TERRY TURBINE DATA

OPERATING CONDITIONS	HORSEPOWER	SPEED RPM	STEAM RATE LB/HP/HR	OPERATING SPEED RANGE R.P.M.
RATED	2000KW	7024	9.8 KW/HR	7024/7024
NORMAL	1200KW	7024		
Low STEAM ~~OVERLOAD~~	2000KW	7024	10.5 KW/HR	

1st CRITICAL SPEED _____ RPM *2nd CRITICAL SPEED _____ RPM, TRIP SPEED 7730 RPM

STEAM CONDITIONS

INLET STEAM NORM. 850 PSIG 905 °FTT, MAX: INIT. _____ PSIG _____ °FTT, MIN: INIT. _____ PSIG _____ °FTT

EXHAUST STEAM NORM. 28.5 ~~PSIG~~/VAC 97 °FTT, MAX. 28.5 ~~PSIG~~/VAC _____ °FTT, MIN. 28.5 ~~PSIG~~/VAC _____ °FTT,

STEAM RATE GUARANTEE POINT, 2000KW STEAM 850 PSIG, EXH. 97 °FTT, LB/KW/HR 9.8 KW/HR

FULL LOAD EXHAUST TEMP. 97 FTT, MAX. CASING PRESS. _____ PSIG, SENTINEL RELIEF VALVE SETTING 2 PSIG

EXTRACTION ☐ ADMISSION ☐ NON RETURN VALVE ☐ EXTRACTION FLOW CONTROLLED ☐ UNCONTROLLED ☐

	FLOW LB/HR	PSIG	FTT
NORMAL			
MINIMUM			
MAXIMUM			

FOR RELIEF VALVE SIZING
MAX: THROTTLE FLOW LB/HR _____
AT STEAM _____ PSIG EXHAUST _____ °FTT
MAX: FLOW TO CONDENSER LB/HR @ IN Hg _____

CONSTRUCTION FEATURES

FRAME DESIGNATION TYPE FM-6 HORIZONTAL ■ VERTICAL ☐ CASING SPLIT: - HORIZONTAL ■ VERTICAL ☐

STEAM FLOW: HELICAL (SOLID WHEEL) ☐ AXIAL (BLADED) ■ NUMBER OF WHEELS 6

STAGES: PRESS. COMPOUND (RATEAU) ☐ VELOCITY COMPOUND (CURTIS) ■ BLADES: TWO ROW ■ THREE ROW ☐

ROTOR CONSTRUCTION: BUILT-UP ■ SOLID ☐

STEAM CHEST ■ STEAM RING ■ JETS ☐ NOZZLE BLOCK ■ REV: CHAMBERS ☐ RATEAU (NO JETS OR NOZZ.) ☐

~~JETS OR~~ NOZZLE GROUP POSITIONS. 1 ■ 2 ■ 3 ■ 4 ■ 5 ■ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐

NO ~~JETS~~/NOZZLES 11 DIAMETERS .28125

NO. NOZZLE GROUPS 5 NO. IN EACH GROUP 2·2·2·2·3

HAND VALVES:- LOW STEAM ☐ PART LOAD (ECON) ☐ OVERLOAD ☐ AUTO. VALVES ☐ POSITION NONE

JETS, HAND VALVES AND NOZZLE GROUPS POSITIONS ARE NUMBERED IN A CLOCKWISE DIRECTION STARTING JUST BELOW THE CASING NTAL JOINT AT THE RIGHT HAND SIDE WHEN FACING THE STEAM RING OR STEAM CHEST FROM THE TURBINE HIGH PRESS. END.

ROTATION FACING COUPLING END: -CW ■ CCW ☐ CASING SUPPORT: FOOT ■ PEDISTAL ☐ CENTERLINE ☐

BEARINGS (ROTOR): - RADIAL TYPE WAUKESHA TYPE TILT PAD JOURNAL THRUST TYPE Kingsbury ~~#~~ 6JHJ

LUBRICATION: - RING OILED ☐ FORCED FEED ■ CIRCULATING ☐ FROM: - TURBINE ☐ GEAR ■ BY OTHERS ☐

OVERSPEED TRIP: - MECHANICAL ■ DISC TYPE ☐ PIN TYPE ■ ELECTRICAL ☐ HYDRAULIC ☐

TRIP VALVE BUTTERFLY ☐ BALL ☐ TRIP AND THROTTLE ■

TRIP AND THROTTLE VALVE: - NONE ☐ OPERATE:-AIR ☐ MOTOR ☐ HYDRAULIC ■ MANUAL ■

TRIP:- MECHANICAL ■ HYDRAULIC ☐ SOLENOID ☐ AIR ☐ EXH. PRESS. ■ MANUAL ☐ MANUF. GIMPEL

INTERSTAGE GLAND SEALS: - CARBON ☐ LABYRINTH ■

END GLAND SEALS: - CARBON ☐ LABYRINTH ■ No: GOVERNOR END _____ No: COUPLING END _____

GLAND SEAL SYSTEM: - PRESSURE LEAK-OFF ☐ VACUUM CONDENSING ■

TURBINE CONNECTIONS	SIZE	RATING	FLANGE FACE	POSITION
INLET	4"	900# ASA	RF	RH FACING COUPLING
EXHAUST	36"	150# ASA	FF	DOWN
EXTRACTION				
ADMISSION				

GOVERNOR TYPE:- MECHANICAL ■ HYDRAULIC ■ ELECTRICAL ☐ AIR HEAD ☐ NEMA CLASS D

GOVERNOR VALVES:- SINGLE ☐ MULTI ■ NO 5 BUTTERFLY ☐ BY OTHERS ☐

ACTUATION:- DIRECT ☐ INDIRECT ☐ REMOTE SERVO ☐ OIL RELAY ■

GOVERNOR MANUFACTURER WOODWARD MODEL UG-40

DUPLING SUPPLIED BY:- TERRY ☐ OTHERS ■ HIGH SPEED ■ TYPE [illegible] LOW SPEED ■ TYPE 4½ LOVEJOY

BASE TYPE:- BOX ☐ PLATE ☐ "I" BEAM ■ SOLEPLATES ☐ UNDER TURBINE ☐

UNDER TURBINE AND GEAR ☐ UNDER TURBINE AND DRIVEN EQUIPMENT ■ NONE ☐

WEIGHTS AND DIMENSIONS: SEE OUTLINE DRAWING

NOTE* WHEN APPLICABLE TO ORDER.

TURBINE SERIAL NO. T-39501 CD

TERRY STEAM TURBINE COMPANY

ALLOWABLE PIPING FORCES AND MOMENTS - NEMA STANDARDS

1) The total resultant force and the total resultant moment imposed on the turbine at any connection must not exceed the following:

$$F = \frac{A - M}{3}$$

F = resultant force in pounds including pressure forces where unrestrained expansion joints are used at the connection.

M = resultant moment in pound-feet.

Inlet Size 4" (a)

Exh. Size 36" (b)

A inlet 2000 (c)

A exh. 8667 (d)

2) The combined resultants of the forces and moments on the inlet and exhaust connections resolved at the centerlines of the exhaust connection must not exceed either of the following two conditions:

A) $Fc = \frac{B - Mc}{2}$

Fc = Combined resultant of inlet and exhaust forces in pounds.

Mc = Combined resultant of inlet and exhaust moments and moments resulting from forces in pound-feet.

B = 4518 (e)

B) The components of these resultants shall not exceed:

Fx = 904 (f)

Fy = 2259 (g)

Fz = 1807 (h)

Mx = 4518 (i)

My = 2259 (j)

Mz = 2259 (k)

Coordinate System

x - parallel to turbine shaft

y - vertical

z - horizontal and at right angles to turbine shaft

The above is a simplified and abbreviated version of NEMA Standards SM21 1970 and 22 1970 Section 7.06.

Z Revision
ZZ Addition

TURBINE TYPE Fm-6 TURBINE NUMBER T-38501CD

PREPARED BY [redacted] DATE 8/29/75

Standard Practice Specification No. SP-113 Page 1

SUBJECT: SPECIFICATION FOR RECOMMENDED USE OF TURBINE STEAM JOINT COMPOUNDS Total Pages 2

REVISIONS

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1. SCOPE - This specification shall apply to turbine joints for all turbine products and will meet API requirements as stated in API 611, General Purpose Steam Turbines for Refinery Services, latest edition; paragraph 7c, page 9 (see 2.).

2. TURBINE JOINTS

2.1 Radial and axial splits, as applicable, of turbine casing shall employ a flat joint tightly maintained by a suitable sealing material(see 3.).

2.2 Turbine joints shall be limited to the following:

a) case horizontal joint,
b) case vertical joint (s),
c) steam ring or steam chest joint to case horizontal or vertical joint, as applicable.

2.3 Copaltite joint compound or gaskets (including string type) shall not be used.

3. SEALING MATERIAL LIMITS

3.1 RTV 732 BLACK shall be used up to 520°F(271°C) inlet temperature for all turbine joints.

3.2 SILVER PLY SEAL shall be used above 520°F(271°C) inlet temperature for all turbine joints.

3.3 ALINCO TRIPLE BOILED LINSEED OIL shall be used for all turbine joints when so specified on engineering drawing(s) or order form (shop sheet).

3.4 COPALTITE shall be used, unless otherwise specified, for components which shall include, but may not be limited to the following:

a) steam ring or steam chest plug (s),
b) jet bodies and/or dummy jet bodies,
c) L-Gland stem packing bonnet,
d) hand valve bonnet (s), body (bodies),
e) nozzle block (s) which shall also include asbestos gasket.

Z Revision
ZZ Addition

Prepared By: G. L. Kniep	Date Issued: 10/24/74	Terry Spec. No. SP-113
Supersedes Issue Dated: [illegible] 9/6/73, Rev. 2		
Product Engin. [redacted] E.J. Lichtsteiner		Page 1 Of 2
Quality Control N.A.		
Purchasing N.A.		Routing – Engin.
Executive N.A.		Stds. List 4: (A,B), 8: (2,3,4)

Standard Practice Specification No. SP-113

SUBJECT

REVISIONS

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It shall not be used for turbine joints (see 2.3).

4. FIELD CHANGES - Should repair and/or maintenance become necessary the following sealing material shall be substituted for all field units where string - type joints were used:

TEMPTITE STRING KIT: STRING GASKET PLUS TURBO SEAL 50.

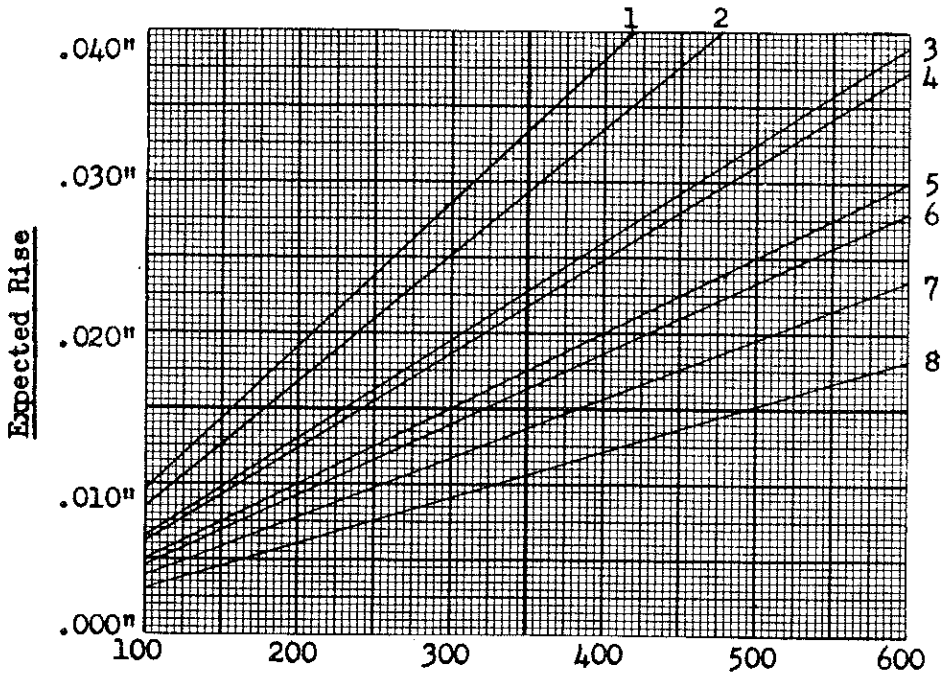
5. DESIGN DATA REFERENCE - Data contained in this specification is controlled by and based on Engineering Design Data 102.04.02.

Z Revision
ZZ Addition

Prepared By G. L. Kniep	Date Issued: 10/24/74	Terry Spec. No SP-113
Supersedes Issue Dated: K-12697 dtd 9/6/73, Rev. 2		Page 2 Of 2
Product Engin. [redacted] E. J. Lichtsteiner		
Quality Control N.A		
Purchasing N.A		Routing – Engin.
Executive		Dist. List:

CAUTION! The figures obtained from the curve are approximate only. Alignment must be hot checked and corrected if necessary.

TURBINES



Exhaust Temperature (°F) minus Room Temperature
(See Title Page for Exhaust Temperature)

Curve No.	Type
1	C-1, C-2
2	CS
3	E, ES, EA, ESA, GS, GSA
4	GA, ZAFS, also GAF with no centerline support on coupling end.
5	Z, ZS, Z-1-J, Z-4, ZS-4, ZAT, ZATS, ZAF with no centerline support on coupling end.
6	G, GAT, GF, GHF
7	F
8	ZFM, also ZS, ZS-4, ZATS, GAF, with centerline support on both ends.

Allow .002" - .003" more opening at the top of the coupling than at the bottom.

REDUCTION GEARS

Based on 140° F. Oil Temperature

Type	Rise	Type	Rise
K & M	.004"	XA, XAM, XB, XC	.009"
O	.006"	#5	.008"
Q, S & SM	.0065"	#10 & #20	.010"
U	.008"		

Subtract gear rise from turbine rise, or rise of driven unit on direct-connected turbines to determine turbine setting below gear or driven unit.

Axial clearance between the faces of the coupling should be large enough so they cannot possibly strike each other in their closest positions. For proper axial clearance, refer to instructions of the coupling manufacturer.

Bolting Instructions:

TURBINE ASSEMBLY INSTRUCTIONS
BOLTING INSTRUCTIONS

SIZE	TYPE	LOCATION	LUBRICATION	TORQUE FT.-LBS.
1-1/4-8"	Stud bolts--Gr B7 Stud bolts--GR B16 Hex Nuts--GR 2H Washers--SPS-WP-20	Horizontal casing flg. Steam chest cover	*Fel-Pro C5-A or Loctite anti-seize lubricant	875
1"-8	Stud bolts--Gr B7, B16 Hex nuts--Gr 2H Washers--SPS-WP-16	Horizontal casing flg. (front end only)	As above	425
1"-8	Stud bolts--Gr B7 Hex nuts--Gr 2H	Governor valve	As above	425
1"-8	Hex head machine bolt --std. steel (A307) Washers--std. steel	Flex plate hold down bolts	As above	250
7/8-9	Socket head cap screws--heat treated, alloy steel	Bearing cases Feed line flanges	SAE 30 oil	305
3/4-10	Socket head cap screws--heat treated, alloy steel Self locking (Nylock)	Bearings caps Nozzle block	SAE 30 oil	190
3/4-10	Stud bolt--Gr 6 (416 SS) Allenut--Gr 6 (416 SS) Shakeproof Internal Type Lock Washer-- 410 SS	Diaphragms stages 1 & 2	*Fel-Pro C5-A Loctite anti-seize lubricant	175
5/8-11	Socket head cap screws --heat treated, alloy Washers--std. steel (flex plates only)	Diaphragm spacer rings --Diaphragm support ring Inner diffusor ring--End seal Holders--Flex plates	As above	100