

**HEPA FILTER HOUSING:**

HEPA FILTER HOUSINGS SHALL BE FLANDERS G1F-CCF-304, MANUFACTURER STANDARD MATERIAL, AND SUITABLE FOR 12" X 12" X 11 1/2" FLANDERS NUCLEAR GRADE FLUID SEAL HEPA FILTER RATED AT 200 CFM CAPACITY. THE FILTER HOUSINGS SHALL BE FURNISHED WITH INLET AND OUTLET STATIC PRESSURE TAPS, INJECTION AEROSOL TEST PORT, UPSTREAM AEROSOL TEST PORT AND DOWNSTREAM AEROSOL TEST PORT AND DRAIN PLUG. THE FILTER HOUSINGS SHALL BE REINFORCED AND SUITABLE FOR HORIZONTAL INSTALLATION AND OUTDOOR USE.

THE FILTER HOUSING SHALL MEET ASME N 509 REQUIREMENTS, AG-1 REQUIREMENTS, AND SHALL BE TESTED PER ASME N 510. THE FILTER HOUSINGS SHALL HAVE BAG-IN/BAG-OUT DESIGN FEATURES. THE FILTER HOUSINGS SHALL BE FABRICATED FROM UNPAINTED 14 GAUGE AND 11 GAUGE TYPE 304 STAINLESS STEEL AND ADEQUATELY REINFORCED FOR HORIZONTAL INSTALLATION OF THE HOUSINGS. THE FILTER HOUSINGS SHALL BE REINFORCED TO WITHSTAND A POSITIVE OR NEGATIVE PRESSURE OF 20 INCHES WATER GAUGE. THE HOUSINGS SHALL BE CYLINDRICAL WITH A LID TYPE DOOR ARRANGEMENT HELD IN PLACE BY TIE DOWN LATCHES. THE INLET AND OUTLET CONNECTIONS SHALL BE 304 STAINLESS STEEL AND SHALL BE ROLLED AND SEAM WELDED, NIPPLE CONNECTION SLIPS ARE 6" OR 4" FOR ASSY 160 DIAMETER BY 5" LONG AND FLANGED. FLANGES SHALL BE SLIP ON TYPE, 150# CLASS, RAISED FACE, 304 STAINLESS STEEL. THE HOUSINGS SHALL BE PROVIDED WITH DOP INJECTION DOWNSTREAM, SAMPLE PORTS WITH CAPS, AND A 2" DIAMETER DRAIN PORT WITH CAP.

THE FILTER HOUSINGS SHALL ACCOMMODATE FLUID SEAL FILTERS. THE FILTER HOUSINGS SHALL INCORPORATE A KNIFE EDGE THAT MATES INTO THE FILTER FLUID FILLED PERIMETER CHANNEL ON THE FACE OF THE FILTER. ACCESS TO THE FILTERS SHALL BE TOP OR SIDE ARRANGEMENT. PRIOR TO LEAVING THE FACTORY, EACH KNIFE EDGE SHALL BE CHECKED WITH AN ALIGNMENT GAGE FOR PROPER ORIENTATION WITH THE FILTER. CLAMPING MECHANISM SHALL ASSURE THAT THE FILTER IS SECURELY COMPRESSED TO THE KNIFE EDGE. SPRING LOADED CLAMPS ON THE HOUSING SHALL SECURE THE FILTER DURING OPERATION. THE CLAMPS SHALL BE CONSTRUCTED OF TYPE 304 STAINLESS STEEL WITH A 3/8" STAINLESS STEEL ROD HANDLE. THE HANDLE SHALL TURN IN ONE DIRECTION ONLY AND LOCK WHEN IN THE CLOSED POSITION. THE MECHANISM SHALL EXERT EQUAL FORCE ON THE FILTER WHEN MAINTAINING THE FILTER ON THE KNIFE EDGE.

THE LATCHES SHALL BE MANUFACTURED IN SUCH A MANNER THAT THEY PIVOT AWAY FROM THE BAG-OUT PORT AFTER RELEASE SO THEY DO NOT INTERFERE WITH THE BAG-IN/BAG-OUT PROCESS. THE INLET AND OUTLET NOZZLES SHALL BE SCHEDULE 40S, 304 STAINLESS STEEL CONNECTIONS, AND WITH AIRFLOW INLET AND OUTLET ORIENTATIONS. THE FILTER HOUSING SHALL HAVE BAFFLE PLATE TO ALLOW UNIFORM AIRFLOW DISTRIBUTION ACROSS THE FACE OF THE HEPA FILTER.

PRESSURE RETAINING WELD JOINTS AND SEAMS SHALL BE A CONTINUOUS SEAL WELD. AS A MINIMUM, JOINTS AND SEAMS SHALL BE WIRE BRUSHED AND BUFFED TO REMOVE ALL HEAT DISCOLORATIONS, BURRS AND SHARP EDGES. WELD JOINTS AND SEAMS THAT ARE A PORTION OF ANY GASKET SEALING SURFACE SHALL BE GROUND SMOOTH AND FLUSH WITH THE ADJACENT BASE.

WELDING PROCEDURES, WELDERS AND WELDER OPERATORS SHALL BE QUALIFIED IN ACCORDANCE WITH ASME BOILER AND PRESSURE VESSEL CODE SECTION IX. ALL PRODUCTION WELDS SHALL BE VISUALLY INSPECTED IN ACCORDANCE WITH SECTION 5 AND 6 OF AWS D 9.1 OR MANUFACTURER'S EQUIVALENT STANDARDS, AS APPROVED BY THE BUYER.

THE HEPA FILTER HOUSINGS SHALL HAVE A BAGGING RING AROUND EACH FILTER ACCESS PORT. THE BAGGING RING SHALL HAVE A MINIMUM OF TWO CONTINUOUS RIBS TO SECURE THE PVC CHANGE OUT BAG. THE OUTLET EDGE OF THE RING SHALL BE HEMMED TO PREVENT THE BAG FROM TEARING. EACH ACCESS PORT AND BAGGING RING SHALL BE COVERED BY A DOOR HAVING AN EXTRUDED NEOPRENE GASKET THAT IS MANUALLY REPLACED AFTER THE DOOR HAS BEEN REMOVED.

THE HEPA FILTER HOUSINGS SHALL BE FURNISHED WITH ONE PVC CHANGE OUT BAG FOR THE FILTER ACCESS PORT. THE PVC BAG MATERIAL SHALL BE A MINIMUM OF 8mil THICK WITH A TRANSLUCENT MATTE TEXTURE FINISH AND SHALL NOT BE CAPABLE OF STICKING TOGETHER. FOR VISIBILITY DURING CHANGE OUT, THE BAG SHALL INCLUDE APPROXIMATELY 12 INCHES OF TRANSPARENT PVC AT THE MOUTH. THREE GLOVE SLEEVES SHALL BE BUILT INTO THE BAG TO FACILITATE HANDLING OF THE FILTER DURING CHANGE OUT. A 1/4 INCH DIAMETER ELASTIC SHOCK CORD SHALL BE HEMMED INTO THE MOUTH OF THE BAG SO THAT IT FITS SECURELY WHEN STRETCHED AROUND THE BAGGING RING. TO PREVENT THE CHANGE OUT BAG FROM SLICING OFF DURING THE HEPA FILTER CHANGE OUT OPERATION, ONE NYLON SECURITY STRAP SHALL BE PROVIDED WITH EACH FILTER ACCESS PORT.

THE FILTER HOUSINGS SHALL BE MANUFACTURED UNDER A QUALITY ASSURANCE PROGRAM THAT MEETS THE REQUIREMENTS OF THE ASME NQA1. EACH FILTER HOUSING SHALL BE TESTED FOR FILTER FIT, OPERATION OF THE FILTER CLAMPING MECHANISM, KNIFE-EDGE ALIGNMENT AND LEAK TIGHTNESS BY THE PRESSURE DECAY METHOD IN ACCORDANCE WITH ASME N510-1995 "REAFFIRMED", AND THE TEST REPORT SHALL BE SUPPLIED TO THE BUYER. THERE SHALL BE A MAXIMUM LEAK RATE OF 0.0005 CFM PER CUBIC FOOT OF VOLUME AT 10 INCHES WATER GAUGE FOR THE FILTER SEALING SURFACE. ADDITIONALLY, THERE SHALL BE A MAXIMUM LEAK RATE OF 0.0005 CFM PER CUBIC FOOT OF HOUSING VOLUME AT 10 INCHES WATER GAUGE FOR THE HOUSING PRESSURE BOUNDARY.

**BUTTERFLY VALVE:**

BUTTERFLY VALVE SHALL BE KEYSTONE KLOK 362-173 (ITEM #171 & #157) WITH 316 SST BODY AND DISC AND 316 SST OR 17-4 PH SST STEM. STEM PACKING SHALL BE TEFLON. RESILIENT SEAT SHALL BE BUNA-N (NBR/NITRILE). STEM BUSHING SHALL BE RTFE/FIBERGLASS EPOXY. THE VALVE SHALL BE FURNISHED WITH MANUAL HANDLE. VALVE SHALL MEET REQUIREMENTS OF ASME B31.1 AND SHALL BE GIVEN A SHELL AND CLOSURE TEST IN ACCORDANCE WITH ASME B16.34. DOCUMENTATION OF TEST PROCEDURE(S) AND TEST RESULTS SHALL BE SUBMITTED.

(ITEM #192) BUTTERFLY VALVE SHALL BE KEYSTONE KLOK 360-173 WITH 316 SST BODY AND DISC, AND 17-4 PH SST OR 316 SST STEM. STEM PACKING SHALL BE TEFLON. RESILIENT SEAT SHALL BE BUNA-N (NBR/NITRILE). STEM BUSHING SHALL BE RTFE/FIBERGLASS EPOXY. THE VALVE SHALL HAVE A HANDLE. VALVE SHALL MEET REQUIREMENTS OF ASME B31.1 AND SHALL BE GIVEN A SHELL AND CLOSURE TEST IN ACCORDANCE WITH ASME B16.34. DOCUMENTATION OF TEST PROCEDURE(S) AND TEST RESULTS SHALL BE SUBMITTED.

**HEPA FILTER SPECIFICATION**

THE FILTER SHALL BE NUCLEAR GRADE AS MANUFACTURED BY FLANDERS FILTERS, INC., WASHINGTON, NC. THE FILTER MEDIUM SHALL BE ALL GLASS WITH A WET STRENGTH, WATER-REPELLENT BINDER IN ACCORDANCE WITH MIL-F-51079 (LATEST ISSUE)

EACH FILTER ELEMENT SHALL BE CONSTRUCTED BY PLEATING A CONTINUOUS FLAT SHEET OF MEDIUM OVER CORRUGATED .0015" MINIMUM THICK ALUMINUM SPACERS WHOSE EDGES HAVE BEEN HEMMED TO RESIST TEARING THE MEDIUM AT THE FOLD.

THE ELEMENT SHALL BE PERMANENTLY BONDED TO A 14 GAUGE, TYPE 304 STAINLESS STEEL INTEGRAL FRAME WITH A FIRE-RETARDANT URETHANE SEALANT. THE PERIMETER OF THE FILTER FACE SHALL HAVE A 3/4" CHANNEL WITH FLUID SEALANT TO SEAL IT TO ITS MOUNTING DEVICE IN SERVICE. CONSTRUCTION OF THE FILTER SHALL BE IN ACCORDANCE WITH THE ESSENTIAL CONSTRUCTION REQUIREMENTS OF ASME AG-1 (LATEST ISSUE) AND AS SHOWN ON THIS DRAWING.

EACH FILTER SHALL BE TESTED, WHILE ENCAPSULATED, FOR RESISTANCE TO AIRFLOW AND PENETRATION IN ACCORDANCE WITH MIL-STD-282 AT THE NOMINAL RATED CAPACITY LISTED IN ASME AG-1 (OR, IF NOT LISTED, AS PROPORTIONAL TO THOSE LISTED VALUES AFTER FACTORS FOR PHYSICAL CONSTRAINTS ARE CONSIDERED) AND AT 20% OF THE CAPACITY FOR PENETRATION ONLY (FILTERS WITH RATED CAPACITY OF 75CFM OF HIGHER). THE PENETRATION AT BOTH FLOWS SHALL NOT EXCEED 0.03%.

THE HEPA FILTERS SHALL COMPLY WITH THE PERFORMANCE REQUIREMENTS AS LISTED IN ASME AG-1. EACH FILTER AND FILTER CARTON SHALL BEAR IDENTICAL LABELS INDICATING THE FILTER MODEL NUMBER, THE SERIAL NUMBER AND THE RESISTANCE AND PENETRATION READINGS AT BOTH TEST FLOWS TAKEN FOR THE FILTER ON THE MANUFACTURER'S Q107 PENETROMETER OR HFATS SYSTEM. IN ADDITION, THE MANUFACTURER SHALL PROVIDE A FILTER TEST REPORT AND A CERTIFICATION OF COMPLIANCE REPORT.

THE MANUFACTURER SHALL PROVIDE EVIDENCE THAT ITS FILTERS HAVE BEEN QUALIFIED IN ACCORDANCE WITH ASME AG-1 OR THAT THE MANUFACTURER MAINTAINS ITS OWN QUALIFIED TESTING PROGRAM, INCLUDING WET OVERPRESSURE, ROUGH HANDLING AND HEATED AIR TESTS.

FILTERS SHALL BE PACKAGED ONE FILTER PER CARTON. EACH FILTER SHALL BE ENCASED IN A FLANGED, TIGHT FITTING LINERBOARD SLEEVE THAT FITS WITHIN CARTON, LEAVING A MINIMUM 1 1/2" DEAD AIR SPACE ON FOUR SIDES OF THE FILTER. THE TOP AND THE BOTTOM OF THE FILTER SHALL BE PROTECTED WITH FOLDED LINERBOARD CUSHION. LINERBOARD CARTONS SHALL BE STRAPPED TO A FLANDERS TYPE II PALLET WITH 3/8" PLYWOOD FACING ON BOTH FACES.

OPTIONAL TESTING OF FILTERS (HNF-S-0552 SECTION 9.0)

- DOE INDEPENDENT LABORATORY TESTING AT FILTER TEST FACILITY (FTF)
  - WILL THIS ORDER OF FILTERS BE TESTED AT THE FTF: SEE DOE DIRECTIONS, LETTER NUMBER 0200073/02-TOD-005 DATED 01/28/02 AND CH2MHILL
  - DOCUMENT #CHG-0200073R1
  - WILL ALL FILTERS BE TESTED OR ONLY A STATISTICAL SAMPLE: STATISTICAL SAMPLE
  - IF NOT "ALL", NUMBER OF FILTERS TO BE TESTED (IF ALL TYPE IN N/A): NONE
  - CRITICAL CHARACTERISTICS OF FILTERS (N/A IF NOT TESTING): N/A
  - TESTING TO BE PERFORMED SHALL BE THE AEROSOL PENETRATION TEST AS DESCRIBED IN AG-1 ARTICLE FC-5120, UNLESS OTHERWISE STATED (N/A IF NO OTHER TESTING): N/A

QUALITY LEVEL (PER HNF-S-0552): QUALITY LEVEL 1

PACKAGING, SHIPPING, AND STORAGE SHALL BE IN ACCORDANCE WITH ASME AG-1, ARTICLE FC-7000, AND SECTION 11 OF HNF-S-0552 SPECIFICATION.

ADDITIONAL SHIPPING INSTRUCTIONS: NONE

**TORQUE VALUES**

- P/N 138, 156, 193 - 100 FT LBS
- P/N 167, 191, 196 - 60 FT LBS
- P/N 183 - 160 FT LBS
- P/N 154, 156, 193 - 115 FT LBS
- P/N 196, 201 - 40 FT LBS

THE ABOVE VALUES ARE PER CHG SPEC. 2-MISC-049

**FILTER DESCRIPTION**

SPECIAL HARDWARE OPTIONS:	NONE
TEMPERATURE RATING:	200 F (93 C)
FILTER MEDIA:	99.97% ON 0.3 M STANDARD MEDIA
FILTER PACK TYPE:	11 INCH DEEP SEPARATORLESS
FRAME MATERIAL:	14 GAUGE TYPE 304 SST
FRAME STYLE:	CHANNEL FOR FLUID SEAL ON ONE FACE
PACK TO FRAME SEALANT:	FIRE RETARDENT URETHANE
GASKET TYPE:	FLUID SEAL
GASKET LOCATION:	UP STREAM
FACEGUARD TYPE:	18 GAUGE SST
FACEGUARD LOCATION:	BOTH FACES
FILTER SIZE:	12" X 12" X 11 1/2" (G1F-CCF)
RATED AIR FLOW:	200 SCFM
MAXIMUM PRESSURE DROP:	1" WG
UL REQUIREMENTS:	586

DWG NO	TITLE	REF NUMBER	TITLE
	DRAWING TRACEABILITY LIST	NEXT USED ON	END ITEM

REV NO	DESCRIPTION	REV BY	DATE
3	ECN 720954-RO ECN 721043-RO REVISED PER ECN 721328-RO	BLK	02/05 2004

U.S. DEPARTMENT OF ENERGY  
Office of River Protection

PIPING  
AIR FILTER INSTALLATION  
ATMOSPHERIC BREATHING

DATE: APR 02 2004  
HAMPDEN RELEASE

NAME	DATE	COMPANY
DRAWN BY	1/4/00	EC
CHECKED BY	1/4/00	DC
DESIGNED BY	1/4/00	DC
PROJECT MANAGER	1/4/00	DC
DESIGN AUTHORITY	1/4/00	DC

SIZE: F 241G 8900  
SCALE: NONE  
SHEET 10 OF 15  
25708