WELL

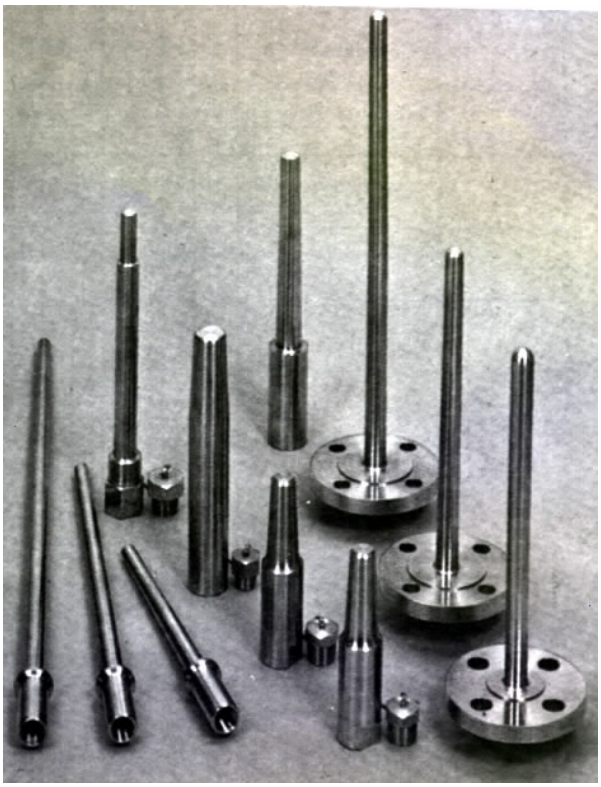
THERMO WELL

KONICS

SS-5090

THERMOWELL (Drilled Bar Stock Type Protection Tube) is usually being used to ensure longer service life under critical conditions such as very corrosive gases or liquids, high temperature, high pressure, vibration, shock or high flow velocity.

AT KONICS various THERMOWELLs durable under these conditions are manufactured.



FEATURES

¨ **Bores & depths**

Bore (mm)	Max. Depth (mm)
4.0	500
5.5	700
7.0	800
8.5	1,000
10.0	1,200
11.0	1,200
12.0	1,200
16.0	1,200

¨ **Test and inspection**

· Integrity test
Each well is tested under air pressure of 5kgf/cm² for 5 minutes.

· Hydrostatic pressure test
Internal pressure test up to 300kgf/cm² is conducted upon request.

· X-ray inspection
X-ray inspection to insure uniform wall thickness or complete finish is also performed upon request.

SPECIFICATIONS

TYPE	CONN, TYPE	MODEL	LENGTH	MAT'L	REMARK
DRILL BAR	SCREW, Welding	ss-5091	50-700	SU304	HIGH TEMP
	FLANGE	SS-5092	50-700	SUS-316	HIGH PRESS
END CLOSED	SCREW, Welding	ss-5093	50-	OTHERS	LOW TEMP
	FLANGE	SS-5094	50-		LOW PRESS

MATERIAL

- **Raw meterial size**
  · Round bar(O.D.) : mm
  25, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 55
  · Hexagonal Bar : mm
  26, 29, 32, 35, 38, 41

- **Standard meterial**
  304 SS, 316 SS, 316L SS, 310S SS, Hastelloy A, Hastelloy B, Hastelloy C, Monel, Nickel and its alloys, 50Co-30Cr, Titanium and its alloys, Inconel. Other special materials are also available upon request.

- **Features of protection tubes metallic protection tubes**

Material	Operating Temp. (°C)	Maximum Temp. (°C)	Features
Plain Steel	800	900	Good resistance to reducing atmosphere but less resistant to oxidation and acids attacks.
304 S.S.	900	1,000	Widely used as common protection tube against heat and corrosion but not recommendable for use in the presence of sulphur or reducing flame.
304L.S.S.	900	1,000	Less carbon content (Cn0.03%) than 304S.S. and excellent resistance to grain boundary corrosion.
321S.S.	900	1,000	Higher corrosion resistance than 304 S.S. because of its Ti content. Excellent resistance to grain boundary corrosion fter welding.
316S.S.	900	1,000	Contains Mo and excellent resistance to heat, acids and alkalis.
316L.S.S.	900	1,000	Less carbon content than 316S.S. and has better resistance to grain boundary corrosion.
310SS.S.	950	1,050	High Ni-Cr content and good high temperature strength with resistance to oxidation at high temperatures.
347S.S	900	1,000	Because of its Nb-Ta content, higher corrosion resistance than 304 S.S. and excellent resistance to grain boundary corrosion.
446 S.S.	1,050	1,125	Excellent resistance to oxidizing and reducing flames containing sulphur. Best suitable for the use in salt baths, molten metals and other high temperature applications.
50Co-30Cr	1,100	1200	Excellent resistance to heat, corrosion and abrasion. Also good resistance to sulphurizing atmospheres.
Inconel 600	1,180	1,250	Excellent resistance to oxidizing and reducing atmospheres at high But sulphurous atmospheres should be avoided.
Inconel 800	870	1,000	Excellent to high temperature oxidizing atmospheres and thermal shock. About 10 times longer service life than 304S.S. against high temperature corrosion.
Kanthal A	Oxi. 1,000 Red. 1,000	–	Good resistance to high temperature oxidation but becomes brittle due to recrystallization.
80Ni. 20Cr	1,100	1,250	Good mechanical strength and corrosion resistance at high temperature oxidizing atmospheres but not recommendable for use in sulphurizing atmospheres.
Kurimax*	1,200	1,400	Excellent resistance to molten chemicals and conbustion gases. Also good resistance to corrosion by liquid copper
Hastelloy B	800	1,100	Excellent resistance to heat and corrosion, especially to HCl and H_2SO_4
Hastelloy C	1,000	1,100	Excellent resistance to high temperature oxidizing and reducing atmospheres and also to Cl_2 gases.
Hastelloy X	1,175	1,260	Excellent resistance to oxidizing and carburizing atmospheres at high temperatures. Better machinability and weldability than other Hastelloy alloys.
Haynes Alloy 25	980	1,100	High resistance to oxidizing and carburizing atmospheres at high temperatures.
Titanium	Oxi. 250 Red. 1,000	–	Superior corrosion resistance in cryogenic temperatures but at high temperatures. Easily oxidized and becomes brittle.
Monel	500	600	Excellent resistance to water vapor, high pressure and corrosion.
Tantalum	Oxi. 300 Red. 2,200	– –	Excellent heat-resistant material with high resistance to all acids but apt to severe oxidation and embrittlement in air at high temperatures.

Note : Operating and maximum temperatures vary depending on the atmospheres.
Other special protection tubes are also available upon request

¨ **Features of protection tubes non-metallic protection tubes**

Material	Code-No.	Operating Temp.(°C)	Maximum Temp.(°C)	Features
Translucent Quartz Transparent Quartz	QT	1,000	1,100	Excellent resistance to thermal shock but fragile. Poor resistance to alkalis but good to acids. Less gas-tightness in hydrogen and reducing gases. High thermal conductivity.
Mullite	PT2	1,400	1,500	High alumina ceramic. Good resistance to thermal shock. Recommendable for use in coal or oil burning and electric furnaces.
	PT1	1,500	1,600	Sintered alumina. Better than PT2 slightly less thermal shock resistance. Recommendable for use in heating furnace and regenerator, impervious.
Recrystal-lized Alumina	PTO	1,600	1,800	Superior chemical stability and better than PT-1, Recommendable for use in molten steel, slag and molten glass, impervious.
Cermet (Cermo-therm)	2040	1,600	2,200	High heat conductivity, good thermal shock resistance and corrosion resistance in molten metals.Recommendable for continuous use in molten steel but not suitable for use in oxidizing atmosphere at high temperatures.
Recrystallized Silicon Carbide	Y1 SiC	1,650	–	Good resistance to acids and alkalis. Recommendable for the use in neutral atmospheres up to 1,500°C and also in molten zinc, aluminum, lead, copper, etc., porous.
Self-bonded Silicon Carbide	Y2 SiC	1,650	2,300	Very low porosity. Excellent resistance to thermal shock, corrosion and abrasion at high temperatures. Recommendable for use in oxidizing and reducing atmospheres up to 1,500°C.
Clay-bonded Silicon Carbide	Y3 SiC	1,500	1,700	Good heat conductivity. More accurate measurement than oxide-type tube can be expected. Excellent resistance to thermal shock, porous.
Nitride Bonded Silicon Carbide	Y4 SiC	1,550	1,750	Excellent performance similar to Y3 Sic but contains Si_3N_4 . Most suitable for use in molten aluminum, porous.
Zirconia	ZR 1706	1,900	2,400	Gas-tight and chemically stable against molten metals other than alkalis. Recommendable for use in molten special metals, slag and glass up 1,900 °C.

Note : Operating and maximum temperatures vary depending on the atmospheres.
Other non-metallic tubes are also available upon request.

¨ Chemical resistance of protection tubes

Corrosives	Content.	Temp.(°C)	304SS	321SS	316SS	316LSS	316J1LSS	310S SS	347SS	Carpenter 20	Inconel 600	Nimonic	Hastelloy B	Hastelloy C	Hastelloy X	Titanium	Monel	Tantalum	Teflon	Copper	Zirconium	Nickel	PVC	Cupro-nickel	Aluminium	Brass	Lead	Common /// el	50Co-30Cr	Haynes alloy 25
H_2SO_4	5%	30	B	B	B	B	B	B	B	A	B	B	A	A	One of the Hastelloy series and excellent in heat resistance.	B	B	A	A	B	A	B	A	B	C	C	A	C	Cobalt-base alloy and excellent in heat and abrasion resistance.	A
	“	B.P	C	C	C	C	C	C	C	B	C	C	A	B		C	C	A		C		C		C	C	C	A	C		B
	10%	30	B	B	B	B	B	B	B	A	B	B	A	A		B	B	A	A	B		B	A	B	C	C	A	C		A
	“	B.P	C	C	C	C	C	C	C	A	C	C	A	B		C	C	A		C		B		C	C	C	A	C		B
	50%	30	C	C	C	C	C	C	C	A	B	B	A	A		B	B	A	A	B		B	A	B	C	C	B	C		A
	“	B.P	C	C	C	C	C	C	C	A	C	C	A	B		C	C	A		C		B		C	C	C	B	C		B
	90%	30	B	B	B	B	B	B	B	A	B	B	A	A		B	B	A	A	B	B	B	A	B	C	C	A	C		A
	“	B.P	C	C	C	C	C	C	C	A	C	C	A			C	C	A		C	B	B		C	C	C	B	C		B
2HCL	5%	30	C	C	C	C	C	C	C	B	B	B	A	A		A	B	A	A	B	B		A	C	C	C	B	C		B
	“	B.P	C	C	C	C	C	C	C	C	B	B	A	A		B	B	A						C	C	C	B	C		C
	10%	30	C	C	C	C	C	C	C	B	B	B	A	A		A	B	A	A	B	B		A	C	C	C	B	C		B
	“	B.P	C	C	C	C	C	C	C	C	B	B	A	A		B	B	A						C	C	C	B	C		C
	20%	30	C	C	C	C	C	C	C	B	B	B	A	A		A	B	A	A	B	B		A	C	C	C	B	C		B
	“	B.P	C	C	C	C	C	C	C	C	B	B	A	A		B	B	A						C	C	C	B	C		C
HNO_3	20%	30	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A	B	C		C	B	C	B	C	C	C		B
	“	B.P	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A		C		C		C	C	C	C	C		C
	40%	30	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A	A	C		C	B	C	B	C	C	C		B
	“	B.P	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A		C		C		C	C	C	C	C		C
	75%	30	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A	A	C		C	B	C	B	C	C	C		B
	“	B.P	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A		C		C		C	C	C	C	C		C
CH_3CO_2H	10%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	B	A	B	A	B	B	C		A
	“	B.P	A	A	A	A	A	A	A	A	A	A	A	A		A	B	A	A	B	A	B		B	A	B	B	C		A
	50%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	B	A	A	B	A	B	A	B	A	B	B	C		A
	“	B.P	B	A	A	A	A	A	A	A	B	A	A	A		A	B	A	A	B	A	B		B	A	C	B	C		A
	85%	30	B	A	A	A	A	A	A	A	B	A	A	A		A	B	A	A	B	A	B	A	B	A	C	B	C		A
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H_3PO_4	5%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	B	A	B	C	C	B	C		A
	“	B.P	B	B	A	A	A	A	A	A	B	A	A	A		A	A	A	A	B	A	B		B	C	C	B	C		A
	50%	30	B	B	B	B	B	B	B	A	A	A	A	A		A	A	A	A	B	A	B	A	B	C	C	B	C		A
	“	B.P	B	B	B	B	B	B	B	A	B	B	A	A		A	B	A	A	B	A	B		C	C	C	B	C		A
	85%	30	B	B	B	B	B	B	B	A	B	B	A	A		A	B	A	A	B	A	B	A	B	C	C	B	C		B
	“	B.P	B	B	B	B	B	B	B	A	B	B	A	A		A	B	A	A	B	A	B		C	C	C	B	A		B
H_2F_2	30%	30	C	C	C	C	C	C	C	C	A		A	A		C	A			A		A	A	C	C	B	B	C		C
	“	B.P	C	C	C	C	C	C	C	C	B		C	C		C	B			C		C		C	C	C	B	C		C
	70%	B.P	C	C	C	C	C	C	C	C	B		C	C		C	B			C		C		C	C	C	C	C		C
HCl		30	B	B	B	B	B	B	B	B	B	B	A	A					A		A							A		A
		200	B	B	B	B	B	B	B	B	B	B	A	A					A		A							A		A
		400	B	B	B	B	B	B	B	B	B	B	A	A					A		A							A		B
NaOH	10%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	A	A	A	B	B	B	B		
	“	B.P	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A		B	A	A		A	B	B	B	B		
	50%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	A	A	A	B	B	B	B		
	“	B.P	B	B	B	B	B	B	B	A	A	A	A	A		A	A	A		B	A	A		B	B	B	B	B		
	70%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	A	A	B	B	B	B	B		
	“	B.P	B	B	B	B	B	B	B	A	A	A	A	A		A	A	A		B	A	A		B	B	B	B	B		
KOH	25%	B.P	A	A	A	A	A	A	A	A	A	A	A	A		C	A	C		C	A	B		B	C	C	B	B		
	50%	B.P	B	B	B	B	B	B	B	A	A	A	A	A		C	A	C		C	A	B		B	C	C	B	B		
HCl(dry)		30	C	C	C	C	C	C	C	A			A	A		A	A		A	A				A	A	C	B	C		A
HCl(wet)		30	C	C	C	C	C	C	C	C			C	C		A	A		A	C				C	C	C	B	C		A
HCl vapor			C	C	C	C	C	C	C	B									A						C	C	B	C		
HF			C	C	C	C	C	C	C	A	C						B	C	A			B	A	C	C	C	B	C		C
$H_2(SiF_6)$	5%	20	C	C	C	C	C	C	C	A	A		A	A			B	C	A			C	A	C	C	C	B	C		
F	10%	30	C	C	C	C	C	C	C	A	A		A	A			B	C	A			C	A	C	C	C	B	C		
NaOH	10%	B.P	B	A	A	A	A	A	A	A									A					A	C	C	B	C		
	75%	100	B	A	A	A	A	A	A	A									A					A	C	C	B	C		
CO_2	10%	200	A	A	A	A	A	A	A	A			A	A			A	A	A											
SO_2			A	A	A	A	A	A	A	A						A	A	A	A			A		A		C				
Na_5P_3O10	10%	30	B	B	B	B	B	B	B	B	C	C	C	A			C			C	B	C	C							
CHCl		30	C	C	C	C	C	C	C							C				C				B	C	C		B		
AlF_3	50%	30	B		B												B			A		B		A	C					
Fatty Acids		100	A	A	A	A	A	A	A	A	A		A	A		A	A	A				A		A						
NH_3			A	A	A	A	A	A	A	A									A											
NaCl			A	A	A	A	A	A	A	A	A									B		A		A	C	B		B		
CrO_4										A									A											
H_2O_2			A	A	A	A	A	A	A	A	A		A	A		A	A	A												
S(liquid)			A	A	A	A	A	A	A	A	A					A	A		A						A					
$CaCl_2$			A	A	A	A	A	A	A	A	A		A	A		A	A		A	C		A	A	A		B				

Note: A=Alost no corrosion in critical conditions. B=Small corrosion but permissible in general use other then specific parts.
C=Heavy corrosion and unsuitable.

DIMENSIONS

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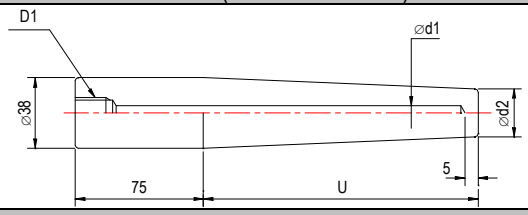

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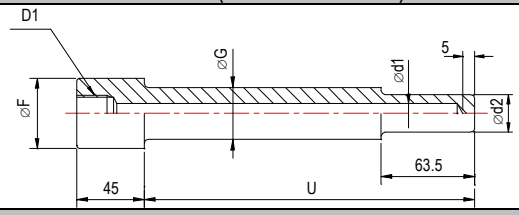

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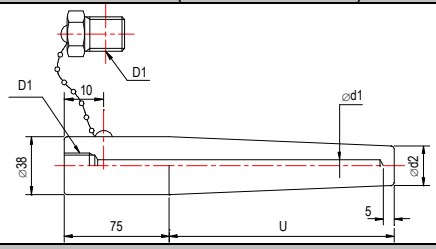

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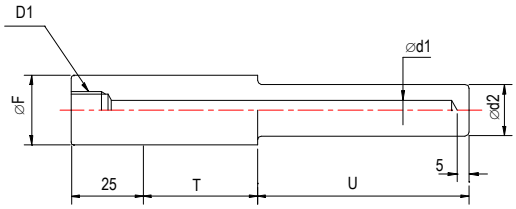

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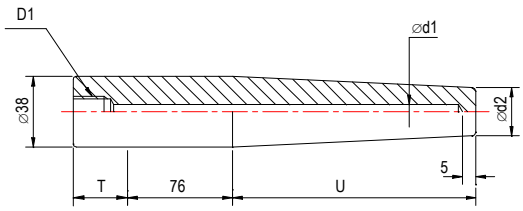

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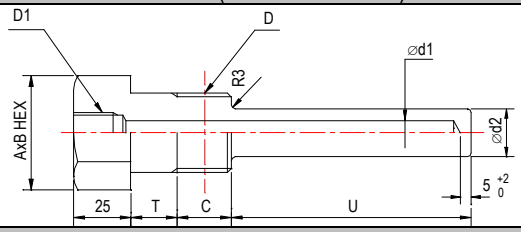

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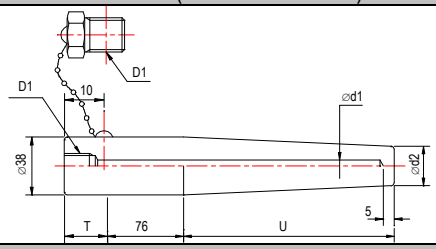

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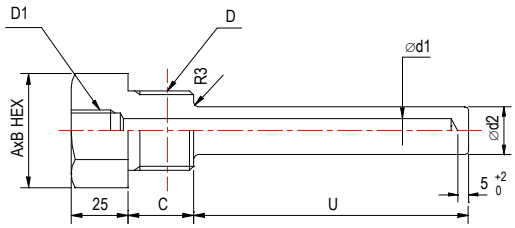

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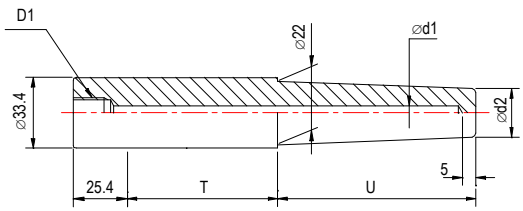

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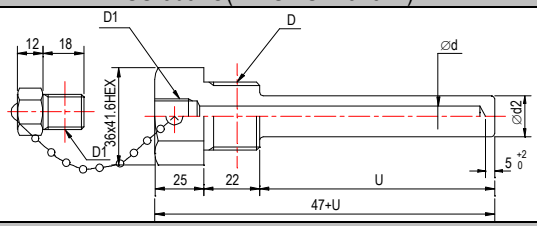

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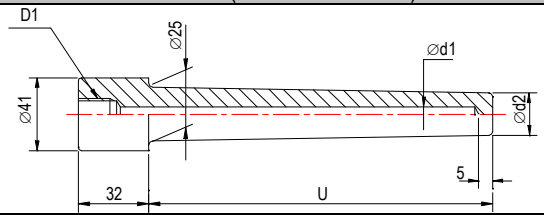

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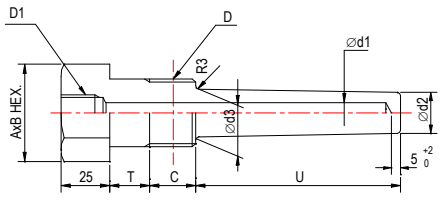

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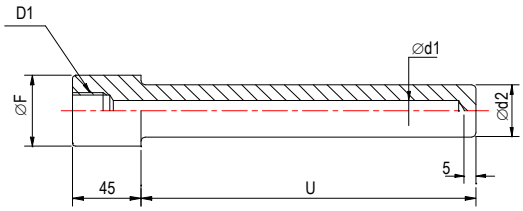

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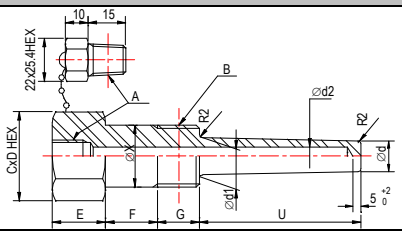

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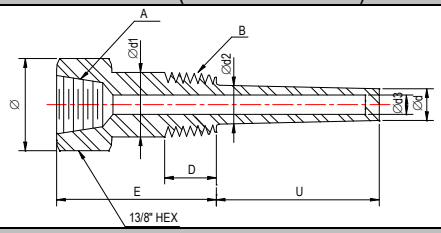

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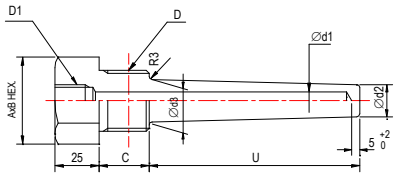

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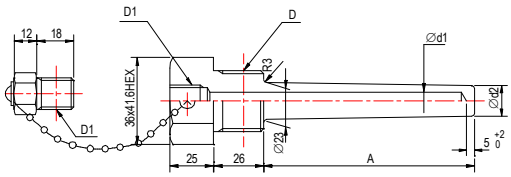

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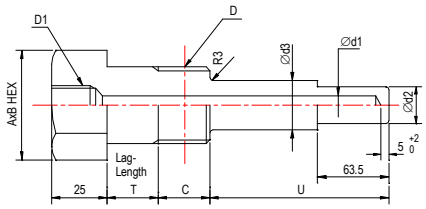

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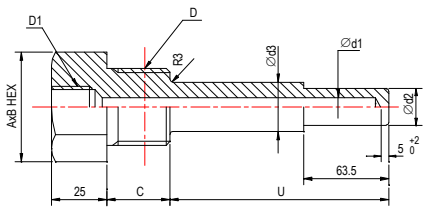

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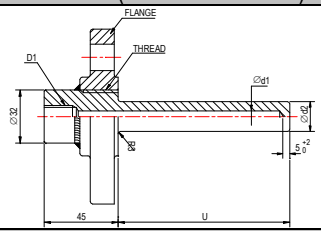

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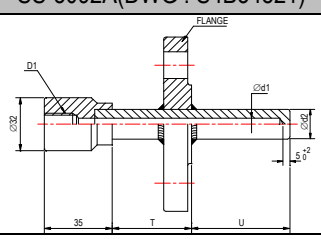

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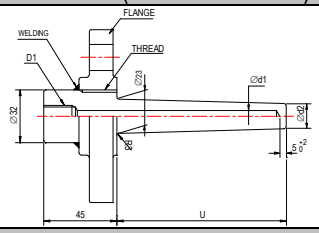

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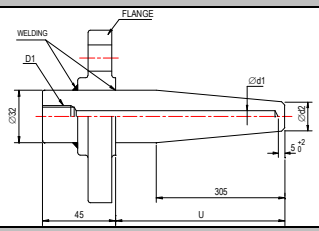

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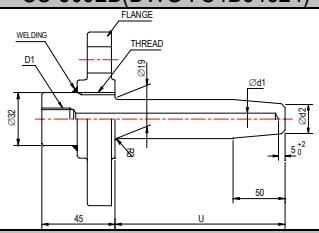

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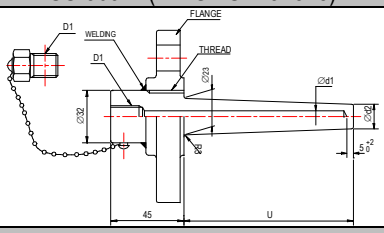

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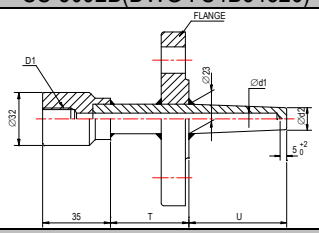

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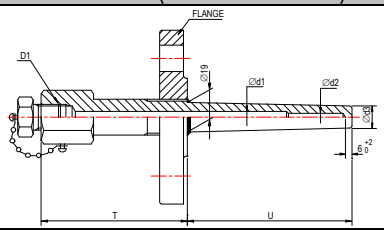

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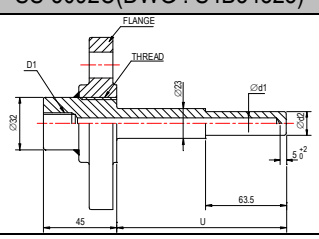

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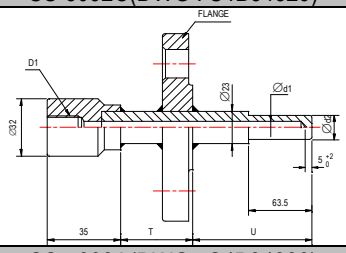	
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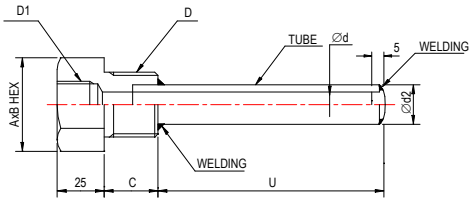	
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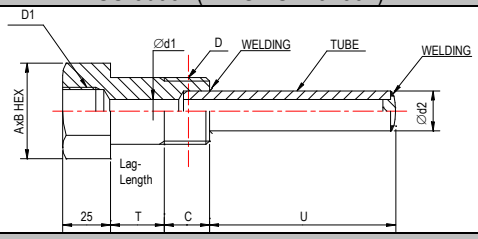	
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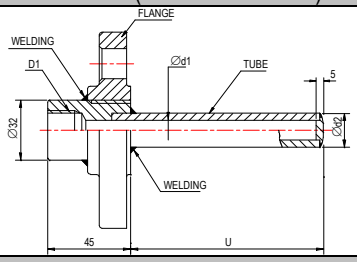	
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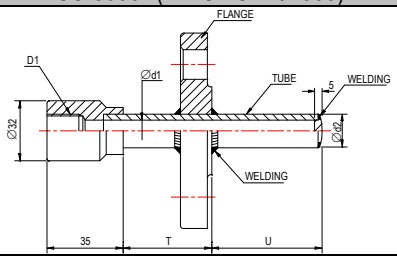	

ORDERING CODE

SS-5094A	OUT & IN DIA METER	AMT'L	LENGTH(L)	FLANGE SIZE	SCREW SIZE	DWG NO
	22 X 17	SUS-304	300	JISIOK 10ARF	PT 1/2	( )