

**SPECIFICATIONS**

1.01 GENERAL MECHANICAL

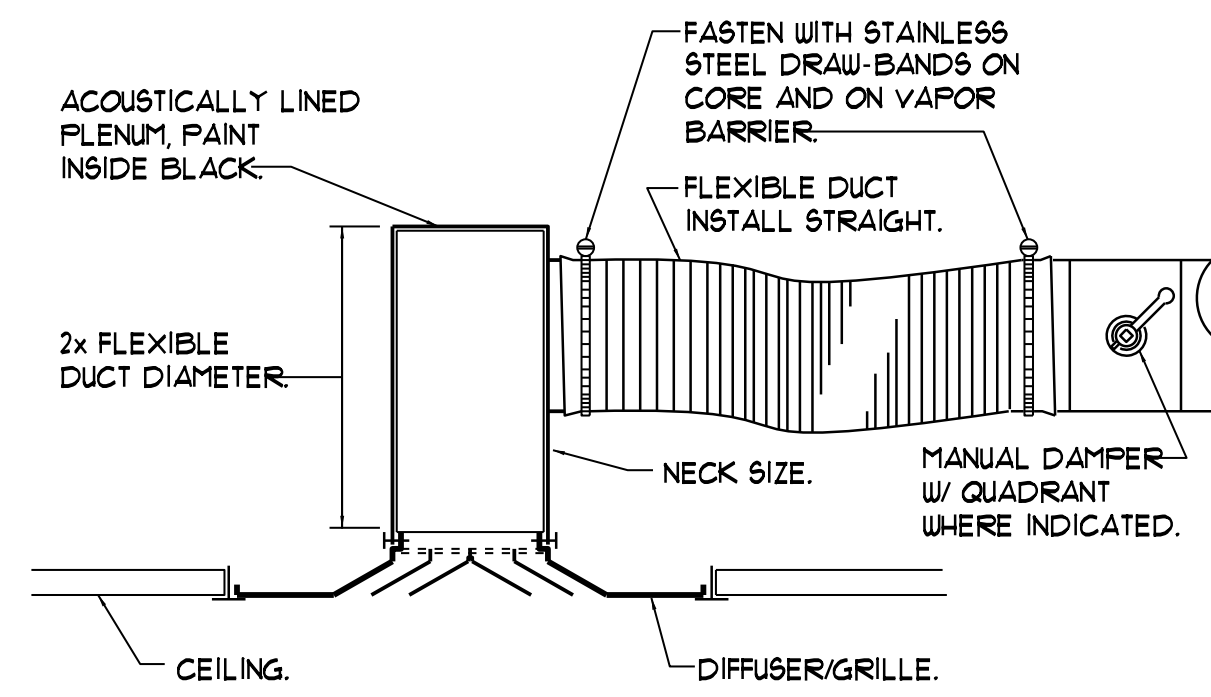
- A. Furnish materials and labor necessary to deliver to the Owner a complete and operable system installed in accordance with the contract documents.
- B. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section.
- C. Provide information sufficiently in advance of this work, so that work by the other trades may be coordinated and installed without delays. Furnish and locate sleeves, supports, anchors and necessary access panels.
- D. Obtain necessary permits and licenses, give notices and comply with laws, ordinances, rules, regulations or orders affecting the work, and pay fees and charges in connection therewith.
- E. Work and materials shall conform to the latest rules and regulations and these rules and regulations hereby are made part of this specification.
- F. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes and the local enforcing authorities, and that it will be free from defects of material and workmanship for not less than one (1) year. Guarantee shall further state that the Contractor will, at his own expense, repair or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects.
- G. Equipment schedules shall serve as the basis of design for the products used, or equal.

1.02 DUCTWORK AND ACCESSORIES

- A. Ductwork shall be galvanized steel conforming to ASTM A527, weight of galvanized coating shall be not less than 1-1/4 ounces total for both sides of one sq. ft. of a sheet. Construction, metal gage, and reinforcements shall conform with SMACNA "Duct Construction Standards" and NFPA 90A for 2" W.G. pressure class. Fittings shall be constructed in accordance with SMACNA Standards and shall be of the types indicated (ONLY). Longitudinal joints shall be Pittsburgh lockseam (ONLY). Button punch snap locks are not acceptable. Joints shall be sealed to SMACNA seal class B with Hardcast Duct Seal 321 water based indoor/outdoor sealant.
- B. Volume dampers shall be Ruskin model MD-35 (rectangular) or model MDRS25 (round) with locking quadrant.
- C. Acoustical duct liner shall be 1" Type AP Armaflex SA elastomeric unicellular, no fiberglass.

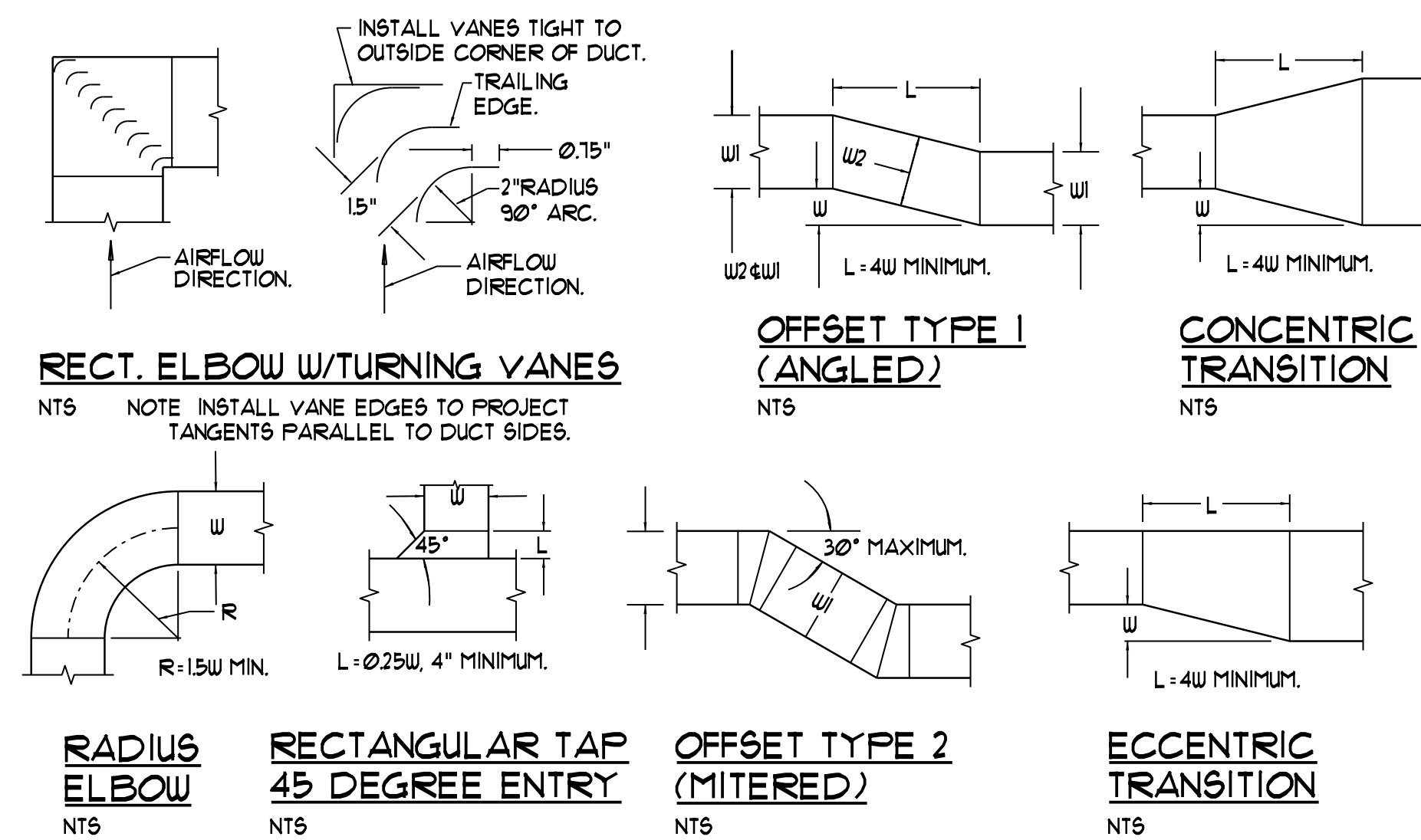
1.03 INSULATION

- A. Supply Air Ductwork: 1-1/2" fiberglass ductwrap with FSK.



**DIFFUSER/RETURN CONNECTION DETAIL**

NTS  
NOTE: DETAIL TYPICAL FOR CEILING GRILLES, REGISTERS AND LINEAR DIFFUSERS. FOR SURFACE-MOUNT DEVICES, SUPPORT PLENUM FROM CEILING GRID WITH STEEL ANGLES FASTENED TO PLENUM.



**LOW PRESSURE DUCT CONSTRUCTION DETAILS - TYPICAL**

**MECHANICAL AND PLUMBING SYMBOLS AND ABBREVIATIONS LEGEND**

NOTE - USE SYMBOLS AND ABBREVIATIONS AS APPLICABLE FOR THIS MECHANICAL DRAWING SET. SOME SYMBOLS AND ABBREVIATIONS IN THIS LEGEND MAY NOT APPLY.

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
CA	COMPRESSED AIR PIPING (CA)	BV	BALL VALVE	TG	TSTAT OR SENSOR W/ TAMPERPROOF GUARD	B	BOILER TAG	EUB	ENTERING WET BULB	LB	POUNDS	RPZ	REDUCED PRESSURE ZONE
C	CONDENSATE DRAIN PIPING (C)	BV	BALL VALVE	AV	MANUAL AIR VENT	BD	BYPASS DAMPER TAG	EWH	ELECTRIC WATER HEATER TAG	LD	LINEAR DIFFUSER TAG	RR	RETURN REGISTER TAG
CTR	COOLING TOWER RETURN PIPING (CTR)	BV3/4	3/4" BALL VALVE WITH 3/4" HOSE END	NT	NOTE TAG (NUMBER)	BFP	BACKFLOW PREVENTER TAG	EWT	ENTERING WATER TEMPERATURE	LTHW/R	LOW TEMPERATURE HOT WATER	RTU	ROOM TEMPERATURE SENSOR
CTS	COOLING TOWER SUPPLY PIPING (CTS)	GV	GATE VALVE	AL	AIR DEVICE TAG (LETTER) WITH CFM	BHP	BRAKE HORSEPOWER	EXG	EXISTING	LRA	LOCKED ROTOR AMPS	RV	RELIEF VALVE
CWR	CHILLED WATER RETURN PIPING (CWR)	RV	PRESSURE REDUCING VALVE	RT	ROOM NUMBER	BTUH	BRITISH THERMAL UNITS PER HOUR	EXH	EXHAUST	LUWO	LOW WATER CUTOFF	RUL	RAINWATER LEADER
CWS	CHILLED WATER SUPPLY PIPING (CWS)	FV	FUSIBLE VALVE	TV	TURNING VANES	CBD	COUNTER BALANCED DAMPER	FC	FLEXIBLE CONNECTION	LWT	LEAVING WATER TEMPERATURE	SA	SUPPLY AIR
FOR	FUEL OIL RETURN PIPING (FOR)	SBV	STRAINER W/ BLOWDOWN BALL VALVE	FC	DUCT W/MANUAL DAMPER	CC	COOLING COIL TAG	FCO	FLOOR CLEANOUT	MAX	MAXIMUM	\$AN	SANITARY (DRAIN & WASTE)
FOS	FUEL OIL SUPPLY PIPING (FOS)	2CV	2-WAY CONTROL VALVE	FCF	DUCT W/FLEXIBLE CONNECTION (FC)	CFM	CUBIC FEET PER MINUTE	FD	FIRE DAMPER	MBH	THOUSANDS OF BTU PER HOUR	SD	SMOKE DAMPER
G	GAS PIPING (G)	SV	SOLENOID VALVE	LAG	LAGGED DUCT	CHLR	CHILLER TAG	FD	FLOOR DRAIN TAG	MCA	MINIMUM CIRCUIT AMPACITY	SEER	SEASONAL ENERGY EFFICIENCY RATIO
HUR	HOT WATER RETURN PIPING (HUR)	3CV	3-WAY CONTROL VALVE	LD	DUCT W/ACOUSTIC LINING	CO	CLEANOUT	FLA	FULL LOAD AMPS	MIN	MINIMUM	SF	SUPPLY FAN
HWS	HOT WATER SUPPLY PIPING (HWS)	4CV	4-WAY CONTROL VALVE (TOP VIEW)	LS	DUCT W/SQUARE-TO-ROUND TRANSITION	CONV	CONVECTOR TAG	FOR	FUEL OIL RETURN	NC	NOISE CRITERION	SG	SUPPLY GRILLE TAG
RL	REFRIGERANT LIQUID PIPING (RL)	4CV	4-WAY CONTROL VALVE (TOP VIEW)	LSQ	FLEXIBLE DUCT	CUH	CABINET UNIT HEATER TAG	FOS	FUEL OIL SUPPLY	NIC	NOT IN CONTRACT	SP	STATIC PRESSURE
RG	REFRIGERANT GAS PIPING (RG)	2BV	2 BUTTERFLY VALVES W/SINGLE ACTUATOR	MOD	MOTOR OPERATED DAMPER	CP	CIRCULATING PUMP TAG	FPFB	FROST PROOF HOSE BIBB	NTS	NOT TO SCALE	SP	SUMP PUMP TAG
SAN	SANITARY PIPING BELOW FLOOR (SAN)	3BV	BUTTERFLY VALVE W/ACTUATOR	AI	AIRFLOW OUT	CT	COOLING TOWER TAG	FFM	FEET PER MINUTE	OA	OUTSIDE AIR	SR	SUPPLY REGISTER TAG
SAN	SANITARY PIPING ABOVE FLOOR (SAN)	TRV	TRIPLE-DUTY VALVE	AI	AIRFLOW IN	Cv	VALVE COEFFICIENT	FS	FLOOR SINK TAG	OB	OPPOSED BLADE DAMPER	SQFT	SQUARE FEET
SV	SANITARY VENT PIPING	U	UNION	AO	AIRFLOW OR FLAT OVAL	CW	COLD WATER	FT	FEET	OD	OUTSIDE DIAMETER	TEMP	TEMPERATURE DIFFERENTIAL
RUL	RAINWATER LEADER ABOVE SLAB (RUL)	UF	PIPE FLANGE	FO	FIRE DAMPER	CHWS/R	CHILLED WATER SUPPLY AND RETURN	FTR	FINTUBE RADIATION TAG	OED	OPEN ENDED DUCT	TEMP	TEMPERATURE
CW	COLD WATER PIPING (CW)	UF	PUMP WITH FLANGES	RO	ROUND OR FLAT OVAL DUCT DOWN	DB	DRY BULB	GAGE	GAGE	OFRUL	OVERFLOW RAINWATER LEADER	TCP	TEMPERATURE CONTROL PANEL
HW	HOT WATER PIPING (HW)	UF	PUMP WITH FLANGES	RO	ROUND OR FLAT OVAL DUCT UP	DB RE	DECIBELS RELATIVE TO	GAL	GALLONS	OFRW	OIL FIRED WATER HEATER TAG	TMP	THERMOSTATIC MIXING VALVE TAG
RHW	RECIRCULATED HOT WATER PIPING (RHW)	UF	PUMP WITH FLANGES	SD	SUPPLY DIFFUSER	DC	DOUBLE CHECK	GFH	GALLONS PER HOUR	OFRD	OVERFLOW ROOF DRAIN	TSP	TOTAL STATIC PRESSURE
PC	PIPE CAP	UF	PUMP WITH FLANGES	SG	STEAM TRAP	DCA	DOUBLE CHECK ATMOSPHERIC	GPM	GALLONS PER MINUTE	OPD	OVERCURRENT PROTECTIVE DEVICE	TYP	TYPICAL
DF	DIRECTION OF FLUID FLOW	UF	PUMP WITH FLANGES	ST	STEAM TRAP	DEG F	DEGREES FAHRENHEIT	GUH	GAS UNIT HEATER TAG	P	PLUMBING FIXTURE TAG	UH	UNIT HEATER TAG
EU	ELBOW UP	UF	PUMP WITH FLANGES	WA	WATER HAMMER ARRESTOR	DIA	DIAMETER	HC	HORSEPOWER	PENETN	PENETRATION	UNO	UNLESS NOTED OTHERWISE
ED	ELBOW DOWN	UF	PUMP WITH FLANGES	FC	FLEXIBLE PIPE CONNECTION (FC)	DW	DOWN IN WALL	HP	HORSEPOWER	PF	PADDLE FAN TAG	VAV	VARIABLE AIR VOLUME BOX TAG
ET	ELBOW TEE UP	UF	PUMP WITH FLANGES	FD	FITCH DOWN	DN	DOWN	HRV	HEAT RECOVERY VENTILATOR TAG	PSIA	POUNDS PER SQUARE INCH ABSOLUTE	VB	VACUUM BREAKER
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	FCO	FLEXIBLE CONNECTION	EA	EXHAUST AIR	HWS/R	HOT WATER SUPPLY AND RETURN	PSIG	POUNDS PER SQUARE INCH GAGE	VFD	VARIABLE FREQUENCY INVERTER DRIVE
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	FCF	DUCT W/FLEXIBLE CONNECTION (FC)	EAT	ENTERING AIR TEMPERATURE	HW	HOT WATER	PVC	POLYVINYL CHLORIDE (PIPE)	VTR	VENT THRU ROOF
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	LAG	LAGGED DUCT	EDB	ENTERING DRY BULB	RA	RETURN AIR	RD	ROOF DRAIN	V/PH/Hz	VOLTS/PHASES/HERTZ
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	LS	DUCT W/SQUARE-TO-ROUND TRANSITION	EDC	ELECTRIC DUCT COIL TAG	RD	RECOMMENDED DUAL ELEMENT FUSE AMPS	RDM	RADIANT FLOOR MANIFOLD TAG	WB	WET BULB
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	LSQ	FLEXIBLE DUCT	EER	ENERGY EFFICIENCY RATIO	RDM	RADIANT FLOOR MANIFOLD TAG	RGM	RETURN GRILLE TAG	WCO	WALL CLEANOUT
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	MOD	MOTOR OPERATED DAMPER	EF	EXHAUST FAN TAG	RGM	RETURN GRILLE TAG	RHW	RECIRCULATED HOT WATER	WG	WATER GAGE
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	AI	AIRFLOW OUT	EFF	EFFICIENCY	RHW	RECIRCULATED HOT WATER	WPD	WATER PRESSURE DROP	WSD	WIRE SIZING AMPS
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	AI	AIRFLOW IN	EG	EXHAUST GRILLE TAG	WPD	WATER PRESSURE DROP	WTD	WATER TEMPERATURE DROP	W	WITH
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	AO	AIRFLOW OR FLAT OVAL	ER	EXHAUST REGISTER TAG	W	WITH	ZD	ZONE DAMPER TAG		
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	FO	FIRE DAMPER	ESP	EXTERNAL STATIC PRESSURE						
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	RO	ROUND OR FLAT OVAL DUCT DOWN	ET	EXPANSION TANK TAG						
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	RO	ROUND OR FLAT OVAL DUCT UP								
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	SD	SUPPLY DIFFUSER								
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	SG	STEAM TRAP								
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	ST	STEAM TRAP								
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	WA	WATER HAMMER ARRESTOR								
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	FC	FLEXIBLE PIPE CONNECTION (FC)								
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	FD	FITCH DOWN								
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	FCO	FLEXIBLE CONNECTION								
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	LAG	LAGGED DUCT								
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	LS	DUCT W/SQUARE-TO-ROUND TRANSITION								
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	LSQ	FLEXIBLE DUCT								
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	MOD	MOTOR OPERATED DAMPER								
ETU	ELBOW TEE UP	UF	PUMP WITH FLANGES	AI	AIRFLOW OUT								
ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	AI	AIRFLOW IN								
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ETD	ELBOW TEE DOWN	UF	PUMP WITH FLANGES	LS	DUCT W/SQUARE-TO-ROUND TRANSITION								
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