SAPPHIRE® PLUS Total Flood Fire Suppression System

Description

A conventional HYGOOD® SAPPHIRE® fire suppression system uses a storage pressure of 25 bar or 42 bar, which is suitable for many applications. The HYGOOD SAPPHIRE PLUS system uses a storage pressure of 70 bar to provide the designer with more flexibility when planning the layout of the fire suppression system. This super-pressurization means the containers can be placed further from the hazard area, if required. The use of smaller pipe diameters, and the use of selector valves help to protect multiple areas using one bank of containers.

Features

- UL Listed and FM Approved
- Fully meets EN 12094
- Designed according to NFPA 2001, EN 15004, and ISO 14520
- UL and FM verified software
- Selector valve systems
- Available with standard pressure gauge or contacted pressure gauge for pressure monitoring
- Electric, pneumatic, or manual operation
- Centralized storage locations
- Reduced pipe diameters for traditional systems

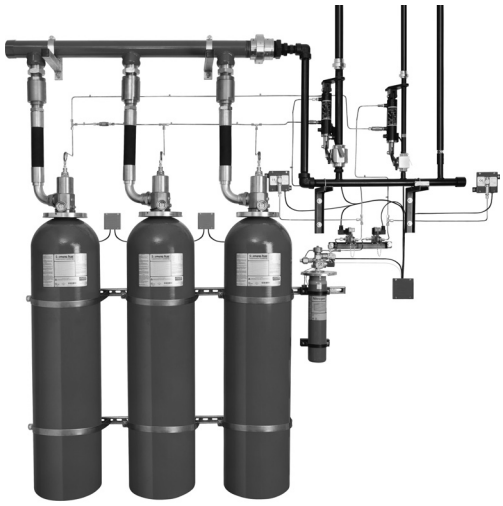
Applications

The HYGOOD SAPPHIRE PLUS Total Flood Fire Suppression System utilizes FK-5-1-12 agent as the suppression agent. FK-5-1-12 agent is effective for the following total flooding fire suppression applications:

- Data centers
- Electrical switching rooms
- Machinery spaces
- Medical facilities
- Heritage and cultural sites
- Air traffic control
- Oil and gas facilities

Approvals, listings, and certifications

- UL Listed
- FM Approved
- CE Marked
- UKCA Marked



Specifications

Table 1: Environmental data

Ozone Depletion Potential (ODP)	0
Global Warming Potential (GWP)	1
Atmospheric Lifetime (ALT)	0.014 years (5 days)
Operating and storage temperature **Note:** The temperature range is dependent on the fill density and nozzle coverage. For details, refer to the latest revision of the SAPPHIRE PLUS Total Flood Fire Suppression System Manual (Part No. 14A-54H).	-20 °C to 50 °C (-4 °F to 122 °F) CE and UKCA -18 °C to 50 °C (0 °F to 122 °F) UL and FM 0 °C to 65 °C (32 °F to 149 °F) UL and FM

Table 2: Physical properties of FK-5-1-12 agent

Properties	Unit	Value
Molecular weight	g/mol	316.04
Boiling point at 1,013 bar (absolute)	°C (°F)	49.0 (120.2)
Freezing point	°C (°F)	-108.0 (-162.4)
Vapor pressure 20 °C (68 °F)	bar abs*	0.3260
Liquid density 20 °C (68 °F)	g/ml	1.616
Saturated vapor density 20 °C (68 °F)	kg/m^3	4.3305
Heat of vaporization at boiling point	kJ/kg	88.0
Chemical formula	$CF_3CF_2C(O)CF(CF_3)_2$	
Chemical name	Dodecafluoro-2-methylpentan-3-one	

* 1 bar = 0.1 MPa = 100,000 Pa = 14.5 psi;
1 MPa = 1 N/mm^2

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Ordering information

From Marinette, Wisconsin, USA (UL Listed and FM Approved)

Table 3: DOT/TPED container assemblies, rated for -18 °C to 50 °C (0 °F to 122 °F)

Part No.	Nominal size L (lb)	Pressure gauge type	Temp. °C (°F)	Fill density Min. kg/L (lb/ft³)	Fill density Max. kg/L (lb/ft³)	Minimum and maximum fills (Weight) Min. kg (lb)	Minimum and maximum fills (Weight) Max. kg (lb)	Valve size mm (in.)	Height from floor to outlet (nom.) mm (in.)	Dia. mm (in.)	Nominal tare weight kg (lb)	Nominal gross weight at max. fill density excluding N_2 kg (lb)
452141	15 (50)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	4.5 (10)	21 (46)	25 (1.0)	695 (27.4)	204 (8.0)	29.3 (64.6)	50.3 (110.9)
452142	30 (100)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	9 (20)	42 (92)	25 (1.0)	1010 (39.8)	229 (9.0)	38.8 (85.5)	80.8 (178.1)
452143	45 (140)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	14 (30)	63 (138)	25 (1.0)	1110 (43.7)	267 (10.5)	60.4 (133.2)	123.4 (272.1)
452144	60 (190)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	18 (40)	84 (185)	50 (2.0)	1428 (56.2)	267 (10.5)	80.1 (176.6)	164.1 (361.8)
452145	120 (370)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	36 (80)	168 (370)	50 (2.0)	1543 (60.7)	360 (14.2)	140.6 (310.0)	308.6 (680.3)
452146	150 (470)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	45 (100)	210 (463)	50 (2.0)	1893 (74.5)	360 (14.2)	166.6 (367.3)	376.6 (830.3)

Notes: 1. The minimum temperature for EU approval is -20 °C (-4 °F).

2. When ordering containers, the gauge type, fill weight, and container label must be specified at the time of shipment.

3. Canada and the USA mutually recognize the regulatory approvals for UN pressure receptacles. This means that UN pressure receptacles manufactured in accordance with 49 CFR (Code of Federal Regulations) marked with USA as the country of approval, commonly referred to as DOT, satisfy the TC requirements.

Table 4: DOT/TPED container assemblies, rated for 0 °C to 65 °C (32 °F to 149 °F)

Part No.	Nominal size L (lb)	Pressure gauge type	Temp. °C (°F)	Fill density Min. kg/L (lb/ft³)	Fill density Max. kg/L (lb/ft³)	Minimum and maximum fills (weight) Min. kg (lb)	Minimum and maximum fills (weight) Max. kg (lb)	Valve size mm (in.)	Height from floor to outlet (nom.) mm (in.)	Dia. mm (in.)	Nominal tare weight kg (lb)	Nominal gross weight at max. fill density excluding N_2 kg (lb)
452141	15 (50)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	4.5 (10)	20.3 (44)	25 (1.0)	695 (27.4)	204 (8.0)	29.3 (64.6)	49.6 (109.3)
452142	30 (100)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	9 (20)	41.0 (89)	25 (1.0)	1010 (39.8)	229 (9.0)	38.8 (85.5)	79.8 (175.9)
452143	45 (140)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	14 (30)	60.8 (133)	25 (1.0)	1110 (43.7)	267 (10.5)	60.4 (133.2)	121.2 (267.2)
452144	60 (190)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	18 (40)	81.0 (178)	50 (2.0)	1428 (56.2)	267 (10.5)	80.1 (176.6)	161.1 (355.2)
452145	120 (370)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	36 (80)	162.0 (357)	50 (2.0)	1543 (60.7)	360 (14.2)	140.6 (310.0)	302.6 (667.1)
452146	150 (470)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	45 (100)	202.5 (446)	50 (2.0)	1893 (74.5)	360 (14.2)	166.6 (367.3)	369.1 (813.7)

Note: When ordering containers, the gauge type, fill weight, and container label must be specified at the time of shipment.

Ordering information

From Great Yarmouth, UK (UL Listed and FM Approved)

Table 5: TPED container assemblies, rated for -18 °C to 50 °C (0 °F to 122 °F)

Part No.	Nominal size L (lb)	Pressure gauge type	Temp. °C (°F)	Fill density Min. kg/L (lb/ft³)	Fill density Max. kg/L (lb/ft³)	Minimum and maximum fills (weight) Min. kg (lb)	Minimum and maximum fills (weight) Max. kg (lb)	Valve size mm (in.)	Height from floor to outlet (nom.) mm (in.)	Dia. mm (in.)	Nominal tare weight kg (lb)	Nominal gross weight at max. fill density excluding N_2 kg (lb)
452134	15 (50)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	4.5 (10)	21 (46)	25 (1.0)	695 (27.4)	204 (8.0)	29.3 (64.6)	50.3 (110.9)
452135	30 (100)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	9.0 (20)	42 (92)	25 (1.0)	1010 (39.8)	229 (9.0)	38.8 (85.5)	80.8 (178.1)
452136	45 (140)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	14.0 (30)	63 (138)	25 (1.0)	1110 (43.7)	267 (10.5)	60.4 (133.2)	123.4 (272.1)
452137	60 (190)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	18.0 (40)	84 (185)	50 (2.0)	1428 (56.2)	267 (10.5)	80.1 (176.6)	164.1 (361.8)
452138	120 (370)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	36.0 (80)	168 (370)	50 (2.0)	1543 (60.7)	360 (14.2)	140.6 (310.0)	308.6 (680.3)
452139	150 (470)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	45 (100)	210 (463)	50 (2.0)	1893 (74.5)	360 (14.2)	166.6 (367.3)	376.6 (830.3)
452140	180 (560)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	54.0 (120)	252 (555)	50 (2.0)	1743 (68.6)	406 (16.0)	214.8 (473.6)	466.8 (1029.1)

Notes: 1. The minimum temperature for EU approval is -20 °C (-4 °F).

2. When ordering containers, the gauge type, fill weight, and container label must be specified at the time of shipment.

Table 6: TPED container assembly, rated for 0 °C to 65 °C (32 °F to 149 °F)

Part No.	Nominal size L (lb)	Pressure gauge type	Temp. °C (°F)	Fill density Min. kg/L (lb/ft³)	Fill density Max. kg/L (lb/ft³)	Minimum and maximum fills (weight) Min. kg (lb)	Minimum and maximum fills (weight) Max. kg (lb)	Valve size mm (in.)	Height from floor to outlet (nom.) mm (in.)	Dia. mm (in.)	Nominal tare weight kg (lb)	Nominal gross weight at max. fill density excluding N_2 kg (lb)
452134	15 (50)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	4.5 (10)	20.3 (44)	25 (1.0)	695 (27.4)	204 (8.0)	29.3 (64.6)	49.6 (109.3)
452135	30 (100)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	9 (20)	41.0 (89)	25 (1.0)	1010 (39.8)	229 (9.0)	38.8 (85.5)	79.8 (175.9)
452136	45 (140)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	14 (30)	60.8 (133)	25 (1.0)	1110 (43.7)	267 (10.5)	60.4 (133.2)	121.2 (267.2)
452137	60 (190)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	18 (40)	81.0 (178)	50 (2.0)	1428 (56.2)	267 (10.5)	80.1 (176.6)	161.1 (355.2)
452138	120 (370)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	36 (80)	162.0 (357)	50 (2.0)	1543 (60.7)	360 (14.2)	140.6 (310.0)	302.6 (667.1)
452139	150 (470)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	45 (100)	202.5 (446)	50 (2.0)	1893 (74.5)	360 (14.2)	166.6 (367.3)	369.1 (813.7)
452140	180 (560)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	54 (120)	243.0 (535)	50 (2.0)	1743 (68.6)	406 (16.0)	214.8 (473.6)	457.8 (1009.3)

Note: When ordering containers, the gauge type, fill weight, and container label must be specified at the time of shipment.

Ordering information

From Mumbai, India (UL Listed)

Table 7: PESO container assemblies, rated for -18 °C to 50 °C (0 °F to 122 °F)

Part No.	Nominal size L (lb)	Pressure gauge type	Temp. °C (°F)	Fill density Min. kg/L (lb/ft³)	Fill density Max. kg/L (lb/ft³)	Minimum and maximum fills (weight) Min. kg (lb)	Minimum and maximum fills (weight) Max. kg (lb)	Valve size mm (in.)	Height from floor to outlet (nom.) mm (in.)	Dia. mm (in.)	Nominal tare weight kg (lb)	Nominal gross weight at max. fill density excluding N_2 kg (lb)
452148	34 (110)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	10.5 (23)	47.5 (105)	25 (1.0)	865 (34.1)	267 (10.5)	48 (105.8)	95.5 (210.5)
452149	80 (250)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	24 (53)	112.0 (246)	50 (2.0)	1792 (70.6)	267 (10.5)	94 (207.2)	206.0 (454.2)
452150	120 (370)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	36 (80)	168.0 (370)	50 (2.0)	1317 (51.9)	406 (16.0)	178 (392.4)	346.0 (762.8)
452151	180 (560)	PG or CPG	50 (122)	0.3 (18.7)	1.4 (87.4)	54 (119)	252.0 (555)	50 (2.0)	1837 (72.3)	406 (16.0)	214 (471.8)	466.0 (1027.4)

Notes: 1. The minimum temperature for EU approval is -20 °C (-4 °F).

2. Add the suffix CR to part numbers for high corrosion-resistant painted container assemblies. For example Part No. 452148 uses standard paint and 452148CR uses high corrosion-resistant paint.

3. When ordering containers, the gauge type, fill weight, and container label must be specified at the time of shipment.

Table 8: PESO container assembly, rated for 0 °C to 65 °C (32 °F to 149 °F)

Part No.	Nominal size L (lb)	Pressure gauge type	Temp. °C (°F)	Fill density Min. kg/L (lb/ft³)	Fill density Max. kg/L (lb/ft³)	Minimum and maximum fills (weight) Min. kg (lb)	Minimum and maximum fills (weight) Max. kg (lb)	Valve size mm (in.)	Height from floor to outlet (nom.) mm (in.)	Dia. mm (in.)	Nominal tare weight kg (lb)	Nominal gross weight at max. fill density excluding N_2 kg (lb)
452148	34 (110)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	10.5 (23)	45.5 (100)	25 (1.0)	865 (34.1)	267 (10.5)	48 (105.8)	93.5 (206.1)
452149	80 (250)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	24 (53)	108.0 (238)	50 (2.0)	1792 (70.6)	267 (10.5)	94 (207.2)	202.0 (445.3)
452150	120 (370)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	36 (80)	162.0 (357)	50 (2.0)	1317 (51.9)	406 (16.0)	178 (392.4)	340.0 (749.6)
452151	180 (560)	PG or CPG	65 (149)	0.3 (18.7)	1.35 (84.3)	54 (119)	243.0 (535)	50 (2.0)	1837 (72.3)	406 (16.0)	214 (471.8)	457.0 (1007.5)

Notes: 1. Add the suffix CR to part numbers for high corrosion-resistant painted container assemblies. For example Part No. 452148 uses standard paint and 452148CR uses high corrosion-resistant paint.

2. When ordering containers, the gauge type, fill weight, and container label must be specified at the time of shipment.

Safety Data Sheets (SDS) are available at www.hygood.com

Note: The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement.