

HANDBOOK

REFRIGERATING SYSTEMS PROTECTORS



FILTER DRIERS WITH REPLACEABLE ANTI-ACID SOLID CORE

Approved by Underwriters Laboratories Inc.



APPLICATIONS

The filters, shown in this chapter, are classified “Pressure vessels” in the sense of the Pressure Equipment Directive 94/23/EC, Article 1, Section 2.1.1 and are subject of Article 3, Section 1.1 of the same Directive.

They are designed for installation on commercial refrigerating systems and on civil and industrial conditioning plants, which use refrigerant fluids proper to the Group II (as defined in Article 9, Section 2.2 of Directive 97/23/EC and referred to in Directive 67/548/EEC).

The dehydrating blocks for filters 44 has been developed for specific installations on refrigerating systems using HFC refrigerant fluids, particularly R134a , R404A , R407C , R410A and R507 mixed with polyolester lubricants. In spite of this, the new block may be successfully used also in refrigerating systems using the old CFC or HCFC refrigerant fluids, mixed with mineral lubricants.

OPERATION

In the case of filters with more than one block, the passage of the fluid takes place in parallel; as a result, the pressure drop does not increase proportionately to the number of blocks. A large ring between the block and the inner surface of the filter permits the accumulation of solid

particles, and prevents clogging. Before leaving the filter, the refrigerant fluid must pass through the mesh sieve on which blocks are mounted. The danger that small particles of dehydrating material being introduced into the system is thus avoided. Furthermore, at filter outlet, a plastic cup, the edge of which closely adheres to the inner surface of the filter, prevents dirt from reaching the outlet connection during normal operation and block change.

CONSTRUCTION

The filters type 4410 are manufactured with steel body and solder connections:

- manufactured with EN 12735-1 – Cu-DHP copper tube (no suffix after connection code)
- machined with a steel bar EN 10025 S355JR. (“F” suffix after connection code)

The filters type 4420 are completely manufactured in steel and solder connection are machined with a steel bar EN 10025 S355JR.

Liquid line filter driers series 4411, 4412, 4413 e 4414 are supplied in these two solutions:

- Codes with “A” suffix , equipped with 1/4” NPT threaded cover for mounting an access fitting with valve core (for example G9150/R05)
- Codes with “B” suffix, equipped with blind cover

Liquid line filter driers series 4423 e 4424 are supplied solely in codes with “A” suffix, equipped with 1/4” NPT threaded cover for mounting an access fitting with valve core (for example G9150/R05).

The blocks 4490, type A and type B, and the block 4491, type A, are molded from a blend of dehydrating charge, totally made of 3 Å molecular sieves, and a special binding agent in appropriate proportions. The choice of the 3 Å molecular sieves, as sole dehydrating material, gives to the block a superlative capacity of water adsorption also maintaining quite good deacidifying characteristics.

The blocks 4490, type AA and type AB, and the block 4491, type AA, are molded from a blend of dehydrating charge, 80% of 3 Å molecular sieves and 20 % of activated alumina, and a special binding agent in appropriate proportions. The choice of blend, molecular sieves – activated alumina, gives to the block a very high capacity of acid adsorption also maintaining very good dehydrating characteristics. The presence of a controlled and defined percentage of activated alumina, lower than the maximum value recommended by ASERCOM, keeps unchanged the original concentration of additives in the polyolester lubricant.

The manufacturing process of blocks series 4490 and 4491 gives a considerable compacted ness and stoutness to both the products so that they are resistant to shocks and abrasions.

The blocks series 4490 have a volume of 48 cu.in., equivalent to approx. 800 cm³, and it is used with type 4411, 4412, 4413 and 4414 filters.

The block series 4491 has a volume of 100 cu.in., equivalent to approx. 1600 cm³. and it is used with type

4421, 4423 and 4424 filters.

The two blocks are shaped as a hollow cylinder and their overall dimensions correspond to those of other international brands. Consequently they are interchangeable. The hollow cylinder shape offers a large surface area to the inflowing fluid, which crosses the block in radial sense. As a result, dehydration is highly efficient with a minimum loss of charge.

TABLE 1: General Characteristics of solid core filter driers

Catalogue Number			Core Cat. Number	Number of Cores	Core Filtering Surface [cm ²]	Nominal Volume		Connections			PED Directive											
Copper connections		Steel connections				[cu.in.]	[cm ³]	ODS		W (2)	TS [°C]		PS [bar]	Risk Category								
Theaded cover	Blind cover	Theaded cover						Ø [in.]	Ø [mm]	Ø [mm]	min.	max.										
4411/5A	4411/5B	4411/5AF	4490/A - 4490/B ; 4490/AA - 4490/AB	1	420	48	800	5/8"	16	21,3	-40	+80	45 (1)	I								
4411/7A	4411/7B	4411/7AF						7/8"	22	26,9												
4411/9A	4411/9B	4411/9AF						1.1/8"	-	33,7												
4411/M28A	4411/M28B	-																				
4411/11A	4411/11B	4411/11AF						1.3/8"	35	42,4												
4411/13A	4411/13B	4411/13AF						1.5/8"	-	48,3												
4411/M42A	4411/M42B	4411/M42AF						-	42	48,3												
4411/17A	4411/17B	4411/17AF						2.1/8"	54	60,3												
4411/21A	4411/21B	4411/21AF		2.5/8"	-	76,1																
4412/7A	4412/7B	4412/7AF		7/8"	22	26,9																
4412/M28A	4412/M28B	-																				
4412/9A	4412/9B	4412/9AF		1.1/8"	-	33,7																
4412/11A	4412/11B	4412/11AF		1.3/8"	35	42,4																
4412/M42A	4412/M42B	4412/M42AF		-	42	48,3																
4412/17A	4412/17B	4412/17AF		2.1/8"	54	60,3																
4413/7A	4413/7B	4413/7AF		4491/A ; 4491/AA	3	1260	144	2400	7/8"	22					26,9	-40	+80	35 (1)	II			
4413/9A	4413/9B	4413/9AF	1.1/8"						-	33,7												
4413/11A	4413/11B	4413/11AF	1.3/8"						35	42,4												
4413/13A	4413/13B	4413/13AF	1.5/8"						-	48,3												
4413/M42A	4413/M42B	4413/M42AF	-	42	48,3																	
4414/11A	4414/11B	4414/11AF	4491/A ; 4491/AA	4	1680	192	3200	1.3/8"	35	42,4	-40	+80	32 (1)	II								
4414/13A	4414/13B	4414/13AF						1.5/8"	-	48,3												
4414/M42A	4414/M42B	4414/M42AF						-	42	48,3												
4414/17A	4414/17B	4414/17AF						2.1/8"	54	60,3												
-	-	4423/17A	4491/A ; 4491/AA	3	1890	300	4800	2.1/8"	54	60,3					-40					+80	32 (1)	II
		4423/21A						2.5/8"	67	76,1												
		4423/25A						3.1/8"	80	88,9												
		4424/25A						3.1/8"	80	88,9												
		4424/34A						4.1/4"	108	114,3												

(1) : MWP = 470 psi according to UL approval
(2) : only for shells with steel connections

BLOCKS REPLACEMENT

Blocks must be ordered separately from the filter. They are supplied in individual packages, which are hermetically sealed in suitable wrappings (type 4490), and in special bags (type 4491) for safe storage over long periods of time. Every cartridge is equipped of two seals in synthetic material to use like seal between the two cartridges and between the cartridge and its covers.

If the filter is installed in a system without any by-pass, the block replacement has to be done following these instructions:

1. Close the valve on the departing line
2. Start the compressor and its auxiliaries in order to transfer the refrigerant charge into the high pressure side of the plant (liquid receiver);
3. Stop the compressor at a suction pressure sufficiently higher than the atmospheric pressure;
4. Shut off the service valve at the suction side of the compressor.

NOTE: if during the transfer of the refrigerant to the high-

pressure side of the plant, the discharge pressures reach too high values (the condenser is flooded due to insufficient capacity of the liquid receiver), shut off the valve on the compressor suction side and stop immediately the compressor.

5. Replace quickly the filter block. During the preparation of the new block, close the filter with a clean cloth. The slight over-pressure inside the filter and the ability of the technician will prevent air from getting into the plant.
6. The internal cleanliness of the body is guaranteed by the cleaning effect of the cup, which is characteristic of Castel filters.

If air is supposed to have entered the plant during filter block replacement, produce a vacuum in the low-pressure side of the plant, and always in the sector of the circuit involved.

7. Open the valve on the departure of liquid line
8. Slowly open the suction valve of the compressor and start the compressor and its auxiliaries.
9. Top the charge up, if necessary.

TABLE 2: Refrigerant Flow Capacity of solid core filter driers

Catalogue Number			Refrigerant Flow Capacity, pressure drop 0,07 bar (1) [kW]					Refrigerant Flow Capacity, pressure drop 0,14 bar (1) [kW]						
Copper connections		Steel connections	R134a	R22	R404A	R407C	R410A	R507	R134a	R22	R404A	R407C	R410A	R507
Theaded cover	Blind cover	Theaded cover												
4411/5A	4411/5B	4411/5AF	82	90	59	90	87	57	144	158	104	158	153	100
4411/7A	4411/7B	4411/7AF	145	158	104	159	153	100	253	277	182	278	268	175
4411/M28A	4411/M28B	—	198	216	142	217	209	137	346	378	249	380	366	240
4411/9A	4411/9B	4411/9AF												
4411/11A	4411/11B	4411/11AF	231	252	166	253	244	160	404	441	291	443	427	280
4411/13A	4411/13B	4411/13AF	247	270	178	271	262	171	432	473	311	474	458	300
4411/M42A	4411/M42B	4411/M42AF												
4411/17A	4411/17B	4411/17AF												
4411/21A	4411/21B	4411/21AF												
4412/7A	4412/7B	4412/7AF												
4412/9A	4412/9B	4412/9AF	223	244	161	245	236	155	391	427	281	429	414	271
4412/11A	4412/11B	4412/11AF	303	331	218	332	321	210	530	579	382	582	561	367
4412/M42A	4412/M42B	4412/M42AF	330	361	238	362	350	229	578	632	416	634	612	401
4412/17A	4412/17B	4412/17AF												
4413/7A	4413/7B	4413/7AF	145	158	104	159	153	100	253	277	182	278	268	175
4412/M28A	4412/M28B	—	223	244	161	245	236	155	391	427	281	429	414	271
4413/9A	4413/9B	4413/9AF												
4413/11A	4413/11B	4413/11AF	324	354	233	355	343	224	567	620	408	622	600	393
4413/13A	4413/13B	4413/13AF	358	391	258	393	379	248	626	684	451	687	663	434
4413/M42A	4413/M42B	4413/M42AF												
4414/11A	4414/11B	4414/11AF	375	410	270	412	397	260	657	718	473	720	695	455
4414/13A	4414/13B	4414/13AF	421	460	303	462	446	292	737	805	530	808	780	510
4414/M42A	4414/M42B	4414/M42AF												
4414/17A	4414/17B	4414/17AF												
—	—	4423/17A	442	483	318	485	468	306	773	845	557	849	819	536
—	—	4423/21A	487	532	351	534	516	337	852	931	614	935	902	590
—	—	4423/25A	663	725	478	728	703	460	1161	1269	836	1274	1229	804
—	—	4424/25A	729	797	525	800	772	505	1276	1395	919	1400	1352	884
—	—	4424/34A	1168	1276	841	1281	1236	809	2043	2233	1472	2242	2164	1416

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier. The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2004 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

TABLE 3: General Characteristics, Dimensions and Weights of solid cores

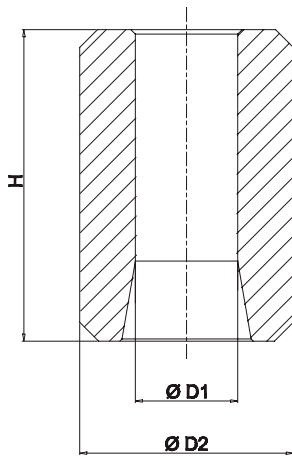
Catalogue Number	Batch characteristic	Filtering Surface [cm ²]	Nominal Volume		Dimensions [mm]			Weight [g]
			[cu.in]	[cm ³]	Ø D	Ø D2	H	
4490/A (1)	High moisture adsorption (100% molecular sieve)	420	48	800	47	96	140	730
4490/B (2)								
4490/AA (1)	Moisture and acid adsorption (80% molecular sieve + 20% activated alumina)	630	100	1600	53	122	165	1560
4490/AB (2)								
4491/A (3)	High moisture adsorption (100% molecular sieve)	630	100	1600	53	122	165	1560
4491/AA (3)	Moisture and acid adsorption (80% molecular sieve + 20% activated alumina)							

- (1): Supplied with cover gaskets as spare part, either for Castel filters or for competitors ones
- (2): Supplied without cover gasket as part part
- (3): Supplied with cover gasket as spare part for Castel filters

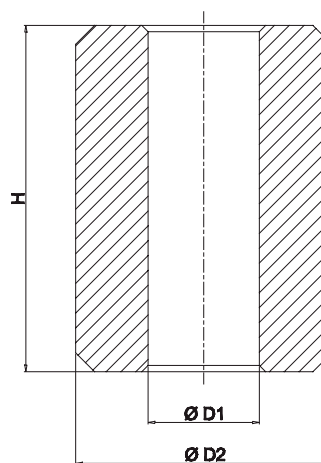
TABLE 4: Water Capacity, dehydratable charge of single block

Catalogue Number	Nominal Volume		Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]					Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	[cu.in]	[cm ³]	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4490/A 4490/B	48	800	82	75	84	67	73	88	81	90	72	79	71	60	78	54	59	76	65	84	58	63
4490/AA 4490/AB			70	64	71	57	62	75	69	77	61	67	60	51	66	46	50	65	55	71	50	54
4491/A	100	1600	216	197	220	177	192	232	212	237	190	207	186	158	205	142	155	200	170	220	153	166
4491/AA			183	167	187	150	163	197	180	201	161	176	158	134	174	121	131	170	144	187	130	141

- (1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:
 - Liquid temperatures: 24 °C and 52 °C
 - Equilibrium point dryness, EPD: 60 ppm for R22
 - Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507



4490



4491

TABLE 5: Dimensions and weights of filters with copper connections

Catalogue Number	Connections		Dimensions [mm]						Weight [g]		
	ODS		Ø D ₁	Ø D ₂	H ₁	H ₂	H ₃	P			
	Ø [in.]	Ø [mm]									
4411/5 (A-B)	5/8"	16	121	149	144	231	185	89	5360		
4411/7 (A-B)	7/8"	22			150	237		95	5405		
4411/M28 (A-B)	–	28			324	155		242	100	5395	
4411/9 (A-B)	1.1/8"	–				167		254	112	5464	
4411/11 (A-B)	1.3/8"	35				158		245	103	5435	
4411/13 (A-B)	1.5/8"	–				182		269	127	5410	
4411/M42 (A-B)	–	42				324		292	379	95	5585
4411/17 (A-B)	2.1/8"	54						297	384	100	6030
4411/21 (A-B)	2.5/8"	–						309	396	112	6880
4412/7 (A-B)	7/8"	22					300	387	103	7015	
4412/M28 (A-B)	–	28					324	433	520	95	6985
4412/9 (A-B)	1.1/8"	–			438			525	112	7136	
4412/11 (A-B)	1.3/8"	35			450			537	100	8375	
4412/M42 (A-B)	–	42			580			667	112	8510	
4412/17 (A-B)	2.1/8"	54			592			679	100	8470	
4413/7 (A-B)	7/8"	22			324	583		670	112	8445	
4413/9 (A-B)	1.1/8"	–				592		679	103	8375	
4413/11 (A-B)	1.3/8"	35				324		583	670	103	8510
4413/13 (A-B)	1.5/8"	–						583	670	112	8470
4413/M42 (A-B)	–	42					583	670	100	8445	
4414/11 (A-B)	1.3/8"	35					324	583	670	100	9900
4414/13 (A-B)	1.5/8"	–	583	670				112	9940		
4414/M42 (A-B)	–	42	583	670				103	9900		
4414/17 (A-B)	2.1/8"	54	583	670				103	9940		
									10010		

TABLE 6: Dimensions and weights of filters with steel connections

Catalogue Number	Connections			Dimensions [mm]						Weight [g]		
	ODS		W	Ø D ₁	Ø D ₂	H ₁	H ₂	H ₃	P			
	Ø [in.]	Ø [mm]	Ø [mm]									
4411/5AF	5/8"	16	21,3	121	149	144	231	185	90	5360		
4411/7AF	7/8"	22	26,9			150	237		95	5405		
4411/9AF	1.1/8"	–	33,7			324	155		242	100	5395	
4411/11AF	1.3/8"	35	42,4				167		254	112	5464	
4411/13AF	1.5/8"	–	48,3				158		245	103	5435	
4411/M42AF	–	42	48,3				182		239	95	5410	
4411/17AF	2.1/8"	54	60,3				324		292	379	95	5585
4411/21AF	2.5/8"	–	76,1						297	384	100	6030
4412/7AF	7/8"	22	26,9						309	396	112	6880
4412/9AF	1.1/8"	–	33,7					300	387	103	7015	
4412/11AF	1.3/8"	35	42,4					324	433	520	95	6985
4412/M42AF	–	42	48,3			438			525	112	7136	
4412/17AF	2.1/8"	54	60,3			450			537	100	8375	
4413/7AF	7/8"	22	26,9			580			667	112	8510	
4413/9AF	1.1/8"	–	33,7			592			679	100	8470	
4413/11AF	1.3/8"	35	42,4			324	583		670	103	8445	
4413/13AF	1.5/8"	–	48,3				592		679	112	8375	
4413/M42AF	–	42	48,3				583		670	100	8510	
4414/11AF	1.3/8"	35	42,4				324		583	670	103	8470
4414/13AF	1.5/8"	–	48,3					583	670	112	8445	
4414/M42AF	–	42	48,3					583	670	100	9900	
4414/17AF	2.1/8"	54	60,3	583	670			112	9940			
4423/17A	2.1/8"	54	60,3	163	200			600	142	18000		
4423/21A	2.5/8"	67	76,1						760	162	18200	
4423/25A	3.1/8"	80	88,9			172				18400		
4424/25A	3.1/8"	80	88,9			760		172		21600		
4424/34A	4.1/4"	108	114,3					172	22000			

