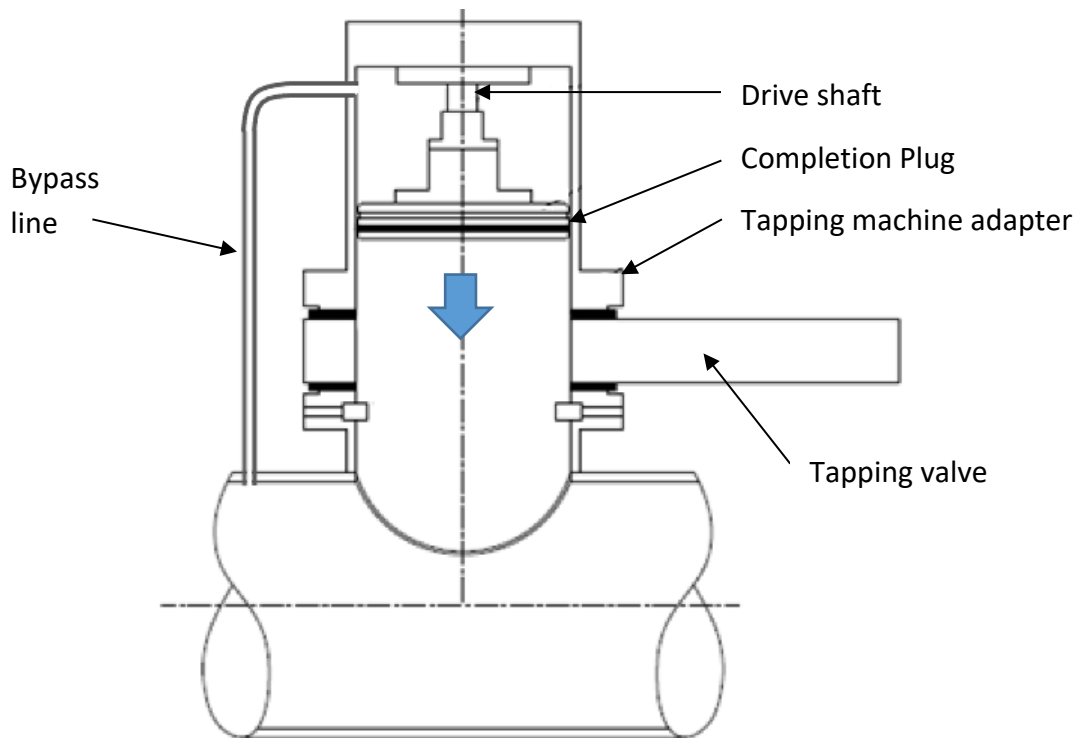


Do not use the cutter feed as this will cause damage to the machine because the driveshaft will try to rotate with the cylinder locks on.



20. Perform a pressure test stack up to confirm the seal is not leaking.

21. Open the bypass between line and cutter housing (flange adapter).



22. Connect the hydraulic supply to the machine.
23. Advance driveshaft to the correct depth for plug set.
24. To ensure that the plug is not rotating, the viewing window can be used to check the internal shaft is not rotating.

Setting the completion plug guidance



WARNING:

DURING COMPLETION PLUG SETTING, DO NOT ALLOW THE LINE PRESSURE ABOVE THE PLUG TO BE LESS THAN LINE PRESSURE BELOW THE PLUG. KEEP THE PRESSURE EQUALIZED ON BOTH SIDES OF THE PLUG. DO NOT OPEN ANY BLEEDER CONNECTIONS ABOVE THE COMPLETION PLUG UNLESS PLUG IS FULLY RETRACTED OR COMPLETELY SET WITH ALL SEGMENTS ENGAGED IN THE PLUG GROOVE. A DIFFERENTIAL PRESSURE ACROSS THE COMPLETION PLUG CAN RESULT IN DAMAGE TO THE TAPPING MACHINE AND POSSIBLE PERSONAL INJURY.

- a) Following job and site specific instructions equalise pressure between the pipe line and the tapping machine adapter.
- b) Check entire assembly for leaks and make sure it is pressure-tight before proceeding.
- c) Check that the pressure is equalized on both sides of the plug and equal to the pipeline pressure before opening valves.

- d) Rotate several closure flange segments in with a torque wrench. Note the torque required to extend the segments against internal pressure. Fully retract all segments.
- e) Start the hydraulic power unit.
- f) Advance the drive shaft using the auxiliary feed motor.
- g) When the lower face of the completion plug approaches the upper face of the closure flange, slow the feed motor speed.
- h) Referring to measurements taken previously, extend the drive shaft and the plug $C + D + I - B - H - 0.25''$. Extend all the closure flange segments. Since at this position, the segments should be under the plug, the segments should extend fully.
- i) Fully retract all segments and extend the drive shaft to $C + D + I - B - H/2$. Extend the segments in toward the plug, counting the number of turns. The segments should hit the middle of the plug and will thus not extend fully.
- j) Fully retract all segments and extend drive shaft total predetermined distance. The distance to set the plug is:

$C + I + D + E/2 - A - F - G/2$ if the drive shaft is advancing

$C + I + D + E/2 - B - F - G/2$ if the drive shaft is retracting

or:

$C + I + K - A - F - G/2$ if the drive shaft is advancing

$C + I + K - B - F - G/2$ if the drive shaft is retracting

- k) Extend all segments fully into segment grooves in plug. Count the number of turns for each segment to confirm it is in the groove.
 - l) If all segments do not insert correctly, retract all segments and then raise or lower the plug by approximately 0.05" at a time. The plug can move up or down on the segment a maximum of 0.25". When extending segments, compare the torque required with that noted in step 4 above, to determine whether the resistance felt is simply due to the internal pressure, or due to interference with the plug. Once one segment is engaged, attempt to engage the segment opposite it. If this segment cannot be full engaged, retract both segments, raise or lower the plug slightly and try again.
25. Once reaching the required depth, set the gearbox lever to neutral, then using the manual hand feed ensure the plug is securely located by moving the drive shaft down and then up. There should be firm resistance in both directions, indicating the wedges are correctly located within the plug. Leave the driveshaft in the raised position because this will ensure the plug cannot not push upwards when the driveshaft is retracted.
26. Once the plug is secured satisfactorily, turn the draw bar 15 full times (or the number of turns previously noted from step 9) by rotating in a clockwise direction, this will retract the locking pins securing the plug holder to the plug adapter. The plug adapter will then be ready to be withdrawn from the plug holder.

27. Manually retract the machine the first 2" to ensure the plug is disconnected from the holder.
28. After the initial 2", Set the gear lever to fast traverse and retract the drive shaft to back within the cutter housing /flange adapter, whilst monitoring the fast feed motor pressure.
Note: if the pressure rises on the fast feed motor it is likely the plug has not been successfully disconnected from the plug holder.

29. Close the bypass line and then release the pressure from above the plug.

Following job and site-specific instructions, bleed the pressure from the tapping machine adapter and equalisation line. Leave bleeder valve open.



WARNING:

DIRECT DISCHARGE FROM VENT VALVE AWAY FROM WORK AREA AND PERSONNEL. KEEP CLEAR OF VENT VALVE WHEN IT IS OPENED. OTHERWISE, PERSONAL INJURY MAY RESULT.



CAUTION: A rapid pressure differential above the plug could cause the plug to damage segments. Slowly reduce pressure to prevent a rapid pressure differential that could damage equipment.

30. Monitor the pressure to ensure the plug has sealed.
 - a. When pressure has been reduced to atmospheric and there is no detectable leakage, remove the equalisation piping.



WARNING:

IF PRESSURE CANNOT BE REDUCED TO ATMOSPHERIC, OR THERE IS SIGNIFICANT RESIDUAL LEAKAGE, THE TAPPING VALVE SHOULD NOT BE REMOVED. LOSS OF PRESSURE CONTAINMENT AND SERIOUS PERSONAL INJURY COULD RESULT.

- b. If leakage is detected, it is most likely that the completion plug bypass valve is partially open, or the o-ring is damaged. In this case remove the completion plug and inspect it to determine the cause of the problem.
 - c. If no leakage is detected, close the tapping valve. The internal bypass should be left open.

31. Disconnect the hydraulic supply from the machine.
Disconnect the hydraulic hoses. Unbolt the tapping machine adapter from tapping valve. Using two cranes, lift the tapping machine and its adapter off the tapping valve and lay them on level ground in a horizontal orientation. Ensure the weight of the tapping adapter is adequately supported.

32. Remove the nuts retaining the cutter housing and safely remove the machine.
33. Return the machine to the horizontal position and return to the ground.
34. Re-connect the hydraulic supply to the machine.
35. Advance drive shaft to beyond the cutter housing (flange adapter).
36. Remove the plug holder (male part) from the drive shaft.
37. Fully retract the drive shaft to starting position.
38. Remove the cutter housing / flange adapter from the machine.
39. Disconnect all hydraulic supply.
40. After final decontamination and cleaning, inspect all components for damage or wear.
41. Fit the Protector Test End to protect the end of the drive shaft.
42. The female plug holder part should be retrieved in accordance with safety site regulations.
43. Install a blind flange on top of the closure flange.

8. Machine Maintenance

General wear and tear items should be replaced with like for like components as per the machine general assembly drawings detailed in this manual. Failure to do so may result in a machine that is not fit for purpose and is outside the design intent it was supplied for. Items that require specific maintenance regimes and products will be detailed here in.

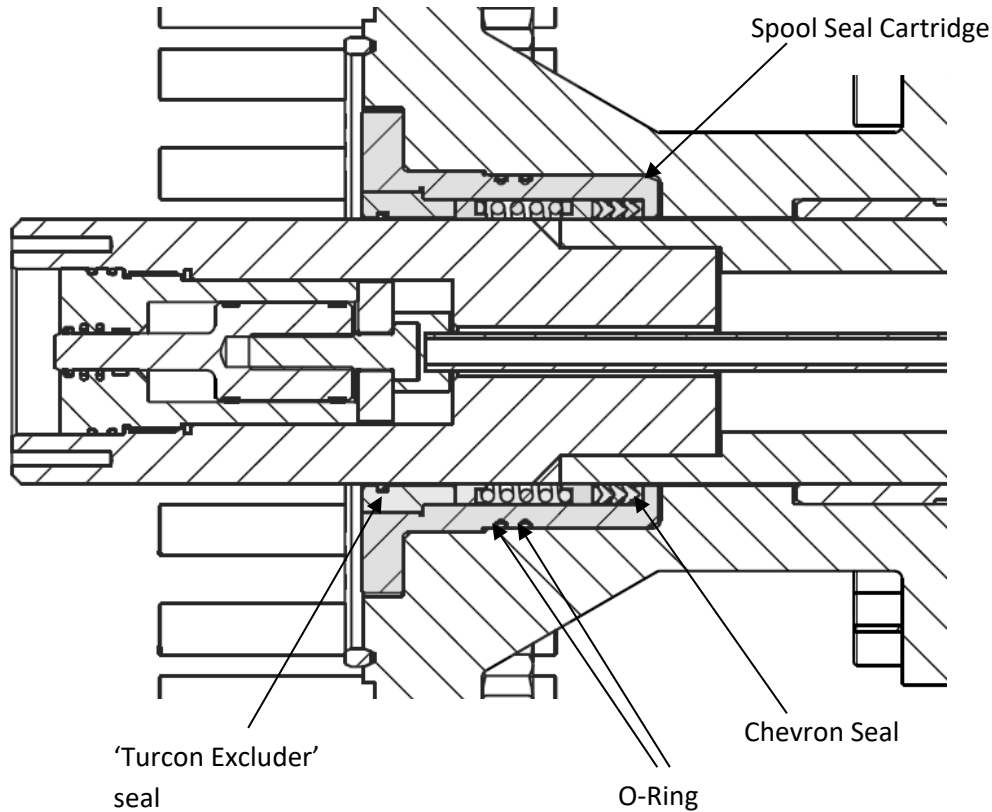
General Maintenance Schedule		
Time Period	Action	Recommended Lubricant
After every use	Clean all cutting debris from machine. Pay particular attention to lead screws, pivots, sealing, sliding & rotating faces.	General water displacing, cleaning oil.
As required	Replace cutting tool/cutting tool inserts.	N/A
Every 10 hours	Apply a small amount of low viscosity oil to all lead screws, pivots, sliding & rotating faces.	Mineral based SAE 10 oil.
	Check all securing nuts & bolts are tight.	N/A
Every 100 hours	Check for backlash in lead screw/lead screw nut & correct if necessary.	N/A
Before long term storage (12 months minimum)	Protect machine, components & accessories from corrosion. Store all machine components securely in original packing box.	General, oil based, rust inhibitor.

8.1. Maintenance

- To ensure that the machine is lubricated, either apply grease through the grease point on the machine spool, or extend the driveshaft completely and apply oil to the bar.
- Check the tightness of the seal cartridge located in the spool and the locking nut within the driveshaft end.
- Remove the inspection cover on the main cylinder and check the keys. Wind the driveshaft assembly out of the way to access the leadscrew and apply grease to it.
- The machine seals must be pressure tested before every use of the machine.
- Pay close attention to the full thread length of the feedscrew, check for signs of wear or damage

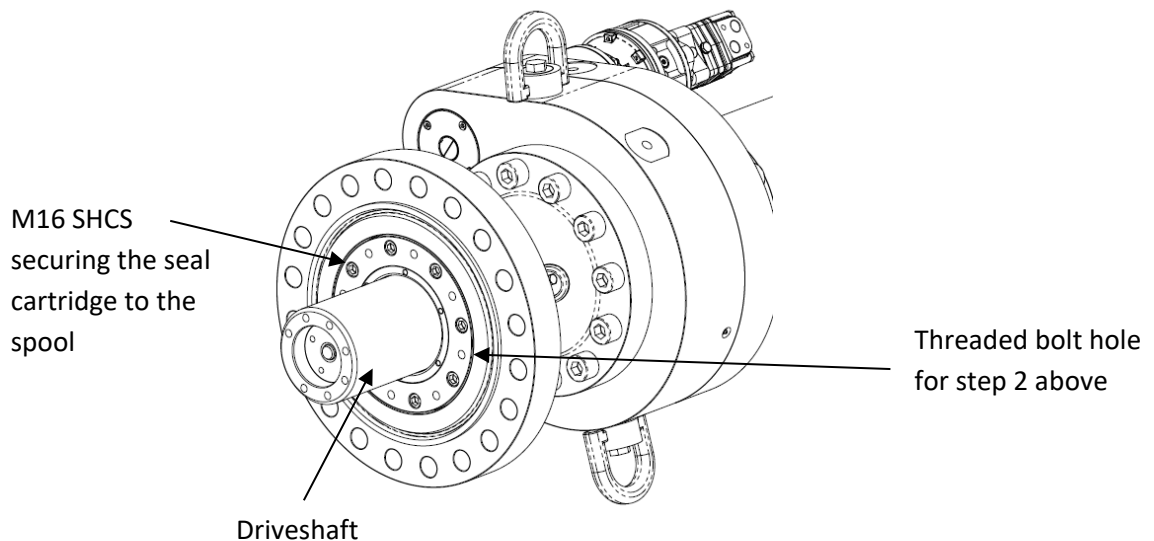
8.2. Replacing Spool seals

The seals in the spool are all contained in one cartridge (MHT2460-41). Refer to the below image for the seals located in this component. The part numbers for these seals are found in the GA assembly drawing.

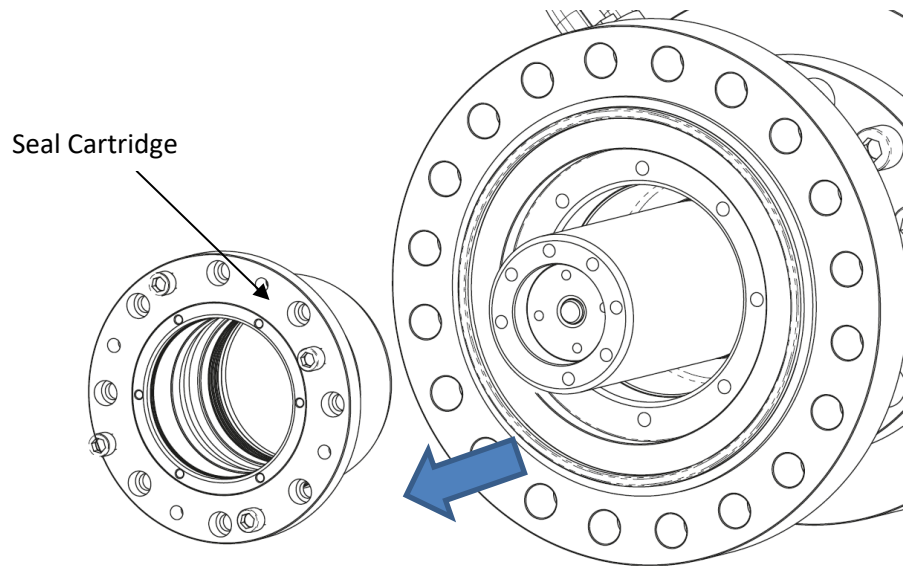


8.2.1. Removal Procedure

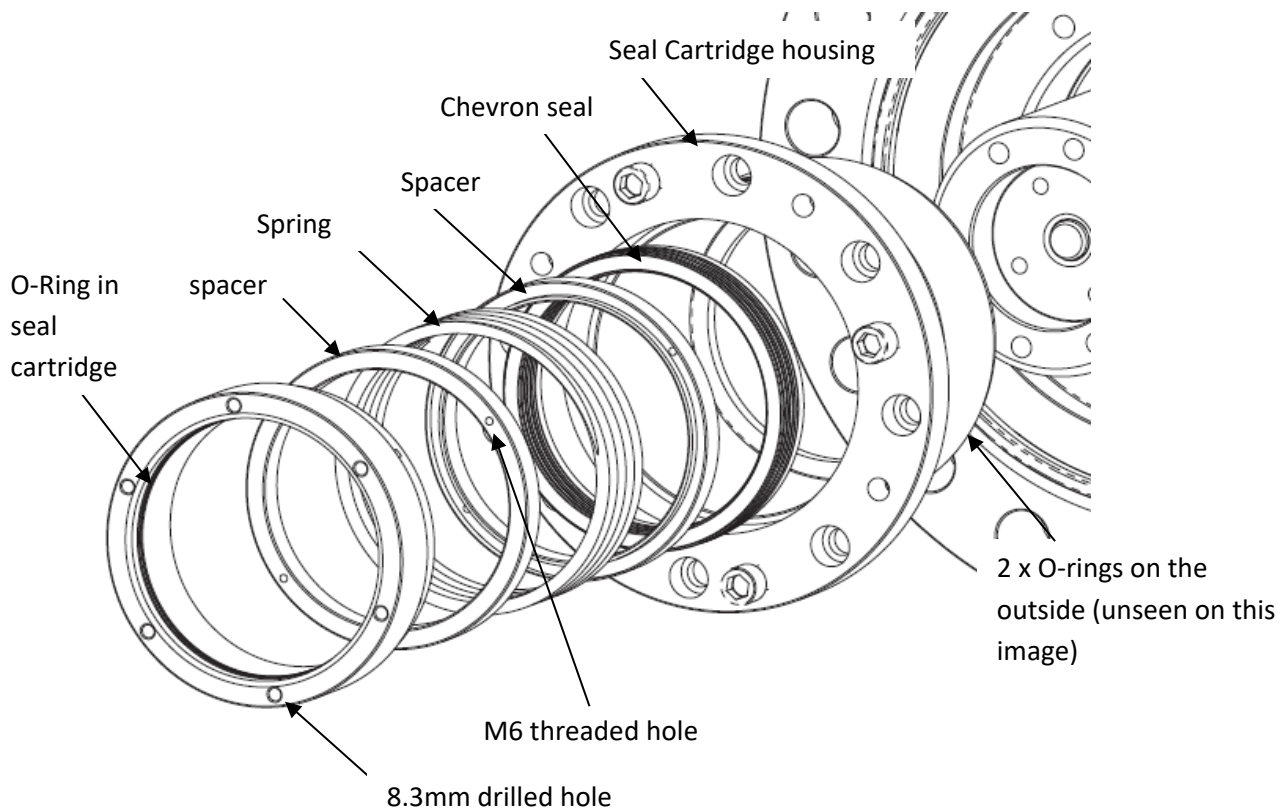
1. Remove the bolted-on key on the drive shaft.
2. To remove the seal from the spool, unbolt the seal cartridge from the spool. There are 8x M16 socket head cap screws (SHCS) to be removed.
3. Use 4 of the M16 bolts from step 2, and screw into the threaded bolt holes. Carefully pull the cartridge away from the spool to separate the seal cartridge.



4. The seal cartridge should now be separate from the spool.

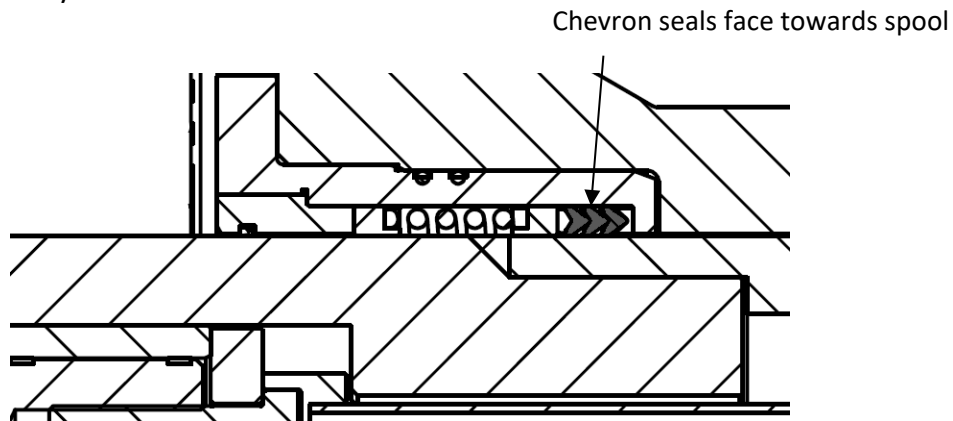


5. Carefully remove the seals from the cartridge housing. There are threaded holes in the components which are used to remove out the parts.



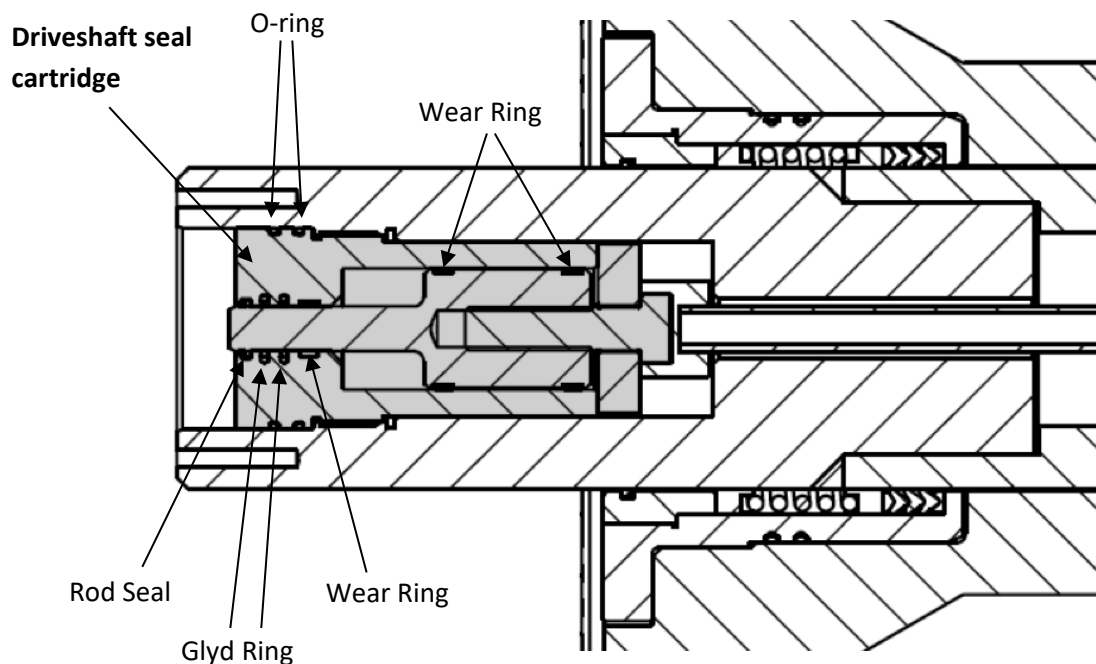
- a. Wind out the Seal cartridge. Use MMT-107 (seal cartridge tool supplied in the toolkit) with the 8.3mm diameter holes to screw out the part.

- b. Pull out the spacer. Screw 2xM6 bolts in the spacer threads and use the bolts to pull out the spacer.
- c. Remove the spring.
- d. Pull out the spacer as step b.
- e. Remove the chevron seals
- f. When reassembling the parts back into the housing, oil the individual components as they are fitted and ensure the chevrons are facing the same way.



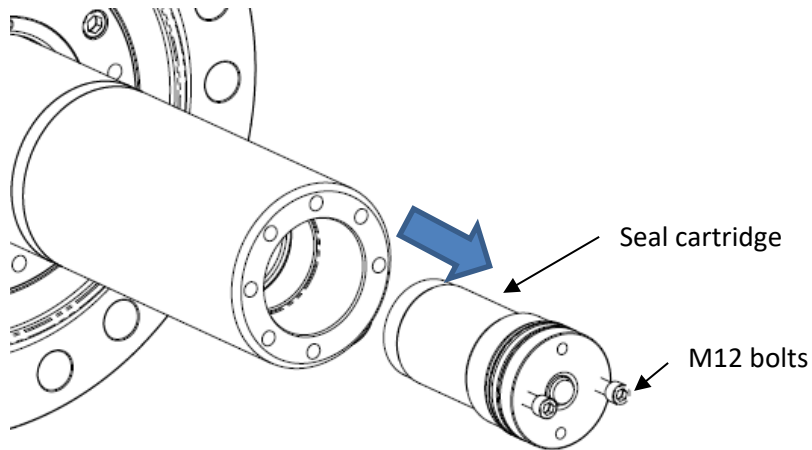
8.3. Replacing driveshaft seals

There are seals located inside the spool end driveshaft, within the Driveshaft Seal Cartridge (MHT2460-40). Refer to the below image for the seals located in this component. The part numbers for these seals are found in the GA assembly drawing.

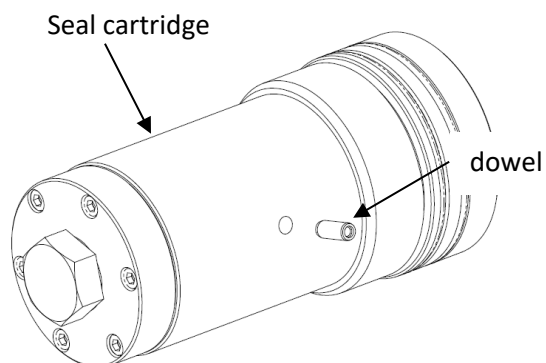


8.3.1. Removal procedure

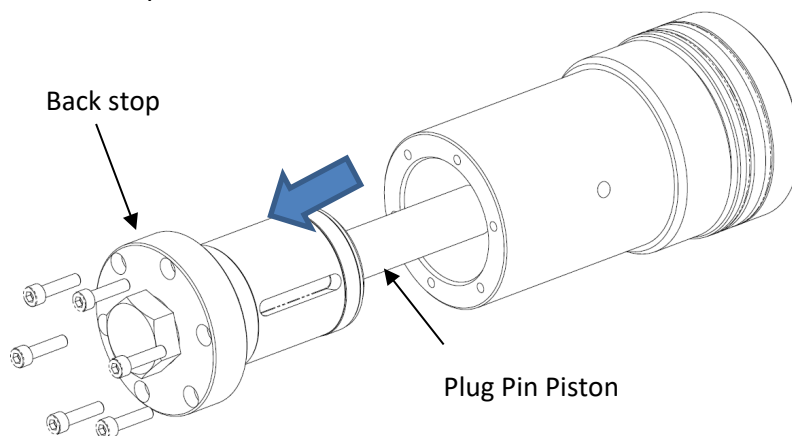
- a) Using the M12 threaded holes in the end of the seal cartridge, screw in M12 bolts to the seal cartridge and carefully unwind the cartridge out.



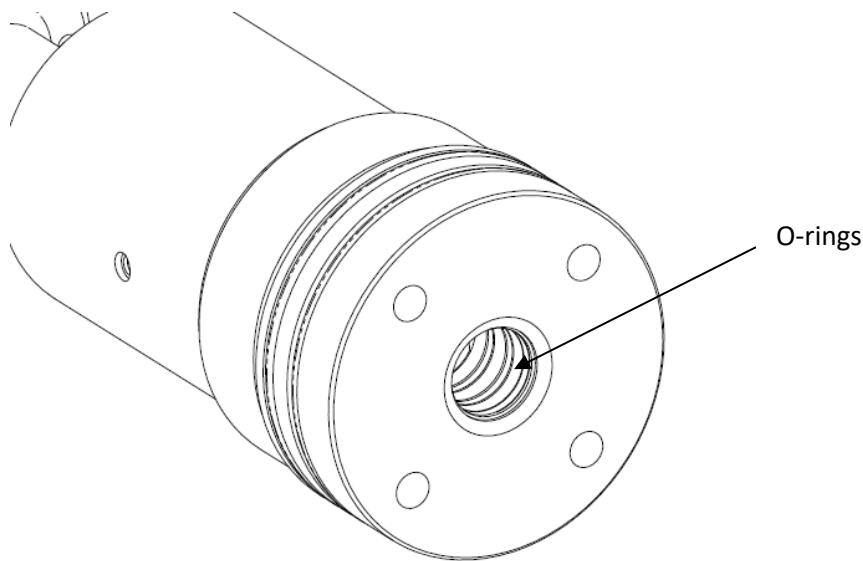
- b) Remove the dowel in the side of the seal cartridge.



- c) Now that the seal cartridge had been separated from the driveshaft, unscrew 6x M6 socket head cap screws, and pull the backstop out, along with the plug pin piston.



- d) The O-ring inside the seal cartridge housing can now be changed as required.



- e) Before reassembling the seal cartridge, check/ change the wear bands as necessary. Carefully slide the plug pin piston back taking care not to damage or dislodge the seals, and secure the unit back together using the 6xM6 socket head cap screws in step C.
- f) Replace the dowel in the seal cartridge (from step b).
- g) Before placing the seal cartridge back into the driveshaft end, replace the o-rings on the outside of the seal cartridge. Take care not to damage or dislodge these when reassembling. Remove the M6 screws used to wind the seal cartridge back in.

9. Troubleshooting Guide

Symptom	Possible cause	Action
The machine will not rotate	1. Hydraulic/Pneumatic supply not available	Check supply
	2. Hydraulic/Pneumatic supply is below the minimum required to operate the machine	Check supply
	3. Drive motor faulty	Remove motor and check operation
	4. Damage to drive gear train	Remove motor and check free rotation
	5. Faulty valve or emergency shut off operational	Check supply to motor
The machine does not traverse	1. The feed control valve is not correctly set	Check position
	2. Drive gear problem	Remove and check drive assembly operation
	3. Depth of cut too deep	Remove cut and check rotation

In the event that the cutter has become stuck and the instructions in the machine operation section have not solved the issue;

The hydraulic controls for the drive motor have grub screws which prevent the use of the drive motor to reverse the cutter out – this is to stop the cutter tips from being stripped from the cutter. If all other methods have been exhausted, then adjust those grub screws to allow the drive motor to reverse the cutter out. This will almost certainly DAMAGE the cutter, so it must only be considered as a FINAL resort.

10. Appendices

10.1. Hot Tapping Data Sheet

Customer Details.....Contact Number.....
Contact Details.....Date / Time.....

Tap Details.

Tap Size.....
Flange Rating.....
Orientation.....
Branch wall Thickness.....
Valve Type.....
Bore Details.....

Pipe Details.

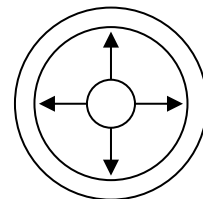
Pipe Size.....
Wall Thickness.....
Material.....
Product Type.....
Pipe Pressure.....
Temperature.....

Flow rate-.....Customer Signature.....
Recommended Flow rates, Gas 20mph; 30fps; 10m/s. Liquids 10mph; 15fps; 5m/s.

Tapping Machine Operational Checks.

Tapping adapter bolts secure.....Y/N
Cutter holder screws secure.....Y/N
Cutter retaining screws secure.....Y/N
Pilot drill / retaining screws secure....Y/N

Drive shaft Alignment Check.



Check Drive shaft is central to Hot Tapping Adapter Y/N

Hot Tapping operation Dimensions.

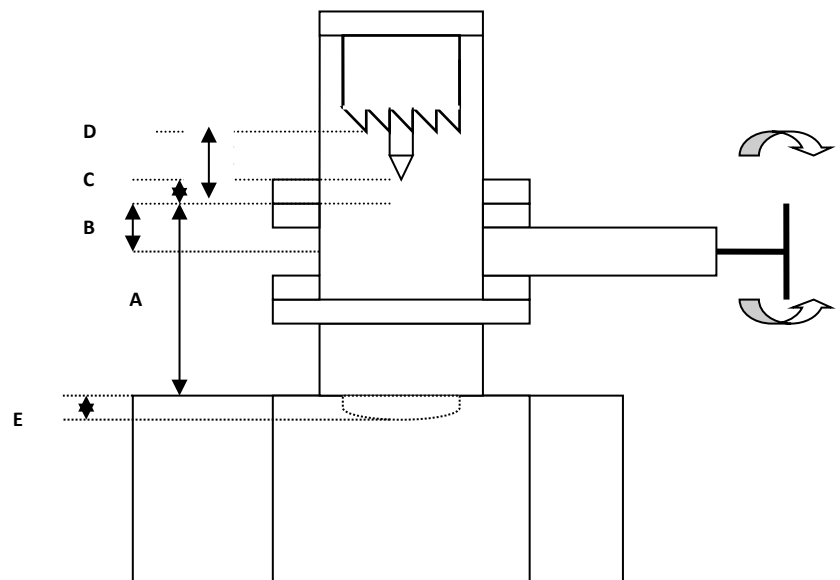
A, Flange to pipe =.....
B, Top valve to gate =.....
C, Pilot drill to flange =.....
D, Cutter to flange =.....
E, Coupon cut depth =.....

Hot Tapping Cutting Distances.

Pilot Drill to pipe, $A+C$ =.....
Cutter to Pipe, $A+D$ =.....
Total Cut Distance, $A+D+E$ =.....
(E =Ref Coupon Distance Chart).

Valve Details.

Valve Flange to Gate B =.....
Number of turns to close / open



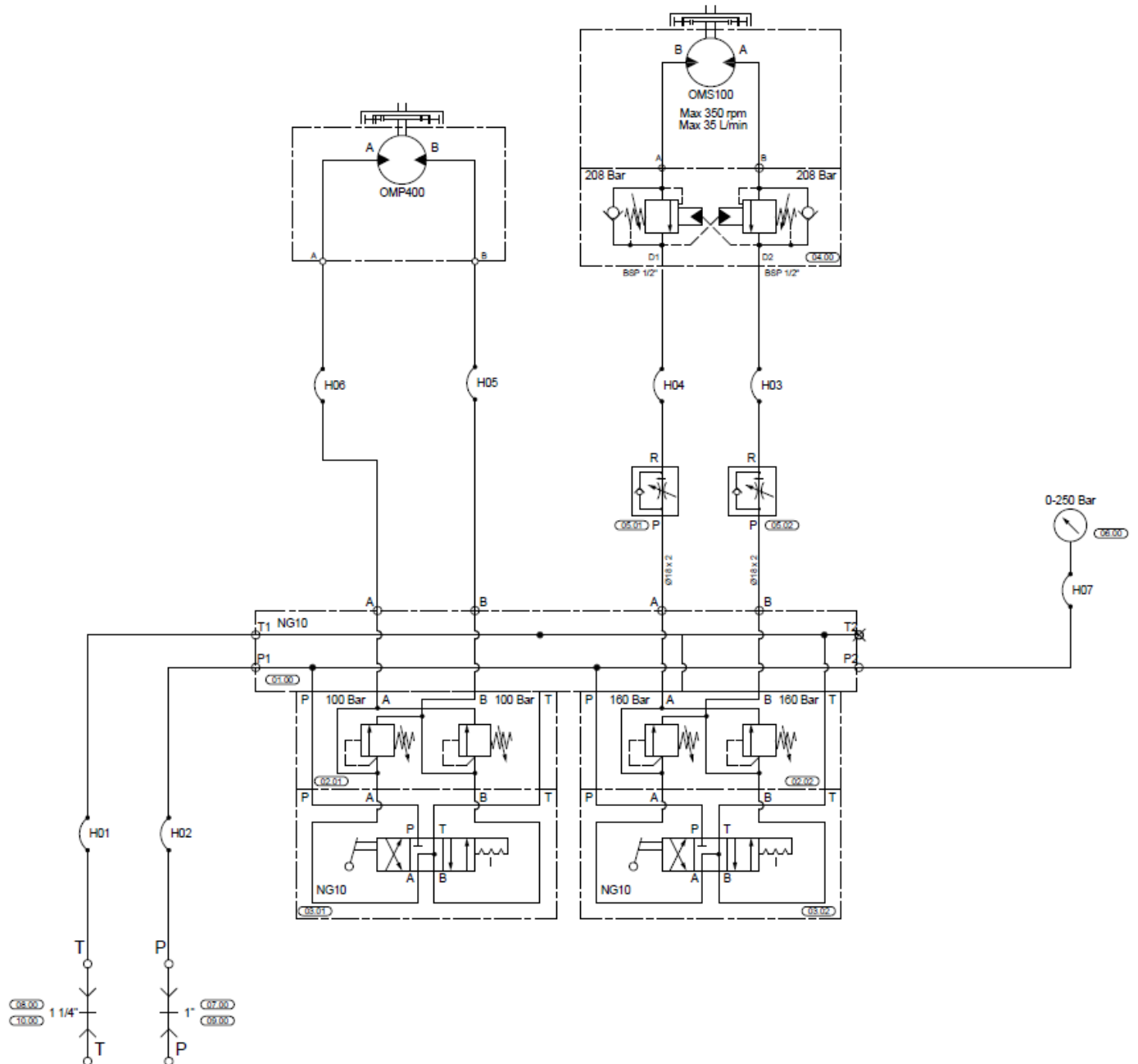
Technician Signature.....Customer Signature.....
Date.....Date.....

10.2. *Recommended torque settings for fasteners*

Thread Ø	Tensile Strength		Torque Setting	
	kN	lbs	Nm	in - lbs
M3	6.54	1470	2.1	19
M4	11.4	2560	4.6	41
M5	18.5	4160	9.5	85
M6	26.1	5870	16	140
M8	47.6	10700	39	350
M10	75.4	17000	77	680
M12	110	24700	135	1200
M14	150	33700	215	1900
M16	204	45900	330	2900
M20	306	68800	650	5750
M22	374	83950	875	7725
M24	441	99100	1100	9700
M30	701	158000	2250	19900
M32	860	193500	3050	27000
M36	1020	229000	3850	34100

10.3. Hydraulic Schematics

Hydraulic for MHT2460-H – 03917.10.02.00



10.4. General Notes

[illegible]