

Twin screw extruder ZSK  
 WP order number: 64007224

## 2 Technical Data

### 2.1 Data sheets of plant components

#### 2.1.1 Processing section

Pos. no.	Designation	Dim.	Data
1	General information		
1.1	Type		ZSK 170
1.2	Make		Werner & Pfleiderer GmbH
1.3	Works no.		505401
1.4	Dimensions L x W x H	mm	360 x 510 x 3840
1.5	Weight	kg	2000
2	Process task		Kneading and plastifying of product
2.1	Throughput	t / h	
2.2	Bulk material	powder pellets	yes / no yes / no
2.3	Barrels	number	8
2.4	Degassing barrel	yes / no	yes
	number		1
3	Required energy / media		
3.1	Heating capacity for processing section and 8/O connection piece	kW	
3.2	Heating zones	number	
3.3	Steam		
	pressure	mPa	
	quantity	kg / h	
3.4	Cooling capacity for proc. section	kW	
3.5	Cooling zones	number	
4	Required specific data		
4.1	Barrel bore	∅ / mm	173.2
4.2	Wear protection liners	yes / no	no
4.3	Screw shaft diameter	∅ / mm	102
4.4	Screw tip (design)		mixing screw tip
4.5	Speed range	rpm	326
4.6	Material		
	screw barrel		1.8519
	screw shaft		1.2344
	screw elements		34 CrAlNi 7V
4.7	Torque per screw shaft	Nm	25000

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## 2.1.2 Start up valve

Pos. no.	Designation			Data
<b>1</b>	<b>General information</b>			
1.1	Type			AV 120
1.2	Make			Wener & Pfeiderer GmbH
1.3	Works no.			505402
1.4	Dimensions	L x W x H	mm	370 x 545 x 1000
1.5	Weight		kg	650
<b>2</b>	<b>Process task</b>			Deviate product flow from the machine during start-up
2.1	Throughput		t / h	7 - 16
2.2	Change-over time for start-up valve		sec	3
<b>3</b>	<b>Required energy / media</b>			
3.1	Steam	pressure	bar	40
3.2		quantity	kg / h	60
3.3	Thermal oil	pressure	bar	40
3.4		quantity	m <sup>3</sup> / h	2.5 - 3.5
3.5	Spindle control			
3.6	Hydraulic oil	pressure	bar	180
3.7		quantity	l	40
<b>4</b>	<b>Required specific data</b>			
4.1	Material	housing		31 Cr MoV 9 G
4.2		spindle		34 Cr AL Ni 7 V
4.3	Rotary piston cylinder			
4.4		type		HY ST 3-18.91-00
4.5		make		Pleiger
4.6	Spindle position			
4.7		type		D-U11 HW
4.8		make		Bernstein

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## 2.1.3 Screen pack changer

Pos. no.	Designation		Data
<b>1</b>	<b>General information</b>		
1.1	Type		SWZ 1900
1.2	Make		Werner & Pfeiderer GmbH
1.3	Works no.		505405
1.4	Dimensions L x B x H	mm	530 x 1755 x 1480
1.5	Weight	kg	1500
<b>2</b>	<b>Process task</b>		Retain dirt particles from the melt flow
2.1	Throughput	t / h	8 - 18
2.2	Time for screen-pack changing	sec	< 1
2.3	Permissible melt pressure before screen	bar	max. 350
2.4	Permissible differential pressure on screen	$\Delta p$ / bar	150
2.5	Screen packs	number	2
2.6	Filtering area	cm <sup>2</sup>	1900
2.7	Filter elements/screen pack	number	19
2.8	Mesh width	mesh	20
<b>3</b>	<b>Required energy</b>		
3.1	Heating capacity	kW	-
3.2	Electrical power	kW	-
3.3	voltage	V	-
3.4	frequency	Hz	-
3.5	degree of protection	IP	-
3.6	Heating elements type		-
3.7	make		-
3.8	Steam pressure	bar	40
3.9	quantity	kg / h	150
3.10	Thermal oil pressure	bar	40
3.11	quantity	m <sup>3</sup> / h	8 - 10
3.12	Cooling water pressure	bar	2-3
3.13	quantity	l / h	60 - 180
3.14	Hydraulic oil pressure	bar	180
3.15	quantity	l / min.	6

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Pos. no.	Designation		Data
<b>4</b>	<b>Required specific data</b>		
4.1	Material	housing	1.8519 nitrided
4.2		spindle	-
4.3		slide plate	31 Cr Mo V 9 G
4.4	Hydraulic cylinder	type	152,4 CJB-2HRLS 38 C 410,8
4.5		make	Parker-Hannifin
4.6	Arrangement of cylinder in flow direction	right / left	left
4.7	Proximity sensors	type	NJ5-30GK-S1N
4.8		make	Pepperl and Fuchs
4.9	Temperature indicator for cooling water	type	M 1200/60/5
4.10		make	Detherma

## 2.1.4 Die plate

Pos. no.	Designation		Data
<b>1</b>	<b>General information</b>		
1.1	Type		Insulated die plate
1.2	Make		Werner & Pfeleiderer GmbH
1.3	Works no.		505406
1.4	Dimensions	D x L      Ø / mm	approx. 642 x 90
1.5	Weight	kg	approx. 300
<b>2</b>	<b>Process task</b>		Divide product stream
2.1	Throughput	t / h	10 - 19
<b>3</b>	<b>Required energy</b>		
3.1	Heating capacity	kW	55
3.2	Steam	pressure	bar
3.3		quantity	kg / h
3.4	Thermal oil	pressure	bar
3.5		quantity	m <sup>3</sup> / h
<b>4</b>	<b>Required specific data</b>		
4.1	Material	plate	1.4006G
4.2		die ring	1.4006G
4.3	Bores	number	754
		diameter	Ø / mm
			2,4

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## 2.1.5 Underwater pelletizer

Pos. no.	Designation		Data
<b>1</b>	<b>General information</b>		
1.1	Type		UG 400
1.2	Make		Werner & Pfleiderer GmbH
1.3	Works no.		505406
1.4	Dimensions L x W x H	mm	approx. 3200x1000x1500
1.5	Weight	kg	3800
<b>2</b>	<b>Process task</b>		Cut the stands coming out of the die plate under water to pellets
2.1	Throughput	t / h	10 - 19
2.2	Driving power	kW	50
2.3	Speed range	rpm	1000
<b>3</b>	<b>Required energy</b>		
3.1	Electric motor		
3.2	power	kW	50
3.3	voltage	V	-
3.4	frequency	Hz	-
3.5	degree of protection	IP	-
3.6	Pellet water pressure	bar	0,5 + transport high
3.7	quantity	m <sup>3</sup> / h	200
<b>4</b>	<b>Required specific data</b>		
4.1	Material housing		1.8519
	pelletizer hood		1.4541
4.2	knife rotor		1.4122
4.3	knives		Ni Cr 143
4.4	Carriage for bearing assembly and drive unit	yes / no	yes
4.5	height of centers	mm	1300
4.6	Knife rotor with flushing bores	yes / no	yes
4.7	Knife shaft bearing assembly, automatic adjustment	yes / no	yes

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## 2.2 Water specification

<u>Conditions</u>		Barrel cooling (boiler feeding water)		Pelletizer (process water)		Cooling water from cooling tower	
		Circuit	Adm.	Circuit	Adm.	Circuit	Adm.
Pressure	[bar]	3 - 7		3 - 7		4.5 - 7	
Temperature	[°C]	10 - 80		10 - 60		max. 28	
Max. temperature increase	[°C]	10		10		8	
Permissible pressure drop	[bar]	-		-		1.5	
<b>Analysis (max. values)</b>							
pH value	[at 20 °C]	8 - 9		7 - 9 *)		7.5 - 9	
Total hardness	[°dH]	0.3	< 0.3	4	2	18	4
Conductivity	[µs/cm]	65	< 65	500	250	1500	400
Oxygen - O	[mg/l]	0.02	< 0.02				
Chlorides - Cl	[mg/l]	5	< 5	50	25	200	50
Sulfate - SO <sub>4</sub>	[mg/l]	5	< 5	100	50	300	70
Oil	[mg/l]	1		1		1	
Germ forming units	[KBE/ml]			1000		10 000	
Settling solids (after appr. 2 hours)	[ml/l]	1		2		2	
Comments		a)		b)		c)	

\*) For UG and MWG preferably higher pH values, up to 10.

To avoid incrustations and corrosion, the water circuits are to be checked to ensure that the above values are not exceeded.

For preparing additional water for boiler feeding and process water, steam condensate or drinking water is to be used.

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**Note on recommended additives:**

- a) Easily alcalizing, organic oxygen fixing agent which is not volatile in steam, or film forming additives on a basis of alcalizing amines and aliphatic polyamines. Stability in the steam phase above 350 °C. When using film forming media, there is no oxygen limit.
- b) If necessary, add hydrogen peroxide - no other biocides.
- c) We recommend adding anti-corrosion agents with calcium stabilizing effect as well as biocides which must be biologically degradable.

The materials for the machine parts (heat exchangers, pumps etc.) were chosen on the basis of the stated water analyses. Water with different values may make it necessary to use different materials. Usually this involves an extra price.

## 2.3 Tightening torques for screw connections

### 2.3.1 Processing section

Machinetype	Screw barrel connections		Screw tips		Connections of tempering pipes on screw barrels	
	Number of screws	M <sub>A</sub> (Nm)	M <sub>A</sub> (Nm) Bolt	M <sub>A</sub> (Nm) Cap	Class of mat. 10.9 M <sub>A</sub> (Nm)	Class of mat. 12.9 M <sub>A</sub> (Nm)
ZSK 170	12 x M 30	1000		840	M 12 80	M 12 120

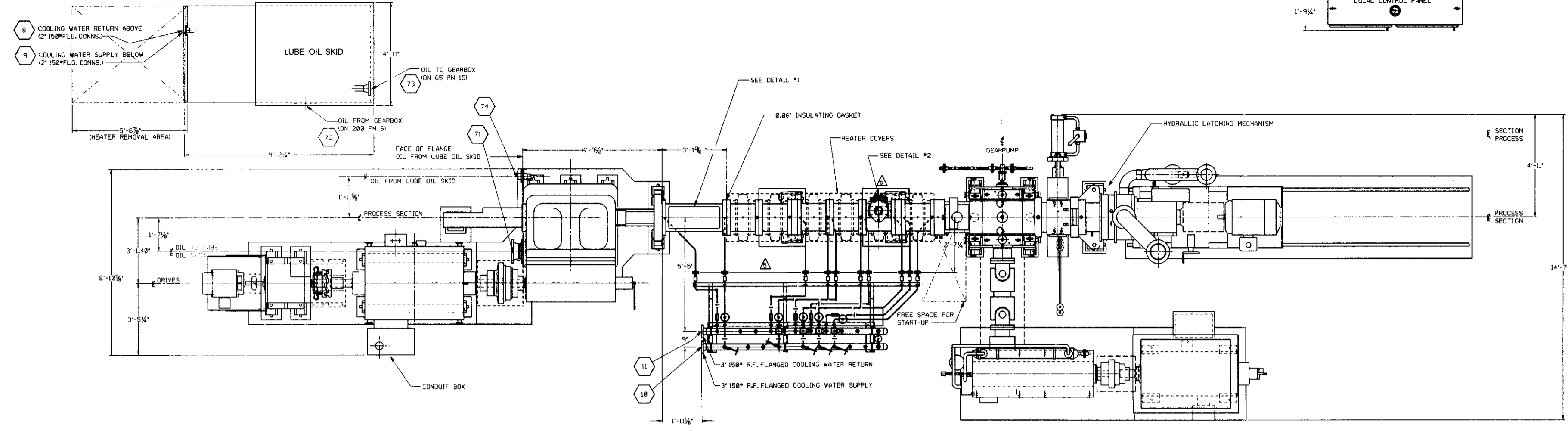
### 2.3.2 Downstream equipment

Screw size	Tightening torque (Nm)	At a temperature of approx. 250 °C
M 6	10	
M 8	24	
M 10	47	
M 12	84	
M 16	200	
M 20	400	
M 24	720	
M 30	1360	
M 36	2340	
M 42	3000	

All bolts to be coated with high temperature paste, like WEICON High-Tech fitting paste, at thread and contact surfaces.

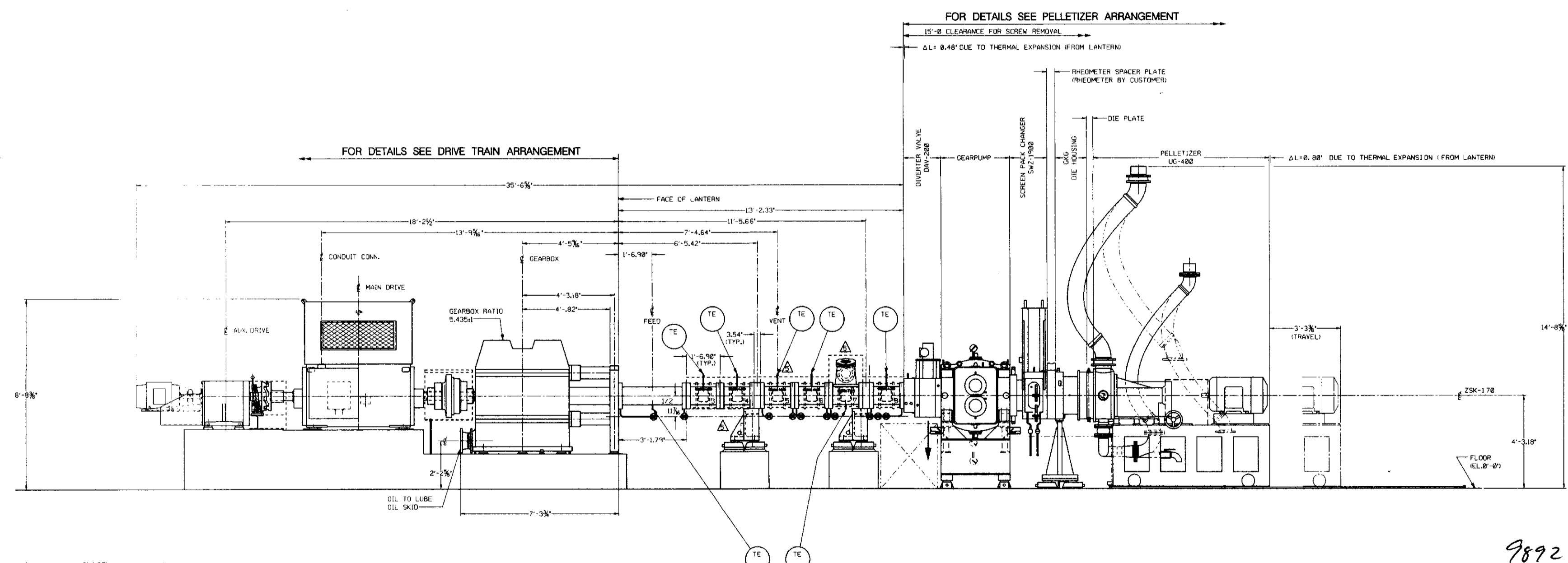


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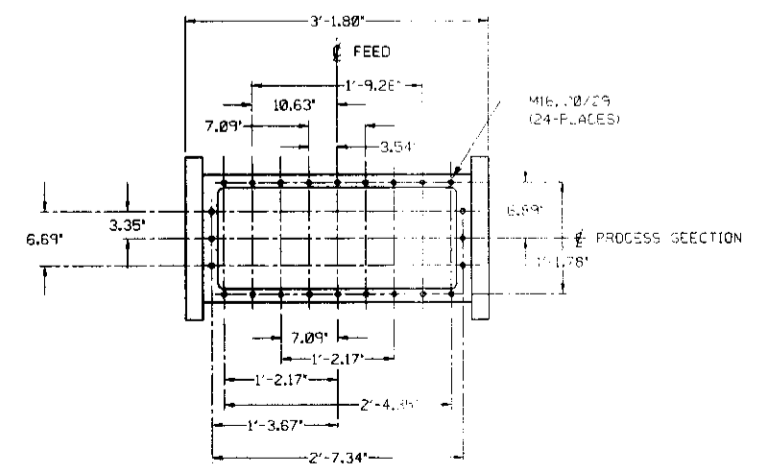


PLAN

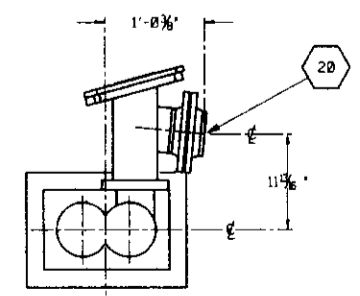
DWG. A3953106-4000 SHEET 2



ELEVATION



SEE DETAIL #1  
 SCALE: 1\"/>



SEE DETAIL #2  
 LOCKING UPSTREAM  
 SCALE: 1\"/>

- NOTES:  
 1. NUMBERS SHOWN THIS INDICATE PIPING CONNECTION DESIGNATION
- REFERENCE DRAWINGS:  
 A3953106-1000 (L) SHEETS — P.A.I.D.  
 A3953106-1002 SHEET 1 — FOUNDATION ARRANGEMENT  
 A3953106-1002 SHEET 2 — FOUNDATION GRouting  
 A3953106-4000 SHEET 1 — PELLETIZER ARRANGEMENT PLAN  
 A3953106-4000 SHEET 2 — PELLETIZER ARRANGEMENT ELEVATION

THIS DRAWING REDUCED 50%

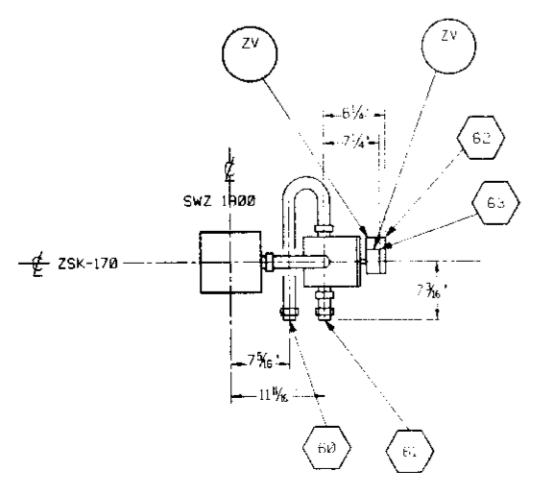
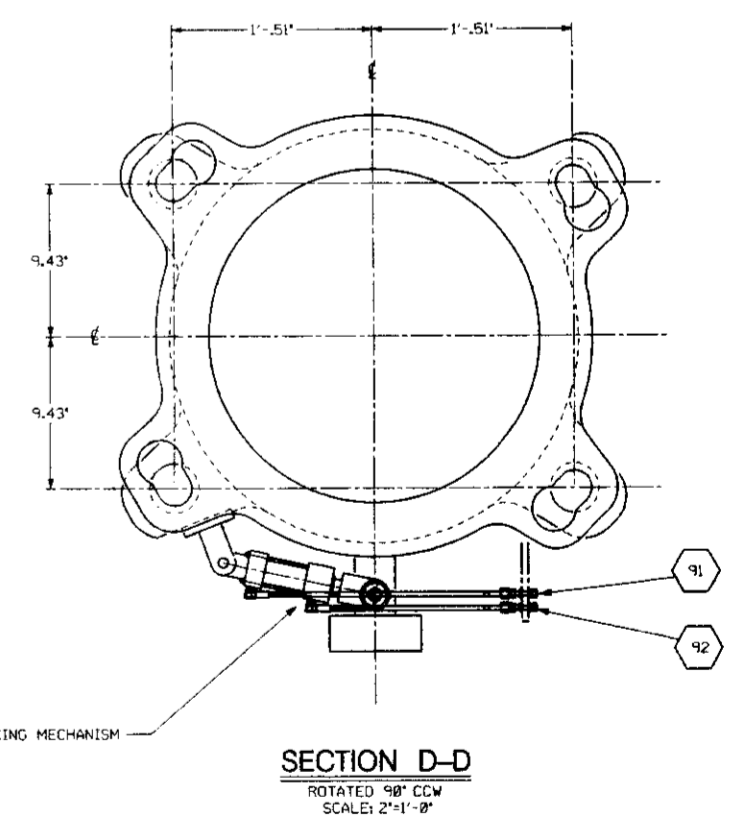
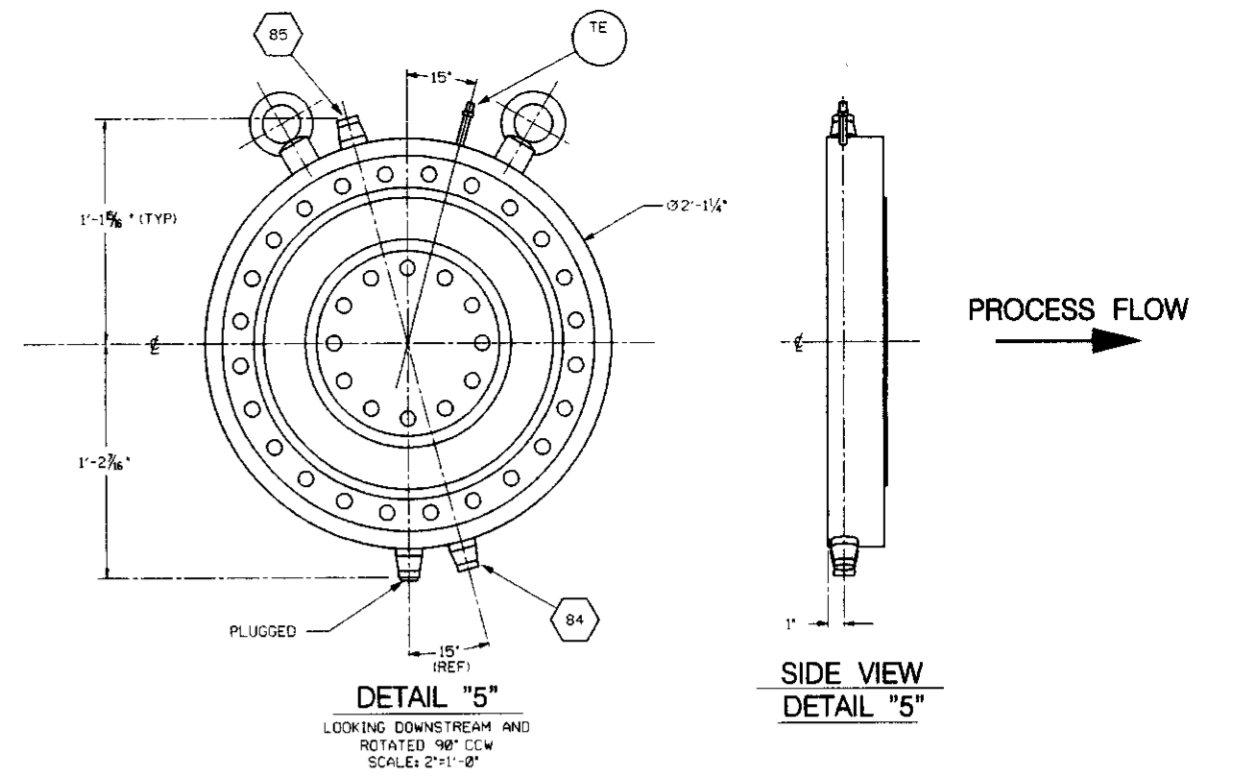
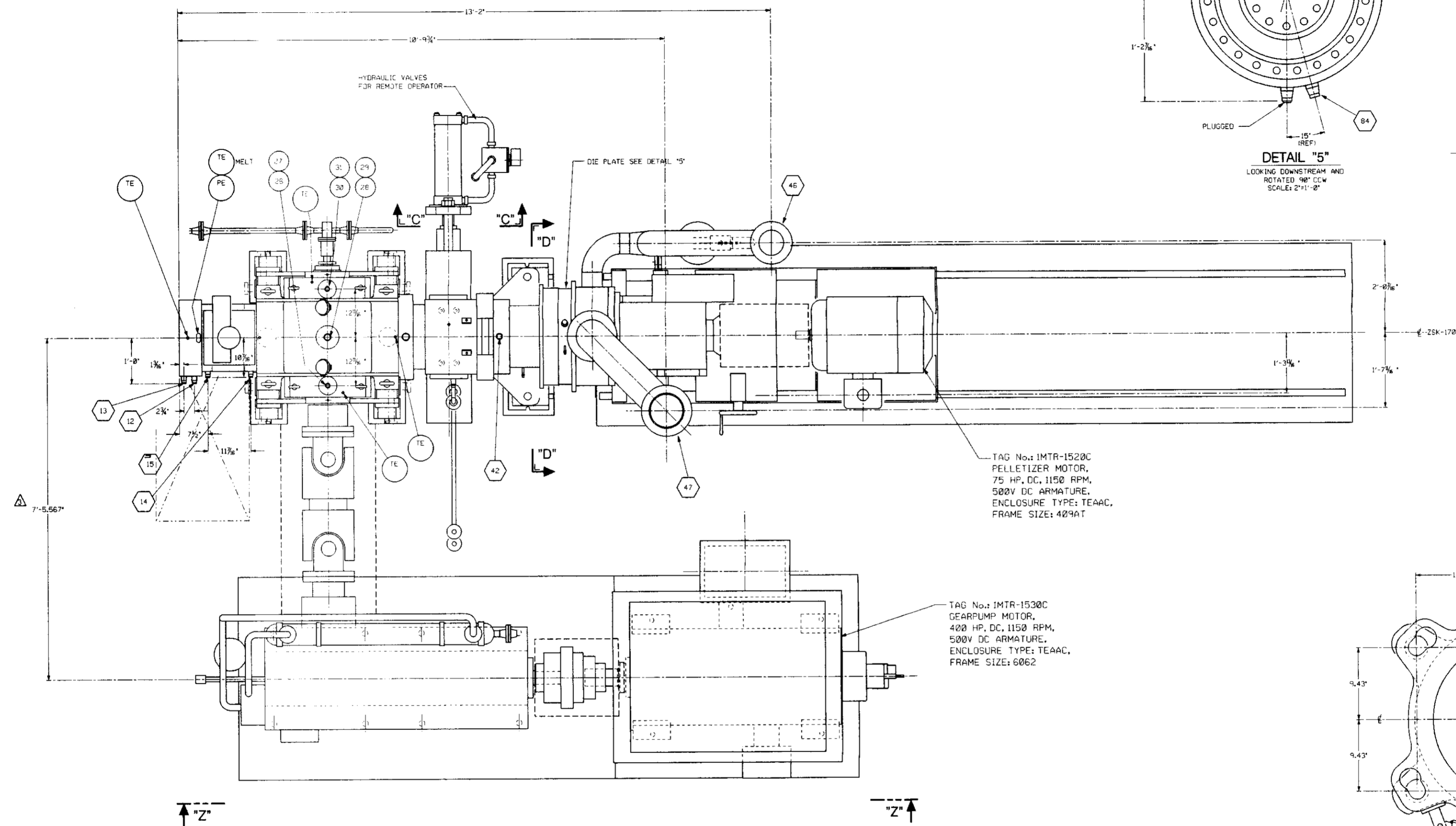
REV.	DESCRIPTION AND RELEASE STATUS	DATE	PREP.	DATE	ENGR.	ELEC.	MACH.	CHK.	DATE	SCALE	PROJECT	TITLE
5	AS BUILT	4/2/96	DSE	2/20/96						1/2"=1'-0"	LYONDELL POLYMERS	MACHINE INSTALLATION ZSK-170
4	CHANGES SHOWN ARE BETWEEN REV. 4 & 2, REV. 3 IS COMPLETELY SUPERSEDED.											
3	GENERAL REVISION											
2	REVISED DETAIL #1 DIMENSION SCALE											
1	GENERAL UPDATE											
0	CONSTRUCTION CERTIFIED											
A	FOR APPROVAL											

98923



22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

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SECTION "C-C"  
NO SCALE

TAG No.: IMTR-1530C  
 GEARPUMP MOTOR,  
 400 HP, DC, 1150 RPM,  
 500V DC ARMATURE,  
 ENCLOSURE TYPE: TEAAC,  
 FRAME SIZE: 6062

98923

- NOTES:  
 1. NUMBERS SHOWN THUS ○ INDICATE PIPING CONNECTION DESIGNATION E3953106-5B35.
- REFERENCE DRAWINGS:  
 A3953106-4800 SHEET 2 — PELLETIZER ELEVATION  
 A3953106-1000 SHT. 1 — MACHINE INSTALLATION  
 A3953106-1002 SHT. 1 OF 2 — FOUNDATION ARRANGEMENT  
 A3953106-1002 SHT. 2 OF 2 — FOUNDATION GRADING  
 A3953106-1100 SHT. 1 — DRIVE TRAIN ARRANGEMENT

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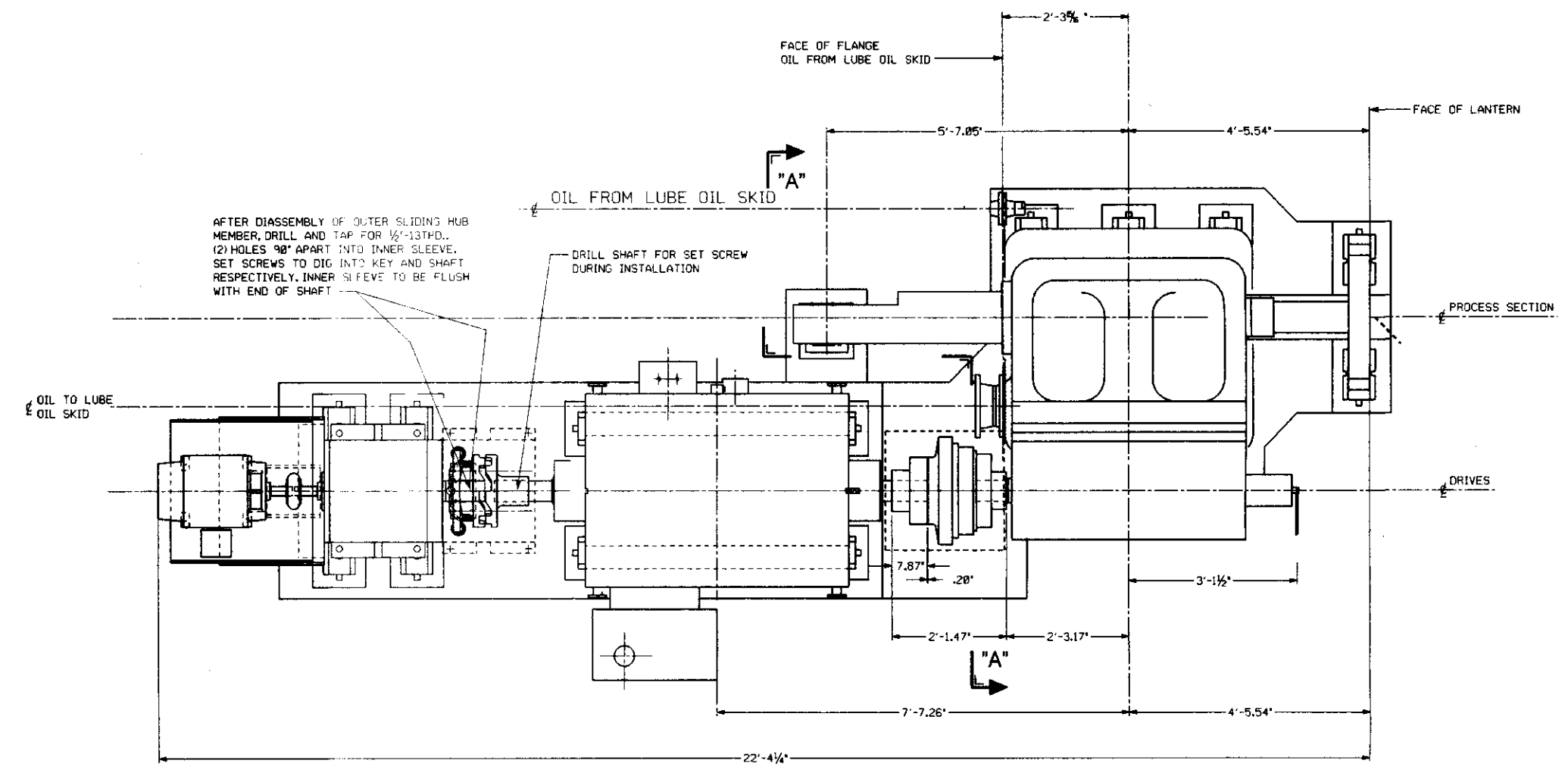
REV.		DESCRIPTION AND RELEASE STATUS	DATE	PROJ.	DATE	ENG.	ELEC.	INC.	MECH.	CHK.	DRW.	SCALE	SHEET	TOTAL
3		AS BUILT										1'-1'-0"	95-3106	3
2		REVISED LOCATION OF CUST. CONNS. 46 & 47												
1		GENERAL UPDATE												
0		CONSTRUCTION CERTIFIED												
A		FOR APPROVAL												

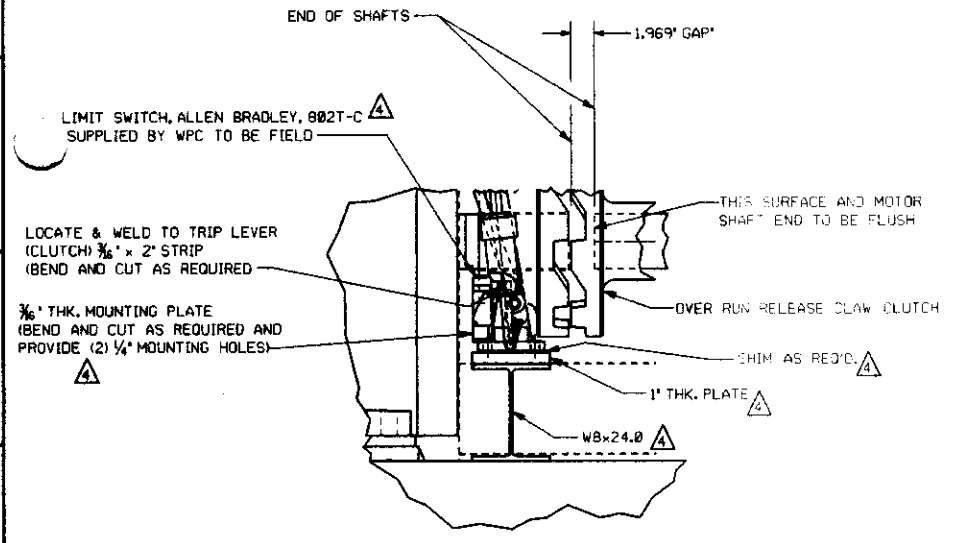
PROJECT		LYONDELL POLYMERS	
TITLE		PELLETIZER ARRANGEMENT-PLAN ZSK-170	
WERNER & PFELEDER CORPORATION		863 L. OSGOOD AVENUE, NEW JERSEY 07140	
TELEPHONE 201-327-6300		TELEX 372987	
DATE	SCALE	PROJECT	NO.
C. MARCIN	1'-1'-0"	3953106-4800	95-3106
ENGINEER		SHEET	1 OF 2

- NOTES:**
- NUMBERS SHOWN THUS  $\odot$  INDICATE PIPE CONNECTION DESIGNATIONS. SEE DRAWING NUMBER E-3953106-5035.
  - DESCH COUPLING PNEUMATIC MONITOR UNIT:
    - MOUNTING TO BE BY CUSTOMER, WITHIN 6 1/2 FEET FROM ROTARY HEAD ON INPUT SHAFT.
    - UNIT DIMENSIONS ARE 23 1/2" L x 14 1/2" W x 8 1/2" D.
    - FOR AIR CONNECTION SIZES SEE DRAWING NUMBER A-905901-008 TAG NUMBERS  $\odot$  AND  $\odot$ .
    - ELECTRICAL CONNECTIONS FOR UNIT TO BE LOCATED AND DRILLED IN FIELD BY CUSTOMER.
    - FOR SCHEMATIC DIAGRAM SEE DRAWING NUMBER A-905901-030-001.

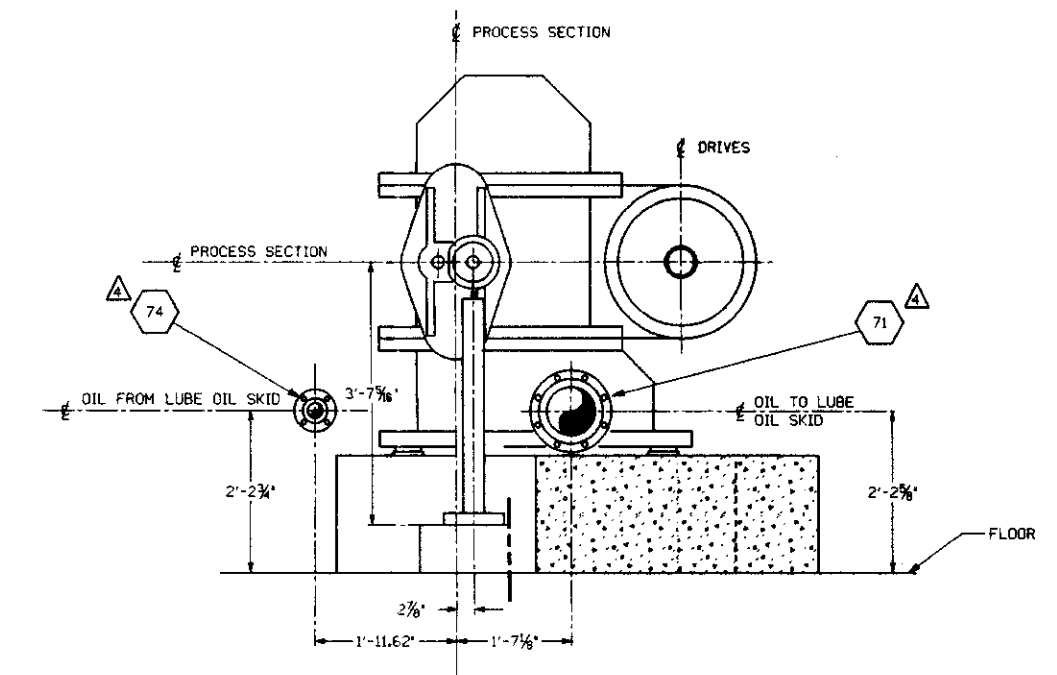
- REFERENCE DRAWINGS:**
- A-3953106-1000 MACHINE INSTALLATION
  - A-3953106-4000 SHEET 1 PELLETIZER PLAN
  - A-3953106-4000 SHEET 2 PELLETIZER ELEVATION
  - A-3953106-1002 SHEET 1 FOUNDATION ARRANGEMENT
  - A-3953106-1002 SHEET 2 FOUNDATION GROUTING



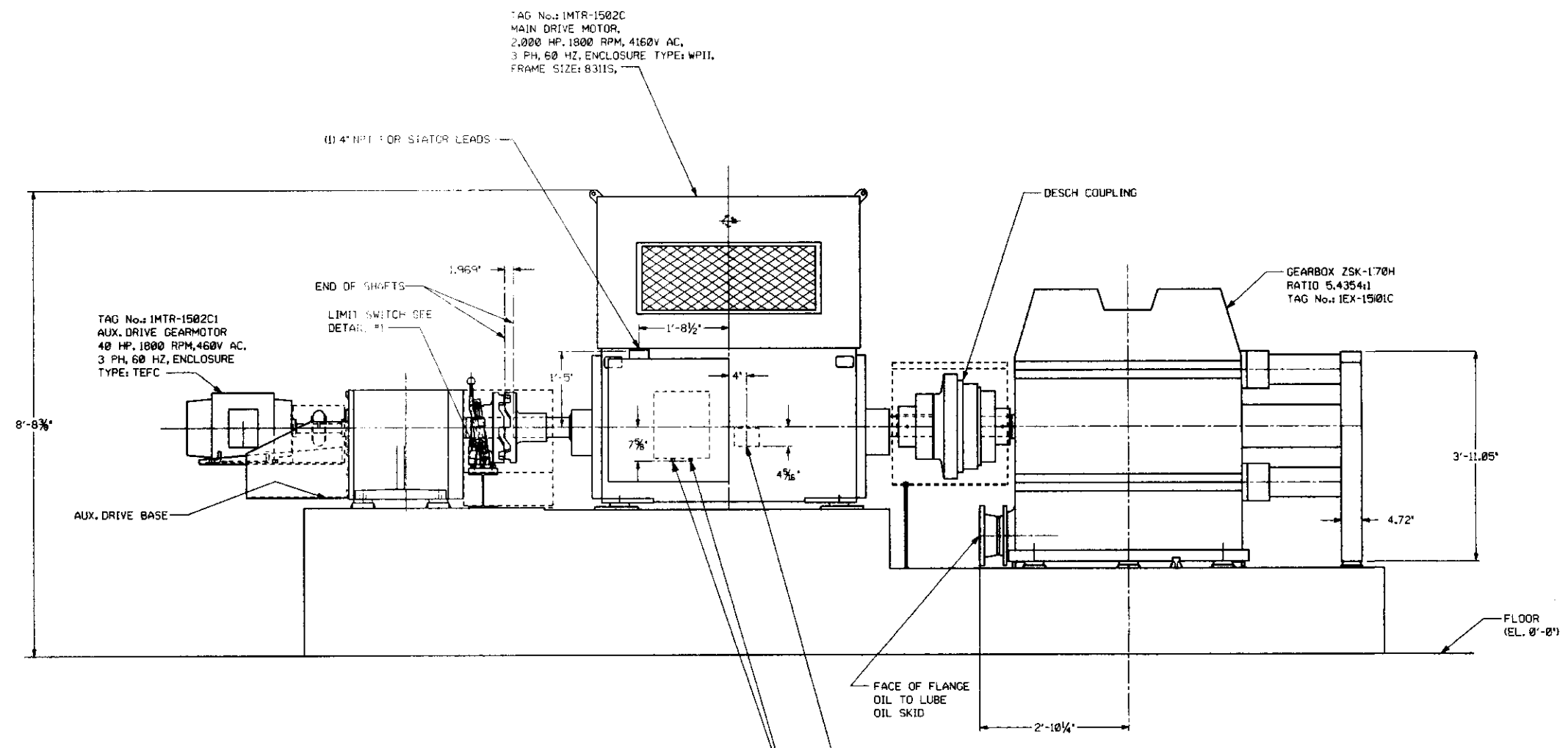
**PLAN**



**DETAIL #1**  
NO SCALE



**SECTION "A-A"**



**ELEVATION**

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PROJECT		LYONDELL POLYMERS	
TITLE		ZSK-170 DRIVE TRAIN ARRANGEMENT	
DATE		4/2/79	
BY		C. MARCIN	
CHECKED		C. MARCIN	
APPROVED		C. MARCIN	
SCALE		3/4" = 1'-0"	
DRAWING NO.		3953106-1100	
SHEET NO.		4	
TOTAL SHEETS		4	
DATE		4/2/79	
BY		C. MARCIN	
CHECKED		C. MARCIN	
APPROVED		C. MARCIN	
SCALE		3/4" = 1'-0"	
DRAWING NO.		3953106-1100	
SHEET NO.		4	
TOTAL SHEETS		4	