

HANDBOOK

REFRIGERATING SYSTEM PROTECTORS

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 **Castel**[®]
Italian technology

CHAPTER 10

REPLACEABLE SOLID CORE FILTER DRIERS

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



APPLICATIONS

Filters 4411E and 4412E illustrated in this chapter have been developed by Castel for all the applications that use the sub-critical R744 refrigeration fluid belonging to Group 2, defined in Article 13, Chapter 1, Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

OPERATION

In the case of filters with more than one cartridge, the fluid passage takes place in parallel. As a result, the pressure drop does not increase in proportion with the number of cartridges. A large ring area between the cartridge and the inner surface of the filter allows for the accumulation of solid particles and prevents clogging. Before leaving the filter, the refrigerant fluid must pass through the mesh sieve in which cartridges are mounted. This eliminates the danger that small particles of drying material be dragged into

circulation. Furthermore, at the 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 cartridge change.

CONSTRUCTION

Filters in series 4411E and 4412E: these filters are manufactured with: aluminium cover, high-strength screws, steel body equipped with brazing connections machined from steel bar EN 10025 S355JR.

They are sold in the following two configurations:

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

Cartridges in series 4490, type A and type B: are made from moulding a dehydrating filler, made completely from 3 Å molecular sieves, with a suitable binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics.

Cartridges in series 4490, type AA and type AB: are made from moulding a dehydrating filler, made from 80% 3 Å molecular sieves and 20% activated alumina, with a suitable binder. The use of a blend of molecular sieves – activated alumina, grant the cartridges a very high deacidifying capacity maintaining very good moisture adsorption characteristics.

The cartridges in series 4490 have volume of 48 cubic inches, equivalent to about 800 cm³, and are suitable for being used with filters in series 4411E and 4412E. Both have a hollow cylinder shape and are of the same size as the corresponding products of the main international brands. Consequently they are interchangeable. The hollow cylinder shape provides a large surface area to the fluid which to cross it in a radial direction. As a result, drying is highly efficient with a minimum loss of charge.

TABLE 45: General characteristics of filter driers with replaceable solid core for R744

Catalogue Number		Core Cat. Number	Number of Cores	Core Filtering Surface [cm ²]	Nominal Volume		Connections			PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
Steel connections							ODS		W		min.	max.	min.	max.	
Theaded cover	Blind cover				[cu.in]	[cm ³]	Ø [in.]	Ø [mm]	Ø [mm]						
4411E/5AF	4411E/5BF	4490/B ; 4490/AB	1	420	48	800	5/8"	16	21,3	62	- 40	+ 80	- 20	+ 50	I
4411E/7AF	4411E/7BF						7/8"	22	26,9						
4411E/9AF	4411E/9BF						1.1/8"	-	33,7						
4411E/11AF	4411E/11BF						1.3/8"	35	42,4						
4411E/13AF	4411E/13BF						1.5/8"	-	48,3						
4411E/M42AF	4411E/M42BF						-	42	48,3						
4411E/17AF	4411E/17BF						2.1/8"	54	60,3						
4412E/7AF	4412E/7BF		2	840	96	1600	7/8"	22	26,9						
4412E/9AF	4412E/9BF						1.1/8"	-	33,7						
4412E/11AF	4412E/11BF						1.3/8"	35	42,4						
4412E/13AF	4412E/13BF						1.3/8"	35	42,4						
4412E/M42AF	4412E/M42BF						-	42	48,3						
4412E/17AF	4412E/17BF						2.1/8"	54	60,3						

TABLE 46: Refrigerant flow capacity of filters with replaceable core for R744

Catalogue Number		Pressure drop 0,07 bar (1) [kW]	Pressure drop 0,14 bar (1) [kW]
Steel connections			
Theaded cover	Blind cover		
4411E/5AF	4411E/5BF	52	62
4411E/7AF	4411E/7BF	91	119
4411E/9AF	4411E/9BF	125	162
4411E/11AF	4411E/11BF	145	189
4411E/13AF	4411E/13BF	156	203
4411E/M42AF	4411E/M42BF	156	203
4411E/17AF	4411E/17BF	156	203
4412E/7AF	4412E/7BF	91	119
4412E/9AF	4412E/9BF	141	183
4412E/11AF	4412E/11BF	191	248
4412E/13AF	4412E/13BF	208	281
4412E/M42AF	4412E/M42BF	208	281
4412E/17AF	4412E/17BF	208	281

(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 710-2009 - with liquid temperature at -5 °C and evaporating temperature at - 40 °C)

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 21

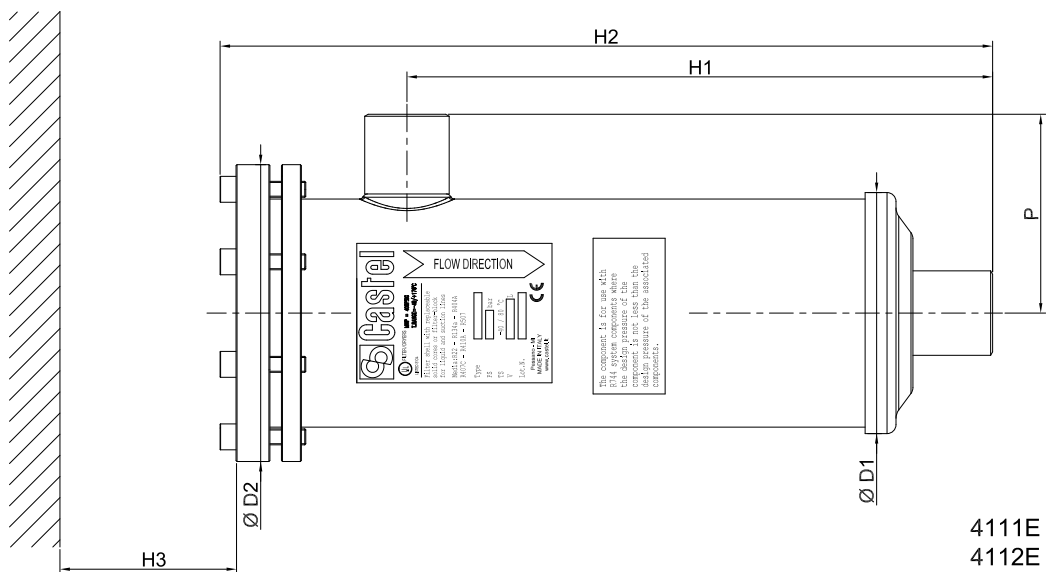
TABLE 47: General characteristics, dimensions and weights of solid cores for R744

Catalogue Number	Batch characteristic	Filtering Surface [cm ²]	Nominal Volume		Dimensions [mm]			Weight [g]
			[cu.in]	[cm ³]	Ø D ₁	Ø D ₂	H	
4490/B (1)	High moisture adsorption (100% molecular sieve)	420	48	800	47	96	140	730
4490/AB (1)	Moisture and acid adsorption (80% molecular sieve + 20% activated alumina)							
111135	Gasket for filter cover							

(1): Supplied without cover gasket as part part

TABLE 48: Dimensions and weights of filters for R744

Catalogue Number		Connections			Dimensions [mm]						Weight [g]
Steel connections		ODS		W	Ø D ₁	Ø D ₂	H ₁	H ₂	H ₃	P	
Theaded cover	Blind cover	Ø [in.]	Ø [mm]	Ø [mm]							
4411E/5AF	4411E/5BF	5/8"	16	21,3	121	149	144	231	185	90	5158
4411E/7AF	4411E/7BF	7/8"	22	26,9			150	237		95	5300
4411E/9AF	4411E/9BF	1.1/8"	–	33,7			155	242		100	5400
4411E/11AF	4411E/11BF	1.3/8"	35	42,4			167	254		112	5450
4411E/13AF	4411E/13BF	1.5/8"	–	48,3			158	245		103	5500
4411E/M42AF	4411E/M42BF	–	42	48,3			292	379		95	6600
4411E/17AF	4411E/17BF	2.1/8"	54	60,3		297	384	100	6800		
4412E/7AF	4412E/7BF	7/8"	22	26,9		324	396	309	396	112	6950
4412E/9AF	4412E/9BF	1.1/8"	–	33,7				300	387	103	7000
4412E/11AF	4412E/11BF	1.3/8"	35	42,4							
4412E/13AF	4412E/13BF	1.5/8"	–	48,3							
4412E/M42AF	4412E/M42BF	–	42	48,3							
4412E/17AF	4412E/17BF	2.1/8"	54	60,3							



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