

<b>Snamprogetti</b>	CLIENTE - Customer <b>NAGARIUNA FERTILIZERS &amp; CHEM. Ltd.</b>	COMMESSA - Job <b>808200</b>	IMPIANTO - Unit <b>01</b>
	LOCALITA' Plant location <b>KAKINADA - INDIA</b>	SPC. No MA-E <b>30311</b> <b>6142</b>	
	IMPIANTO - Unit <b>KAKINADA FERTILIZERS COMPLEX</b>	FG - Sh - DI - of <b>1 / 11</b>	Rev <b>5</b>
			0 1 2 3 4 <b>5</b>

**FOGLIO DATI PER POMPE CENTRIFUGHE ORIZZONTALI**  
HORIZONTAL CENTRIFUGAL PUMP DATA SHEET

1	SERVIZIO Service <b>H.P. CARBONATE SOLUTION PUMP</b>	SIGLA Item No <b>01 - P-102 A/B</b>
2	FUNZIONAMENTO Operation <b>SUNDSTRAND</b>	N° UNITA' PRINC./RISERVA No of units main/spare <b>1/1</b>
3	COSTRUTTORE Pump Mfr <b>SUNDSTRAND</b>	MODELLO Type <b>HMP 3512</b>
4	ORDINE N° Purchase order No <b>808200/92/00026</b>	TIPO MOTRICE PRINC./RISERVA Drive type: main/spare <b>elec. motor</b>
5	LIQUIDO POMPATO Liquid handled <b>CARBONATE SOLUTION</b>	

6	PORTATA Capacity m <sup>3</sup> /h <b>15</b>	PROG Rated <b>65 (1)</b>
7	COMP CORROSIVI/EROSIVI Corrosive/Erosive compounds <input checked="" type="checkbox"/> SI Yes <input type="checkbox"/> NO No	% SOLIDI % Solids <b>NO</b>
8	TEMPER POMP MIN./ESERCIZIO Suction temperature min./oper <b>60/72</b>	
9	PESO SPECIFICO A TEMP. MIN./ESERCIZIO Specific gravity at min./oper temperature <b>0.93 ÷ 1</b>	
10	VISCOSITA' CINEM A TEMP. MIN./ESERCIZIO Viscosity at min./oper temperature <b>cps &lt; 3</b>	
11	PRESSIONE ALL'ASPIRAZIONE Suction pressure <b>Kg/cm<sup>2</sup> abs. MIN 15 NORM 18 MAX 24 (2)</b>	
12	PRESSIONE ALLA MANDATA Discharge pressure <b>Kg/cm<sup>2</sup> abs. NORM 15.5 (4)</b>	
13	TENSIONE VAPORE ALLA TEMP. ESERCIZIO Vap. pressure at operating temperature <b>Kg/cm<sup>2</sup> abs.</b>	
14	PRESSIONE DIFFERENZIALE Differential pressure <b>Kg/cm<sup>2</sup> abs. 13.7</b>	PREVALENZA m. <b>14.75</b>
15	POTENZA ASSORBITA ALL'ASSE STIMATA Estimated BHP <b>450 (1 = 0.53)</b>	N.P.S.H. DISP N.P.S.H. avail m. <b>10</b>
16	REGOLAZIONE PORTATA Flow control CONT. AUTOMATICA	MANOM. AUTOMATICA
17	SISTEMA DI REGOLAZIONE Flow control type <b>by throttling on discharge and by-pass</b>	CAMPO Range <b>25 ÷ 100</b>
18	TIPO TENUTA ESERC. Seal type operation <b>mechanical (JOHN CRANE)</b>	TIPO TENUTA AVVIAM. Start-up <b>mechanical</b>
19	FLUIDO RISCALDANTE TIPO Heating fluid type <b>L.P. steam</b>	PRESS. NORM./PROG Press. norm./des <b>Kg/cm<sup>2</sup> abs. 4.5</b>
20	FLUIDO REFRIGERANTE TIPO Cooling fluid type <b>C.W.</b>	TEMP. Temp. °C <b>35/45</b>
21	FLUIDO FLUSSAGGIO TIPO Flushing fluid type <b>D.W.</b>	PRESS. NORM./PROG Press. norm./des <b>Kg/cm<sup>2</sup> abs. 6</b>
22	RIACCELERAZIONE Reacceleration <input type="checkbox"/> SI Yes <input checked="" type="checkbox"/> NO No	AVV. AUTOMATICO Automatic start-up <input type="checkbox"/> SI Yes <input checked="" type="checkbox"/> NO No
23	MATERIALE LINEE MONTE/VALLE POMPA Piping material upstream/downstream <b>ALSI 316 #</b>	SUPPORTO Bracket <input type="checkbox"/> IN LINE <input type="checkbox"/>

23	CASSA MOUNTING <input type="checkbox"/> TIPO SUPPORTAZIONE Centerline <input type="checkbox"/> MEZZERIA Foot <input type="checkbox"/> PIEDI Split <input type="checkbox"/> ASSIALE Axial <input checked="" type="checkbox"/> RADIALE Radial	TIPO VOLUTA Single <input type="checkbox"/> SINGOLA Double <input type="checkbox"/> DOPPIA <input checked="" type="checkbox"/> DIFFUSORE Diffuser	ASPIRAZIONE Suction <input checked="" type="checkbox"/> SINGOLA Single <input type="checkbox"/> DOPPIA Double
24	ATTACCHI PER CONNECTIONS for <input type="checkbox"/> DRENAGGIO Drain <input type="checkbox"/> SFIATI VENTS <input type="checkbox"/> MANOMETRI Press. gauges	GIOCHI API API Clearance <input type="checkbox"/> SI Yes <input type="checkbox"/> NO No	AUTOADESCANTE Selfpriming <input type="checkbox"/> SI Yes <input type="checkbox"/> NO No
25	ANELLI USURA Wear rings <input type="checkbox"/> LATO INGRESSO Suction side <input type="checkbox"/> LATO CASSA STOPPA Stuffing box side <input type="checkbox"/> SOLO CASSA Casing only <input type="checkbox"/> CASSA E GIRANTE Casing & impeller	ASPIRAZIONE LINEA DIAM. Suction line dia <b>8"</b>	RATING ANSI ANSI rating <b>300 RF</b>
26	MANDATA LINEA DIAM. Discharge line dia <b>6"</b>	RATING ANSI ANSI rating <b>NOTE (3)</b>	BOCCHELLI NOZZLE size <b>3"</b>
27	GIRANTI TIPO IMPELLERS type <b>OPEN</b>	DIAM. PROG. MIN/MAX Dia des. min/max <b>101.6/151.45/175.26</b>	MONTATE MOUNTING <input type="checkbox"/> TRA CUSCINETTI BETWEEN BEARINGS <input checked="" type="checkbox"/> A SBALZO OVERHUNG
28	CUSCINETTI RADIALI TIPO BEARINGS radial <b>4 RAIN JOURNALS</b>	REGGIA TIPO THRUST <b>3 FLAT RATE TYPE</b>	COMUNE A MOTRICE Common with driver
29	GIUNTO TIPO/COSTR. Coupling type/mfr. <b>35 JTNS/METASTREAM</b>	BASAMENTO BASEPLATE <input type="checkbox"/> SEPARATO SEPARATE	ROTTANTE CARBIDE - TUNGSTEN CARBIDE CARBIDE API PLAN 32, 61 <b>STATIC FACE - CARBON GRAPHITE API PLAN 32, 61</b>
30	TENUTA MECC. TIPO/COSTR. Mech seal type/mfr. <b>SIG 1: SINGLE JOHN COOPER CODE: CRANE BAB</b>	TIPO LUBRIFICAZIONE Lubrication type <input type="checkbox"/> A SBATTIM. Oil splash <input checked="" type="checkbox"/> FORZATA FORCED	AD ANELLO Ring oil

30	MATERIALE Material CODICE API 610 API 610 Code <b>ASTM code</b> <b>316 SS</b>	31 MOTORE ELETTRICO Electric motor COSTR. Mfr <b>MEM MR102A/B</b>	32 TURBINA VAPORE Steam turbine ITEM COSTR. Mfr <b>2</b>
31	POTENZA NOM. Rated power <b>450</b>	POLY N° Poles No. <b>2</b>	VAPORE INGR. Inlet steam <b>bar °C</b>
32	FORMA Frame <b>5.5</b>	ESECUZIONE Execution <b>B3</b>	VAPORE USC. Exhaust ste <b>bar °C</b>
33	TIPO ALIM. Power lead <input checked="" type="checkbox"/> NORM. Norm. <input type="checkbox"/> PREF. Pref. <input type="checkbox"/> C.C. C.C. <input type="checkbox"/> D.C. D.C.	VOLTS/FASI/CICLI Volts/Phases/Cycles <b>3300/3/50</b>	TIPO CUSCINETTI BEARINGS <b>TIPO OLIO LUBE</b>
34	TIPO OLIO LUBE <b>NITRONIC 50</b>	TIPO CUSCINETTI BEARINGS <b>4140</b>	TIPO OLIO LUBE <b>316 SS</b>
35	TIPO CUSCINETTI BEARINGS <b>316 SS</b>	FORNIT DA Supplied by <b>OTHERS</b>	FORNIT DA Supplied by

4	REVISED WHERE MARKED	G.T.	RWC	RWC	29-7-88
3	REVISED WHERE MARKED	C.S.B.	RWC	RWC	12-8-88
2	CLIENT COMMENTS ADDED	W.H.K.	9/3/88		
5	GENERAL REV - ISSUED FOR ORDER ON SUNDSTRAND	J.P. Thomas			10-10-89
0	EMISSIONE - Issue				9/12/86



**CARATTERISTICHE COSTRUTTIVE E MATERIALI**  
CONSTRUCTION FEATURES AND MATERIALS

FG	Sh	DI	of	Rev				
2	1	11		0	1	2	3	4
				5				

33 CURVA CARATTERISTICA DI OFFERTA N Offer characteristic curve No **H88047-BE** HEAD SALT ON PUMP 50/50 BETWEEN STAGES

34 NPSH RICHIESTO (ACQUA) NPSH required (water) **8-4 RATED / 6-4 AT MIN FLOW** INDICE CAVITAZIONE Suction specific speed **18302 IN US UNITS**

35 N DI STADI No. of stages **TWO** GIRI r.p.m. **13010** RENDIM. Efficiency **59.3** POTENZA ASSORBITA Absorbed power **408.4 kW**

36 PORTATA MAX CON GIRANTE PROGETTO Max. BHP with design impeller **447.6 kW** PREVAL MAX CON GIRANTE PROGETTO Max head with design impeller **1603.40 @ 13010**

37 PORTATA MIN CONTINUA Min. continuous capacity **34.7 PROCESS MIN FLOW** SEE NOTE 8 ROTATION VIEWED FROM COUPLING END  CW

38 ACQUA RAFFREDDAMENTO Cooling water **PER PUMP 16.6 M<sup>3</sup>/H** MATERIALE TUBAZIONI Piping material **304SS**

CUSCINETTI Bearings **5.7 M<sup>3</sup>**  CAMERA TENUTA Stuffing box  BASAMENTO Pedestal  PREMISTOPPA Gland  SCAMB FLUIDO FLUSSAGGIO Flushing fluid exchanger **10.9 M<sup>3</sup>/H**

39 TENUTA MECCANICA Mechanical seal  SINGOLA Single  DOPPIA Double  TANDEM Tandem **2ND STAGE**  TENUTA AUSILIARIA Auxiliary seal  SI  NO

40 FLUSSAGGIO TENUTA INTERNA Flushing int. seal  DALLA MANDATA From discharge nozzle  ESTERNO External **m/h**  SI  NO **Kg/cm<sup>2</sup>**

FLUSSAGGIO TENUTA ESTERNA Flushing ext. seal  CON BARILOTTO From reservoir  ESTERNO External **m/h**  SI  NO **Kg/cm<sup>2</sup>**

41 CARICHI AMMISS. SU FLANGE Allow. loads on flanges PARALL ALBERO Parallel to shaft VERTICALE Vertical ORIZZ 90 ALBERO Horiz 90° to shaft

ASPIRAZIONE FORZA/MOMENTO Suction force/torque **1892** **1432** **946** **18302**

MANDATA FORZA/MOMENTO Discharge force/torque **1892** **1432** **946** **18302**

42 SPINTA ASSIALE SULL ALBERO Axial thrust on shaft **DIRECTION STG1 UNTIL RIMP DESIGN STG.** DIREZIONE Direction **STG2 AWAY FROM INLET**

43 AREA OCCHIO GIRANTE Eye area **cm<sup>2</sup>** DIAMETRO Diameter **mm** VELOCITA SPECIFICA Specific speed **Nm**

V ASSOLUTA Inlet Outlet abs vel **m/sec** INGRESSO USCITA  NORM Norm **Nm**

V RELATIVA Inlet Outlet rel vel **m/sec** INGRESSO USCITA  NORM Norm **Nm**

44 COLLAUDI Shop tests **ACCORDING TO SPC QN-E-13415 REV 1** RILIEVO CURVA Performance curve **YES** NPSH **AT 4 POINTS MINIMUM YES** PROVA IDRAUL. Hydrostatic test **YES** SMONTAGGIO Sino-down

PRESENZIATI Witnessed **ONE OF THE TEST POINTS TO BE AT MIN FLOW.** **2 STG 1 146** **2 STG 2 184** **2 STG 3 184**

NON PRESENZIATI Non witnessed

PRESSIONE DI PROVA IDRAULICA Hydrostatic test pressure **Kg/cm<sup>2</sup> abs. 180** **TEMP MAX. ADMISS. Max. admitt. temp. 110**

45 PESI Weights **kg** POMPA Pump **953** BASAMENTO Baseplate **1542** MOTORE Motor **BY OTHERS** TURBINA Turbine **//**

46 DATI CON ACQUA (IN CASO DI LIQUIDO VISCOSO) Data with water (for viscous fluid)

CURVA OFFERTA N Offer curve No **H 88047-BE** VISCOSITA Viscosity **cs** FATTORI CORRET Correct factors **CO CH CE**

PORTATA Capacity **m/h** PREVALENZA Head **m** RENDIMENTO Efficiency **PESO SPECIFICO Spec gravity**

POTENZA ASS Absorbed power **kW** POTENZA MOTORE Motor power **kW**

47 ESTENSIONE FORNITURA Supply limits  (INCLUSIONI INCLUDED)

BASAM COM A POMPA MOT. VARIATORE Common baseplate for pump, driver & gear  MOTICI Driver **( IN FIELD ) ( SEE NOTE 5 )**

GIUNTI Couplings  WITH SPACER  BULLONI DI FONDAZIONE SECONDO Foundation bolts in accordance **STD SP 8500-84 + RUGMENT DEVICES**

SPECIAL TOOLS LISTED IN QUOTE  PROT GIUNTI Coupling guards **ANTISC Non-sparking**  SI  NO

SUCTION SPOOL PIECES AND CROSSOVER RING  FILTRI TEMPOR. ASPIRAZIONE Temporary suction filters

AVVIAM. AUTOM. POMPE RISERVA E EMERGENZA Automatic starting for spare emergency pumps  SISTEMA DI LUBRIFICAZIONE Lube oil system **REFER TO P. 8 OF THIS SPEC AND SUNDSTRAND P. 10 PROIFA26**

SEPARATORI SU FLUSSAGGIO Flushing separator system **REFER TO P. 8 OF THIS SPEC AND SUNDSTRAND P. 10 PROIFA26**  ACCUSTIC ENCLOSURE  0.75 KW MOTOR WITH BLOWER

PREFABB. TUBAZIONI OLIO Shop-fabrication of lube oil piping  TUBAZIONE COLLEGAMENTO CENTRALINA LUBRIF. E POMPA Connect piping between lube console and pump

ATTREZZI E CHIAVI SPECIALI Special tools and wrenches  COLLAUDI OFFICINA Shop tests **( ACCORDING TO QN-E-13415 )**

LIBRETTO ISTRUZ. No. **COPIE IN LINGUA english**  PARTI RICAMBIO PER N Spare parts for **COMMISSIONING / 2 YEARS**

ACCOPP. POMPA MOTORE Assem. pump-driver  IN OFFIC. In factory  IN CANT. In field  ALL RELEVANT PIPE SUPPORTS WITHIN THE PACKAGE CONFINES

TENUTE MECCANICHE Mechanical seals  SS CONDENSATE RESERVOIR WITH ASSOCIATED SS PIPING

AUSILIARI TENUTE MECCANICHE Auxiliaries for mechanical seals  BARILOTTO Ext. reservoir  TERMOMETRO Temperature indicator

MANOMETRO Pressure indicator  VALV. SICUREZZA Safety valve  VALV. DI SFIORO Relief valve

PRESSOSTATO Pressure switch  INTER. DI LIVELLO Level switch  INDICATORE DI LIVELLO Level indicator

**47a PUMP / GEAR, MOTOR AND ALL ANCILLARY SYSTEMS CONTAINED WITHIN CONFINES OF BASEPLATE**

- 48 NOTE
- Capacity is based on suction conditions 2. This figure is only for mechanical reason. The max value for process condit. is 19 Kg/cm<sup>2</sup> abs.
  - DISCHARGE FLANGES SHALL BE OF SPECIAL LENS DESIGN TO SP STD TB 5002.84
  - Safety valve setting: Kg/cm<sup>2</sup>g 180. SHALL NOT BE EXCEEDED
  5. Pump baseplate to be undrilled
  - motor only, motor half coupling to be machined by motor vendor.
  - MINIMUM FLOW AT WHICH THE PUMP CAN OPERATE IS 34.7 M<sup>3</sup>/H.
  - Seal flushing D.W. flow shall not exceed 70l Kg/hr. CONFIRMED BY SUNDSTRAND
  - CONTROL VALVE, FV-06 SHALL BE SUPPLIED BY SP AND POSITIONED NOT MORE THAN 2.13M FROM THE PUMP



COMMESSA No.	808200	IMP. No. / U.	01
SPC. N° MA-E-30311			
FG	3	11	
Rev.	0	1	2
	5	3	4

REFER TO SUNDSTRAND DRG-PROIFA21 FOR TOTAL SCOPE

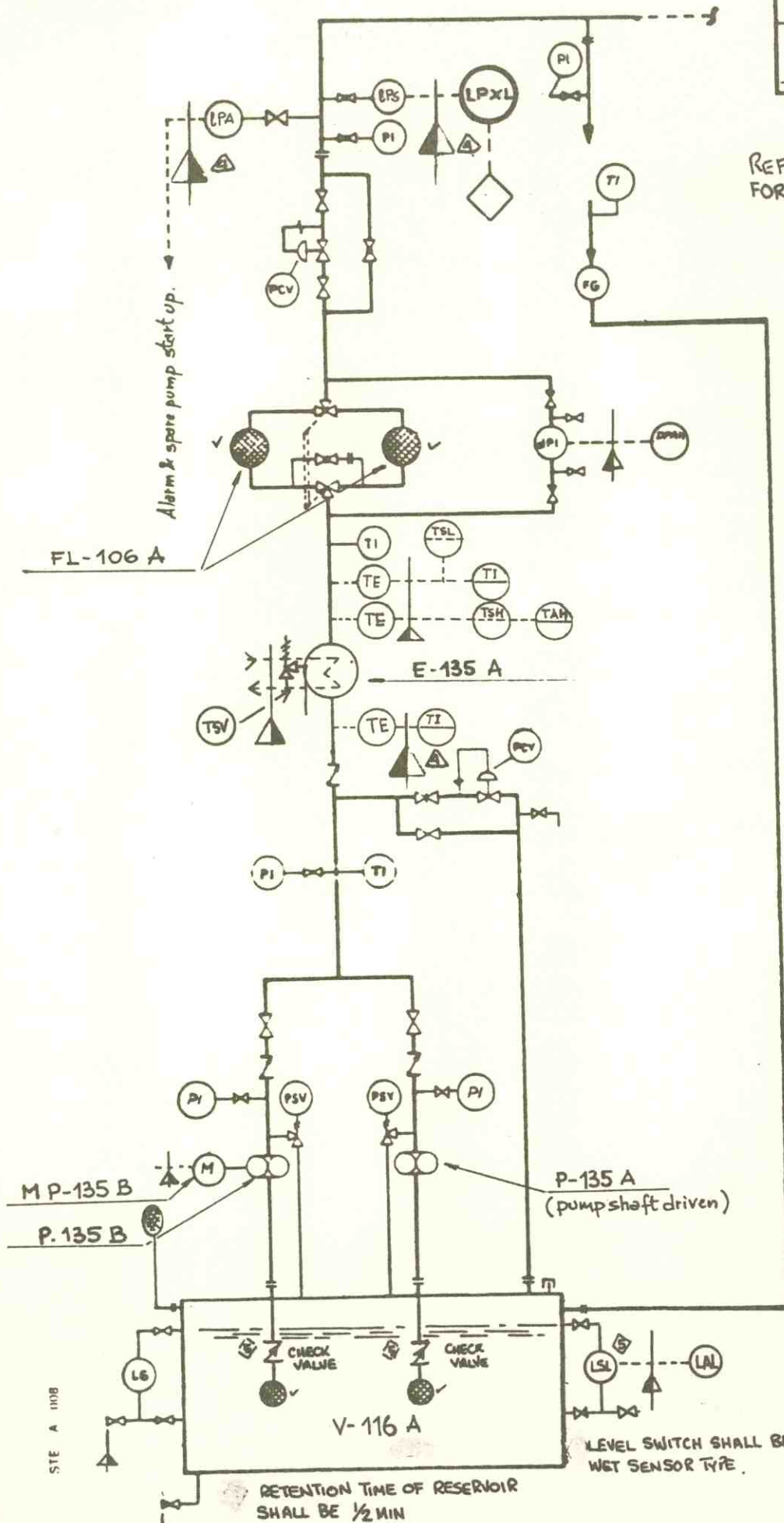
VALID FOR ONE PUMP

THE LUBE OIL SYSTEM SHALL BE TESTED DURING THE PUMP PERFORMANCE TEST

SUMP HEATER NOT REQUIRED

ALL WIRING OF SWITCHES SHALL TERMINATE AT JUNCTION BOXES

VENDOR | OTHERS



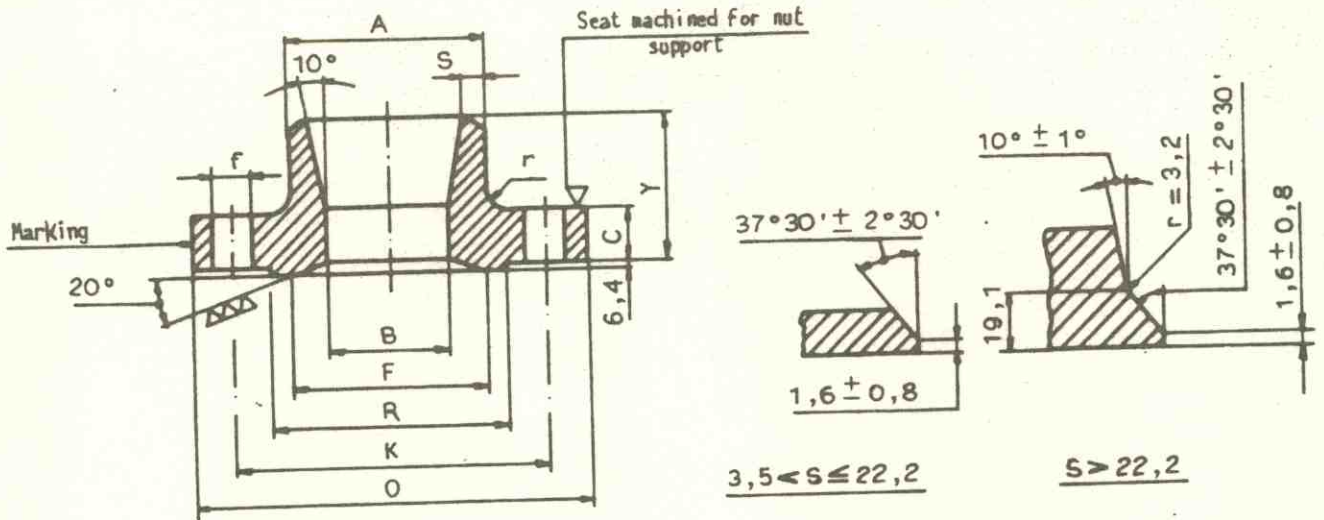
STE A 1108

MATERIALS FOR UREA  
STAINLESS STEEL WELDING NECK FLANGES

Fg. - Ed. / di - of

4 / 11

Rev.				
0	1	2	3	4
5				



EXAMPLE OF DESIGNATION : Flange. DNP 4" x (1), per Snamprogetti Std. TB.5002, Sheet 11.  
ASTM A 182 F 316L, per SPC. G510.  
EXAMPLE OF MARKING : 4 - (1) / 316L - G510 / TB.5002-11.

DNP	A	B <sup>+0,5</sup> <sub>-0</sub>	O	K	R	F	C	Y	f	r	S	N° of holes	Stud Bolts		Mass Kg
													DN"	Length	
3/4	26,7	14,7	100	64	44	22,0	25	93,6	15,9	2	to suit pipe wall thickness	4	1/2	100	1,8
1	33,4	19,2	105	68	46	29,5	30		19,1	3			5/8	120	2,4
1 1/2	48,3	30,5	135	95	70	43,5	35	22,2	5				3/4	130	4,4
2	60,3	39,3	155	110	82	53,0	45	25,4		6			7/8	160	6,9
3	88,9	58,4	200	145	115	79,0	60	31,8	7			1 1/8	190	15,4	
4	114,3	77,2	250	185	150	103,0	75	41,3		8		1 1/2	235	26,5	
6	168,3	116,4	330	255	210	152,0	100	50,8				2	1 7/8	325	55,5
8	219,1	153,1	410	320	265	196,0	120	173,6		55,0			2	430	109,0
10	273,0	190,0	480	380	321	241,0	140	203,6					161,0		

Dimensions in mm.

DNP, DN" = Nominal Size, Inches.

- DIMENSIONS : As shown in Table.  
 CONSTRUCTION : Forged.  
 TOLERANCES : ANSI B 16.5  
 MATERIALS & TESTS : Per SPC. G510 and as specified in P.O.  
 DESIGN CONDITIONS : 292 bars at 80°C  
 258 bars at 150°C  
 221 bars at 250°C  
 STUD-BOLTS : Per ENI STD 0368.00

NOTES FOR PURCHASE ORDER AND MANUFACTURER

- 1) - State "S" thickness as specified each time.
- 2) - Each piece to be marked by its marking.

TUB.1

