

## R-22 TO FORANE<sup>®</sup> 427A RETROFIT PROCEDURE

Retrofit procedures that may be given by some original equipment manufacturers (OEMs) should be followed as a priority. The following guidelines are given as an indication only. Before the retrofit of the system:

- Make sure that the system is operating properly, repair if necessary.
- Check for any leaks, repair if necessary.
- Check that the elastomeric seals, gaskets and valve packing are in good condition, replace if necessary.
- Record where possible the operating conditions of the system with R-22, this will provide a baseline for comparison when the system is brought back into operation with Forane<sup>®</sup> 427A.

Retrofit procedure:

- Fully recover the entire original R-22 load from the system using appropriate recovery cylinders. Arkema does not recommend mixing Forane<sup>®</sup> 427A with R-22.
- Remove the original oil from the system. When replacing R-22 with Forane<sup>®</sup> 427A it is advisable to replace the original oil (mineral or alkylbenzene) with a polyolester oil (POE). However thanks to Forane<sup>®</sup> 427A's ability to tolerate a high residual amount of original oil in the POE lubricant, in most cases only one oil draining operation is required.
- Fully recover the drained oil for destruction.
- Analyse the drained oil if possible (humidity, acidity, particles): this will indicate whether the installation is in a good state of repair.
- Refill the system with a POE lubricant: use the same volume of POE oil as for the original oil.
- Replace the filter drier.
- Drain the installation.
- Refill the system with Forane<sup>®</sup> 427A. Forane<sup>®</sup> 427A must be installed in the liquid phase. It is advisable to first fill the installation with a Forane<sup>®</sup> 427A load equal to 95% wt of the nominal R-22 load and then top up to 100% only if necessary. As Forane<sup>®</sup> 427A is a zeotropic blend some bubbles may appear at the compressor sight glass, but this does not mean there is under-charge.
- Restart the installation. Record the new operating conditions and compare them to those obtained with R-22. Please note: the Pressure-Temperature relationship for Forane<sup>®</sup> 427A is different from the P-T relationship for R-22 (please refer to the enclosed saturation table).
- It may be necessary to adjust the expansion valve to achieve an optimized superheat.

Clearly label the system to indicate that it is now running on Forane<sup>®</sup> 427A and a POE lubricant.

FORANE® 427A : Properties of saturated liquid and saturated vapor											
Abs. Pressure P bar	Liquid					Vapor					Latent heat of vaporization Lv kJ/kg
	Bubble T T' °C	Volume v' dm <sup>3</sup> /Kg	Density p' kg/m <sup>3</sup>	Enthalpy h' kJ/kg	Entropy s' kJ/(kg.K)	Dew T T'' °C	Volume v'' m <sup>3</sup> /Kg	Density p'' kg/m <sup>3</sup>	Enthalpy h'' kJ/kg	Entropy s'' kJ/(kg.K)	
0,025	-100,2	0,637	1571,0	81,3	0,466	-91,7	6,667	0,150	346,5	1,961	265,2
0,125	-79,6	0,661	1513,1	103,5	0,587	-71,6	1,475	0,678	359,3	1,881	255,8
0,225	-70,6	0,672	1487,1	113,4	0,637	-62,8	0,852	1,174	365,0	1,855	251,6
0,325	-64,5	0,681	1469,0	120,3	0,670	-56,8	0,605	1,654	368,9	1,840	248,6
0,425	-59,8	0,687	1454,8	125,7	0,696	-52,2	0,471	2,124	371,9	1,829	246,3
0,525	-55,9	0,693	1442,9	130,1	0,716	-48,4	0,387	2,586	374,4	1,821	244,3
0,625	-52,5	0,698	1432,7	134,0	0,734	-45,2	0,329	3,043	376,6	1,815	242,6
0,725	-49,6	0,702	1423,6	137,4	0,749	-42,3	0,286	3,495	378,4	1,810	241,0
0,825	-47,0	0,707	1415,4	140,5	0,763	-39,7	0,254	3,943	380,1	1,805	239,6
0,925	-44,6	0,710	1407,9	143,3	0,775	-37,4	0,228	4,388	381,6	1,801	238,3
1,025	-42,4	0,714	1401,0	145,9	0,787	-35,3	0,207	4,831	383,0	1,798	237,1
1,125	-40,4	0,717	1394,5	148,3	0,797	-33,3	0,190	5,271	384,2	1,795	236,0
1,225	-38,5	0,720	1388,5	150,5	0,806	-31,5	0,175	5,708	385,4	1,793	234,9
1,325	-36,8	0,723	1382,8	152,6	0,815	-29,8	0,163	6,144	386,5	1,790	233,9
1,425	-35,1	0,726	1377,4	154,7	0,824	-28,2	0,152	6,579	387,6	1,788	232,9
1,525	-33,5	0,729	1372,2	156,6	0,832	-26,6	0,143	7,011	388,5	1,786	232,0
1,625	-32,1	0,731	1367,3	158,4	0,839	-25,2	0,134	7,443	389,5	1,784	231,1
1,725	-30,6	0,734	1362,6	160,1	0,847	-23,8	0,127	7,874	390,4	1,782	230,2
1,77	-30,0	0,735	1360,6	160,9	0,850	-23,2	0,124	8,067	390,7	1,782	229,8
2,17	-25,0	0,744	1343,7	167,1	0,875	-18,3	0,102	9,778	393,8	1,776	226,7
2,57	-20,7	0,753	1328,8	172,6	0,897	-14,1	0,087	11,48	396,4	1,772	223,8
2,97	-16,8	0,760	1315,5	177,5	0,916	-10,3	0,076	13,17	398,7	1,768	221,2
3,37	-13,4	0,767	1303,2	182,0	0,933	-7,0	0,067	14,87	400,8	1,765	218,7
3,77	-10,2	0,774	1291,9	186,2	0,949	-3,9	0,060	16,56	402,6	1,762	216,4
4,17	-7,3	0,780	1281,3	190,0	0,963	-1,1	0,055	18,25	404,2	1,760	214,2
4,57	-4,6	0,787	1271,3	193,7	0,977	1,5	0,050	19,94	405,8	1,758	212,1
4,97	-2,1	0,792	1261,9	197,1	0,989	4,0	0,046	21,64	407,2	1,756	210,1
5,37	0,3	0,798	1252,9	200,4	1,001	6,3	0,043	23,34	408,4	1,754	208,1
5,77	2,5	0,804	1244,3	203,5	1,012	8,5	0,040	25,05	409,6	1,752	206,2
6,17	4,6	0,809	1236,0	206,4	1,023	10,5	0,037	26,76	410,8	1,751	204,3
6,2	4,8	0,809	1235,4	206,7	1,024	10,7	0,037	26,88	410,8	1,751	204,2
6,6	6,8	0,815	1227,5	209,5	1,034	12,6	0,035	28,60	411,9	1,749	202,4
7,0	8,7	0,820	1219,8	212,3	1,044	14,5	0,033	30,33	412,8	1,748	200,6
7,4	10,6	0,825	1212,4	214,9	1,053	16,3	0,031	32,06	413,8	1,747	198,9
7,8	12,3	0,830	1205,2	217,5	1,062	18,0	0,030	33,80	414,6	1,745	197,1
8,2	14,0	0,835	1198,2	220,0	1,070	19,6	0,028	35,55	415,4	1,744	195,5
8,6	15,7	0,839	1191,4	222,4	1,079	21,2	0,027	37,31	416,2	1,743	193,8
9,0	17,3	0,844	1184,7	224,7	1,087	22,8	0,026	39,08	416,9	1,742	192,2
9,4	18,8	0,849	1178,2	227,0	1,094	24,2	0,024	40,86	417,6	1,741	190,6
9,8	20,3	0,853	1171,8	229,3	1,102	25,7	0,023	42,64	418,3	1,740	189,0
10,0	21,0	0,856	1168,6	230,4	1,106	26,4	0,023	43,54	418,6	1,739	188,2
11,0	24,5	0,867	1153,4	235,7	1,123	29,7	0,021	48,08	420,0	1,737	184,3
13,0	30,7	0,889	1124,5	245,7	1,156	35,8	0,017	57,37	422,4	1,732	176,7
15,0	36,3	0,911	1097,5	254,9	1,185	41,1	0,015	67,01	424,2	1,728	169,3
17,0	41,4	0,933	1071,6	263,6	1,212	46,0	0,013	77,05	425,6	1,723	162,0
19,0	46,1	0,956	1046,5	271,9	1,237	50,4	0,011	87,54	426,5	1,719	154,7
21,0	50,4	0,979	1021,9	279,8	1,261	54,5	0,010	98,56	427,1	1,714	147,3
23,0	54,4	1,002	997,5	287,6	1,284	58,3	0,009	110,2	427,4	1,709	139,8
25,0	58,1	1,028	973,0	295,1	1,307	61,8	0,008	122,5	427,3	1,703	132,2
27,0	61,7	1,055	948,2	302,6	1,328	65,2	0,007	135,6	426,9	1,698	124,3
29,0	65,1	1,084	922,7	310,0	1,350	68,3	0,007	149,7	426,2	1,691	116,2
31,0	68,3	1,116	896,1	317,5	1,371	71,3	0,006	164,9	425,1	1,685	107,6
33,0	71,4	1,152	867,9	325,1	1,392	74,1	0,006	181,6	423,6	1,677	98,5
35,0	74,3	1,194	837,2	333,0	1,414	76,8	0,005	200,3	421,6	1,668	88,7
35,5	75,0	1,206	829,0	335,0	1,419	77,4	0,005	205,3	421,0	1,666	86,1

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