WELCOME TO CAE











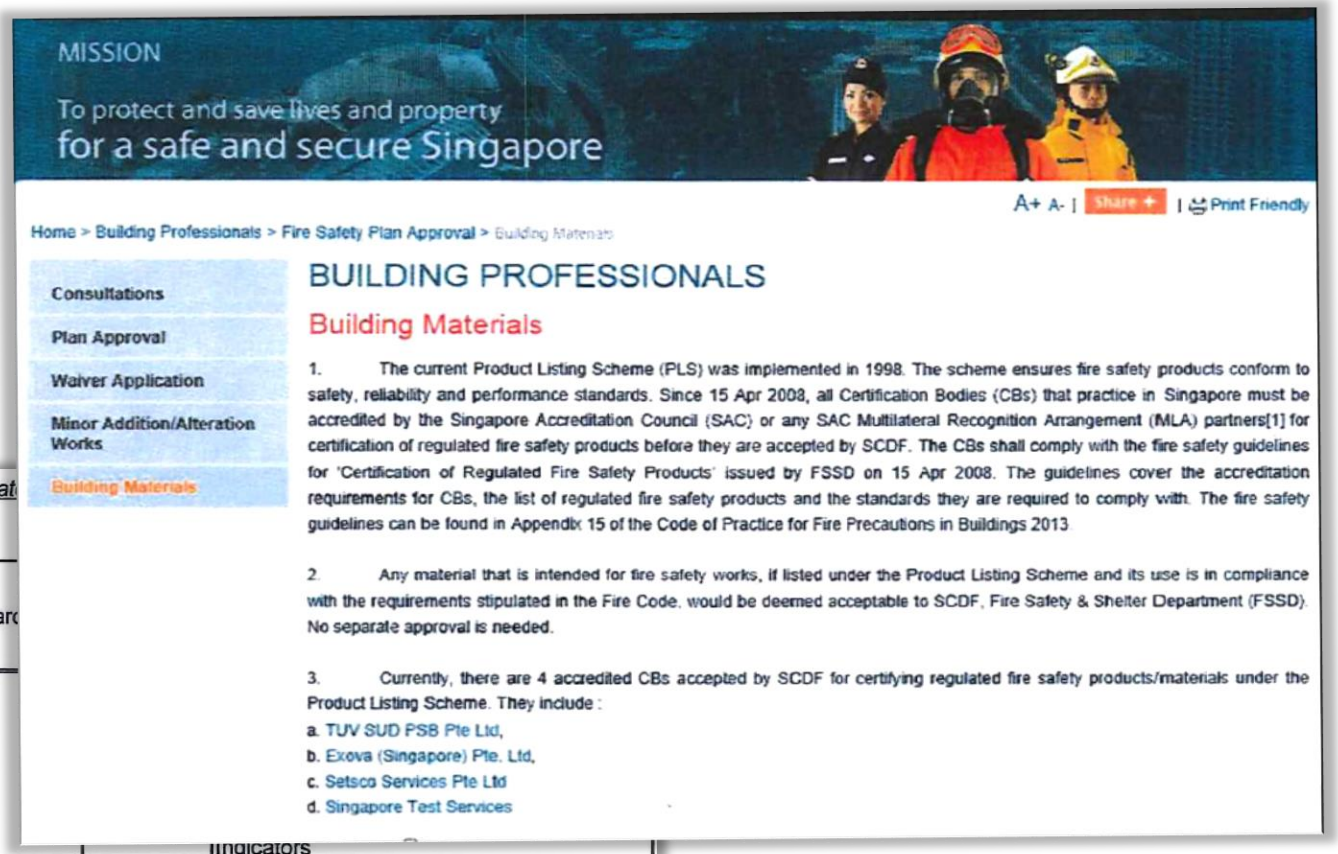
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Introduction to the
Singapore Standard
SS575:2012
(FORMERLY CP29)
OR
CP52 : 2004



List of Regulated Fire Safety Products & Mat

Product	Acceptable Standard		
1. Fire Alarm Panel	1.EN 54 Pt 2 & 4 2.CP10		
			Indicators
2. Fire Pump	1.AS 2941, UL, FM, BRE	1A (Labels issued)	AS - Annual witness testing; FM/UL/BRE-Annual; Submission of reports shall include surveillance inspection & witness testing.

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Results:

Table 2j: Specific Requirements

Type of Test	Sample Reference: Model	Result	AS 2941-2013 (Clause 4.2.2)
Casing	CL40133-844122	Complied	The design of the pump casing shall permit examination and removal of impellers and other internal parts without disturbing either suction or discharge piping. An opening with thread for corrosion-resistance pipe plug should be provided

Table 2k: Specific Requirements

Type of Test	Sample Reference: Model	Result	AS 2941-2013 (Clause 4.2.3)
Impeller	CL40133-844122	Complied	The impeller shall be secured with an impeller nut threaded so as to tighten with rotation

Table 2l: Specific Requirements

Type of Test	Sample Reference: Model	Result	AS 2941-2013 (Clause 4.2.4)
Coupling	CL40133-844122	N.A.	Back pull-out type pumps shall include a spacer shaft coupling to enable removal of the rotating assembly without disturbing either the driver or the pump casing.

Remark: Coupler supplied separately

Table 3a: Shop Testing and Conformances

Type of Test	Sample Reference: Model	Result	AS 2941-2013 (Clause 10.2.1)
Hydrostatic Test	CL40133-844122	Complied	The pump casing shall not rupture, crack, leak or show signs of permanent deformation

Remark:
a) Hydrostatic tested at 3800 kPa for 5 mins.
b) Pressure gauge Serial No.: MHS 52, calibration report reference: 541505, dated 27th January 2016

Table 3b: Shop Testing and Conformances

Type of Test	Sample Reference: Model	Result	AS 2941-2013 (Clause 10.3.2.1)
Performance Test	CL40133-844122	Complied	Performance test result shall be within the specified tolerance given in table 10.1 (excluding pump efficiency)

Remark: Observed reading and evaluation of test results are summarized on the test sheets and plotted on graphs. See Appendix A

The above tests was witnessed by:
a) Mr. Sam Chan (CAE)

CAE testing procedure for the pump and controller in compliance with the requirement of AS2941:

Each pump casing shall be hydrostatically tested to 1.5 times its maximum allowable working pressure or 1600 kpa, whichever is the greater, for not less than 5 minutes. The casing shall not rupture, crack, leak or show signs of permanent deformation.

CAE testing procedure for the pump and controller in compliance with the requirement of AS2941:

Each pumpset comprising pump, driver and control equipment shall be tested as a working assembly

The materials used in the construction of the pump shall be suitable for the range of water quality being pumped, so that excessive corrosion does not reduce the pump's life expectancy. For normal fire service duty, a pump shall be constructed with a cast iron casing, a bronze impeller and a stainless steel shaft. The use of non-metallic materials is not permitted.

CERTIFICATE OF CONFORMITY

This Certificate is issued to

CAE PUMPS AND EQUIPMENT PTE LTD
No. 1 Yishun Street 23
#01-45 YS-One
Singapore 768441

For Product Certification Scheme: Class 1

Product	:	**Fire Pumpset**
Brand	:	**GRUNDFOS**
Model	:	**NK Series**
Country of Origin	:	**Denmark**
Product Details	:	**Comprising pump, driver and controller Refer to appendix for details.**

which has complied with the requirements of the scheme based on the following:

STANDARD(S)	TEST REPORT(S)	
AS 2941: 2008	FN00104-13	FN00110-14
AS 2417: 2001	FN00010-13	FN00016-14
	FN00147-14	FN00101-13
	FN00035-12	FN00018-14
	FN00187-14	FN00117-14
	FN00084-13	FN00121/23/25-11
	FN00118-14	FN00023/24-15
	FN00119-14	FN00207-14
	FN00026-14	FN00096-14
	FN00009-15	FN00150-13

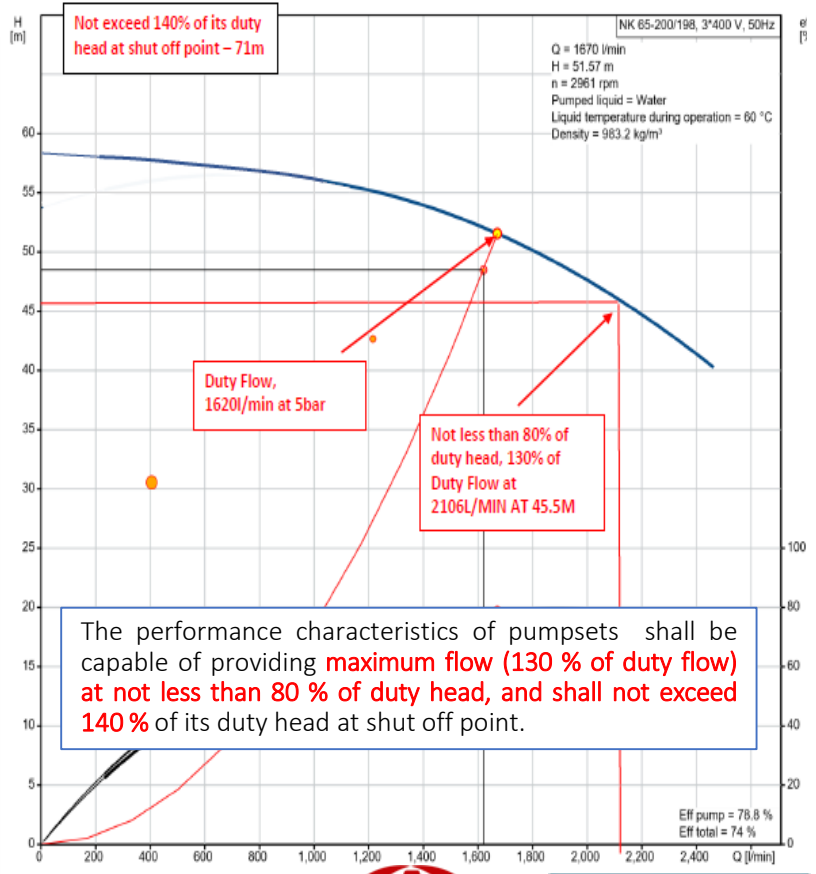
Sze Thiam Siong (Mr)
General Manager
SETSCO Services Pte Ltd
18 Teban Gardens Crescent
Singapore 608925

Certificate No	*Date of Issue*	*Date of Expiry*
FSP-2015-0260	*31/08/2015*	*30/08/2018*

This Certificate is part of full report and should be read in conjunction with it. This Certificate remains the property of SETSCO Services Pte Ltd (SETSCO) and shall be returned upon request. The use of this Certificate is subjected to the terms and conditions of the SETSCO Product Certification Scheme. The manufacturer is solely responsible for ... same designation as the product type ... Person ... on this Certificate should ... at www.setsco.com.

SETSCO

97829240 NK 65-200/198 50 Hz



The performance characteristics of pumpsets shall be capable of providing **maximum flow (130 % of duty flow) at not less than 80 % of duty head, and shall not exceed 140 %** of its duty head at shut off point.

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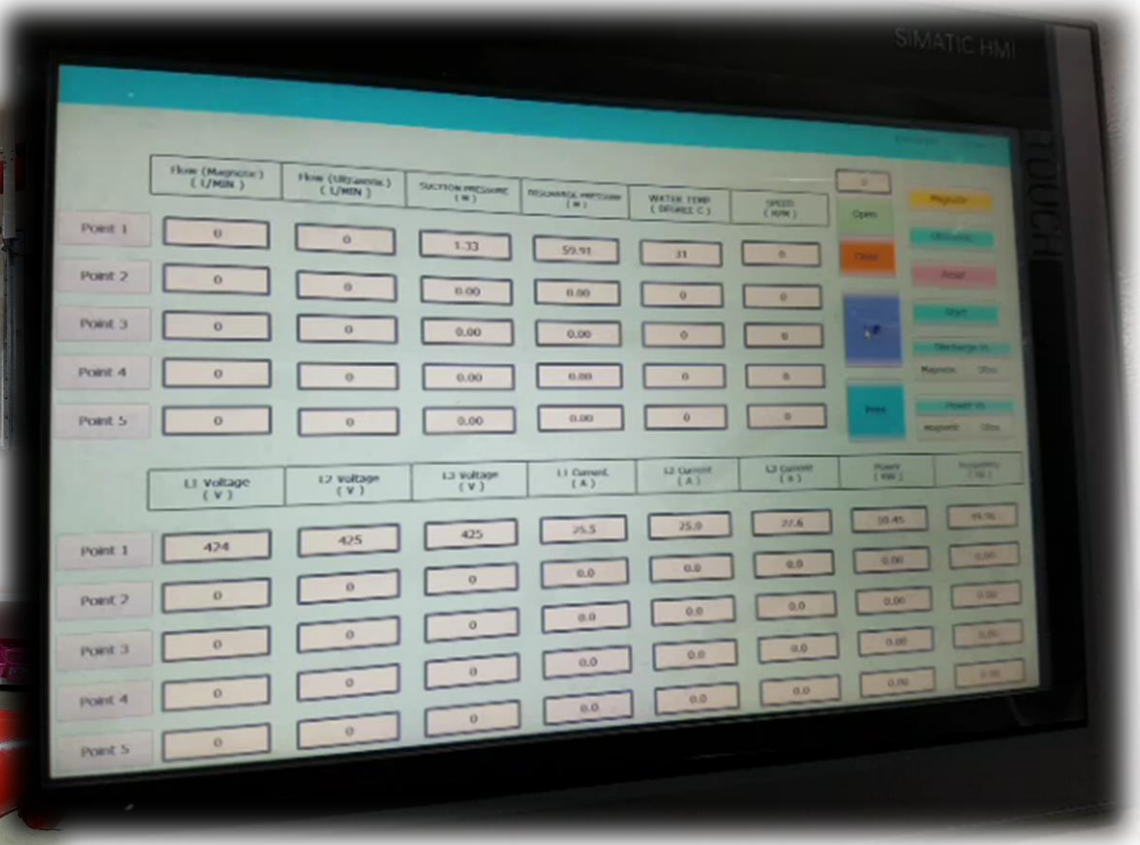
CAE testing procedure for the pump and controller in compliance with the requirement of AS2941:

Motorised valve



Suction pressure gauge and transducer





Touch screen controller



Discharge flow meter, pressure gauge , transducer and temperature sensor



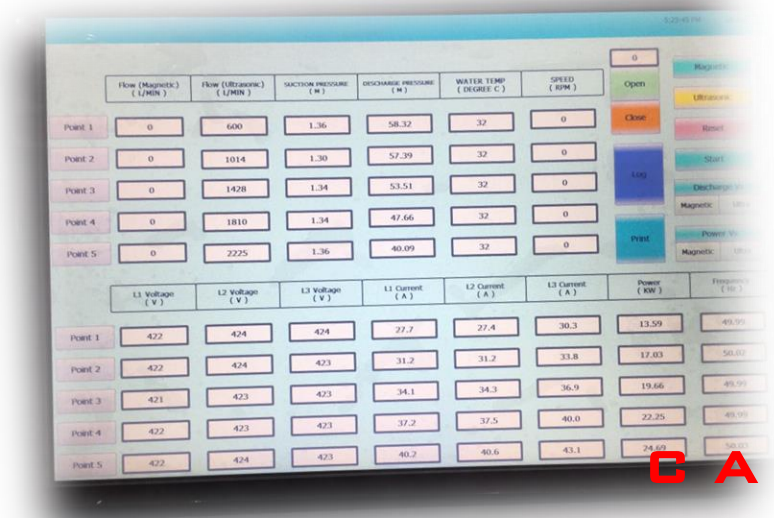
CAE testing procedure for the pump and controller in compliance with the requirement of AS2941:

The pump shall be operated at various flow rates to verify the specified performance requirements. At each flow, the total discharge head, total suction head, and shaft speed shall be measured. For electrically driven pumps, the actual absorbed power shall be measured.

Head measurements shall include those at zero flow, duty flow, 130% duty flow, and two other points

The pump shall demonstrate its ability to achieve 80% of its duty head when operating at 130% of its duty flow.

In addition to the time taken to carry out tests at the points nominated above, electric drivers shall be run for a period of not less than 15 minutes with the pump operating at its rated flow and head.



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PUMP PERFORMANCE FINAL REPORT - ELECTRIC

CLIENT : TEST
ADDRESS 26 boonlay way, #01-88
singapore 609970
CLIENT CONTACT :

TEST PREMISES cae - boonlay test bay
ADDRESS 26 boonlay way, #01-88
singapore 609970

JOB NO: TEST
DATE : 30-Aug-17
PROJECT : MODULAR PUMPSET TEST

DUTY POINT: FLOW(l/s): 27.0 HEAD(m): 51.0

PUMP TYPE/SIZE : NK 65-200 C/W 30KW TEFC 2POLE
PUMP SERIAL N°:

**** PUMP TESTING CARRIED OUT IN ACCORDANCE WITH AS2417 EXCLUDING CAVITATION AND AS2941 ****

PT.	FLOW (l/s)	GAUGE READINGS DISCH. (m)	GAUGE READINGS SUCT. (m)	VELOCITY HEAD DIFF. (m)		TOTAL HEAD (m)	POWER MEASUREMENT METER CONST: 1.0 Power (kW) METER		Current (A)	MOTOR EFF. (%)	PUMP POWER INPUT (kW)	PUMP POWER OUTPUT (kW)	PUMP EFF. (%)	PUMP SPEED (RPM)
1	0.00	61.58	1.59	0.00		59.99	10.44	10.44	27.00	89.7%	9.36	0.00	0.0%	2900
2	16.71	58.11	1.58	0.03		56.56	16.98	16.98	33.60	90.6%	15.38	9.27	60.3%	2900
3	27.38	49.79	1.63	0.08		48.24	21.36	21.36	38.60	91.2%	19.48	12.95	66.5%	2900
4	34.13	43.10	1.64	0.13		41.59	23.76	23.76	41.60	91.2%	21.67	13.92	64.2%	2900
5	39.01	36.53	1.60	0.17		35.10	25.28	25.28	43.50	91.1%	23.03	13.42	58.3%	2900
6														
7														
8														
9														
10														
11														

MOTOR
Make : MOTORLOGY kw : 30.0
Type/Frame : 180LB-2 amps : 53
Serial No. : 17031141C Speed : 2970
Voltage : 415 Phase : 3
Motor efficiency Cert.N°

% Load	100%	75%	50%
Efficiency	90.7%	91.3%	89.6%

CONTROL PANEL
Make : CAE
Type No. : 30KW SS FPC VER-01
Voltage : AC 415 V
Serial No : 1708001
Starter : SOFT STARTER
Option 1. : DATA LOG
Option 2. :
Option 3. :

MEASURING INSTRUMENTATION
HEAD Disch.Sensor: KROHNE OPTIBAR P1010C Cert.N°
Suct. sensor: KROHNE OPTIBAR P1010C Cert.N°
FLOW: Magnetic Flow meter Cert.N°
KROHNE OPTIFLUX 1000 C/W IFC 050 Serial N°
Doc.N°
POWER: SIEMENS SENTRON PAC3200 Cert.N°
SPEED: CEM AT-6 TACHOMETER Cert.N°

TEST BY :
SIGNATURE :
DATE :

Flow= Flow Constant x √Manometer Diff.
Suction Pipe Ø : 200
Discharge Pipe Ø : 150
Velocity Head (x10^5) : 11.157
Velocity Head Diff. (m)= Flow^2x Velocity Head Diffx10^-5

Full Load (A) 43.50
Impeller Ø : 198 mm
File No: TEST, R22-8-17, T03

We shall be confirm in writing the pumpset serial number, that the tests have been conducted and that each pumpset is in accordance with the AS2941 standard.

Besides that, we shall supply a pump characteristic curve calculated from the data obtained during the test.

The manufacturer shall also supply a schedule of all readings taken during the test.

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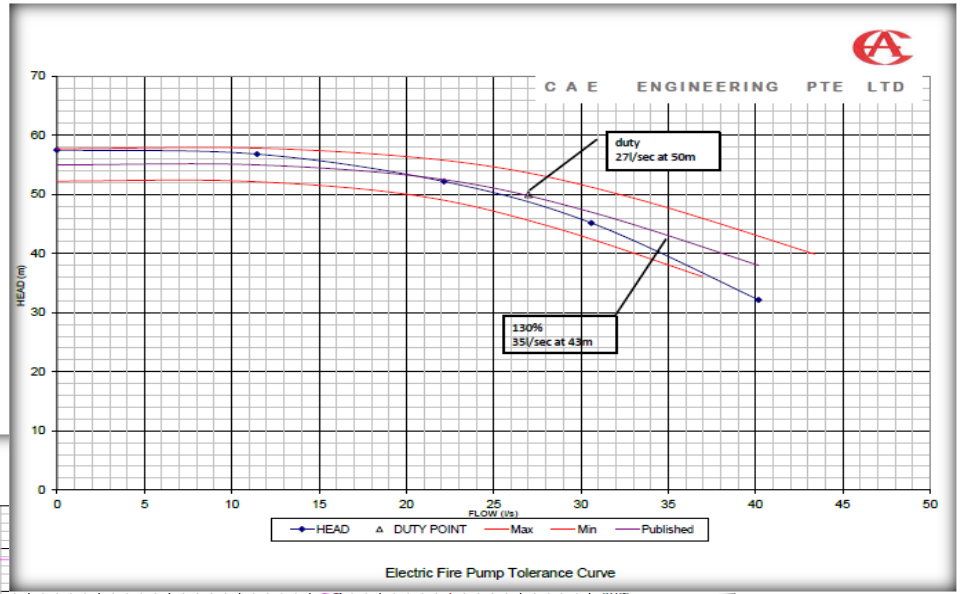
GRUNDFOS

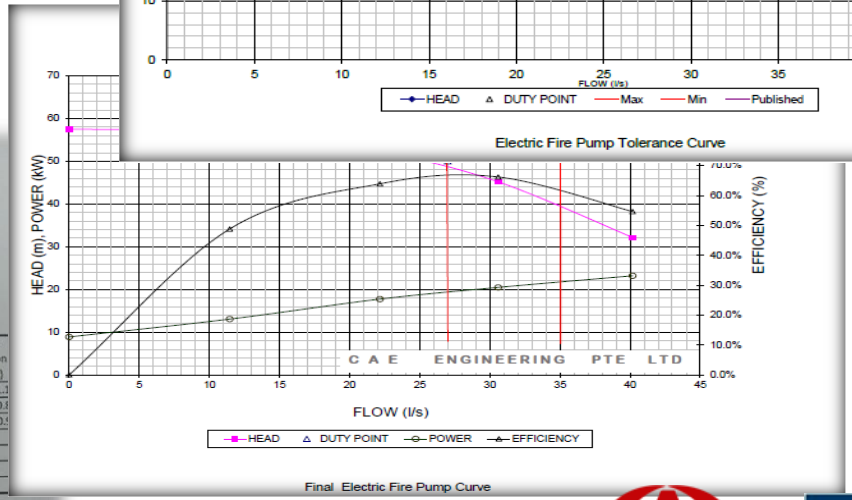
CAE testing procedure for the pump and controller in compliance with the requirement of AS2941:

In addition, during the hydraulic performance test of the fire pump set, the checks listed below shall be carried out and, where indicated, details of readings shall be confirmed in writing:

1) Temperature readings of the bearings on the pump and electric driver
2) Undue vibration in the pump, driver or both. Any vibration in this category shall be investigated and rectified

All readings shall be taken periodically, during, and at the completion of the test run. Besides that, all readings shall be confirmed in writing





ELECTRIC PUMP SET - During 15 min test, check the following :

Every 5 minutes

Flow rate: 0
Controller Serial Number: 1708001
Pump Model : NK 65-200
Motor Model : ME-180L8-2
Panel Model : CAE - AS 2941

Date : 8th Aug 2017
Pump Serial Number : B98917263
Motor Serial : 17031141C
Panel Serial Number : 1708001

Duration (min)	ACTUAL START TIME : Actual time :(Hour:Min)	Voltage (V) L1/L2/L3	Current (A) L1/L2/L3	Power (KW)	Stffing Box Temperature (°C)	Bearing Temperature (°C) Motor End	Bearing Temperature (°C) Pump End	Speed (r/min)	Check Vibration (mm/s)
5	15:36	419/421/421	25.6/24.4/27.6	10.38	37.8	51.2	35.6	2990	1.1
10	15:46	419/421/421	24.8/23.8/26.9	10.34	39.6	57.4	36.8	2992	0.3
15	16:01	419/420/420	24.8/23.8/26.9	10.3	40.4	57.6	36.8	2991	0.5

Tested By : Sam Chuah.
Job Title : Operation Manager
Signed :

Approved By:
Job Title :
Signed :

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FIRE PUMP CONTROLLERS

BUILT TO AS2941-2013 (5TH EDITION)

Model : FPC VER-01



Standard Features

- IP55 ENCLOSURE
- INCOMING,OUTGOING AVAILABLE INDICATION
- PHASE REVERSAL /LOSS ALARM
- PUMP ON DEMAND, RUN, OVERCURRENT, FAILED TO START INDICATION
- AC AMPERE DISPLAY
- BATTERY CHARGER DC VOLTAGE, AMPERE DISPLAY
- START AND STOP PUSHBUTTONS
- LAMP TEST PUSHBUTTON
- REMOTE START PROVISION
- INTERLOCK AND LOCK OUT PROVISION
- BUZZER WITH MUTE PUSHBUTTON
- VOLTAGE FREE CONTACT FOR REMOTE MONITORING

Options

- OP1 - Anti-condensation heater & thermostat
- OP2 - Data log, pressure & event recording
- OP3 - Modus with RS485 connection





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All functions of the fire pump controller shall be tested to ensure compliance with the AS2941 , SS575 OR CP52 REQUIREMENT.

- An individual fire pump controller shall be provided for each fire pump and shall have a degree of protection not inferior to IP54.
- The cabinet is provided with lockable access doors & viewing panel which is less than 40% of the door area.
- The pump circuit shall be isolated and protect by a circuit breaker that is capable of being locked in the “ON” position (power supply on)
- The transition for the motor starter , through the starting steps shall be automatic.
- Motor attains full speed before 15 seconds of receipt of start signal
- A test facility shall be provided for the testing of indicator lights and audible alarms.
- Ammeter is provided to indicate the phase currents of the motor
- The monitor battery is capable to maintain the monitoring and alarm functions for greater than 72 hours
- Battery charger is provided to charge the battery and capable of three stages battery charging. The accuracy class for DC voltmeter and ammeter is 1.5

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Model : FPC VER-01 (Option 2 & 3)

- OP2-Data log, pressure & event recording

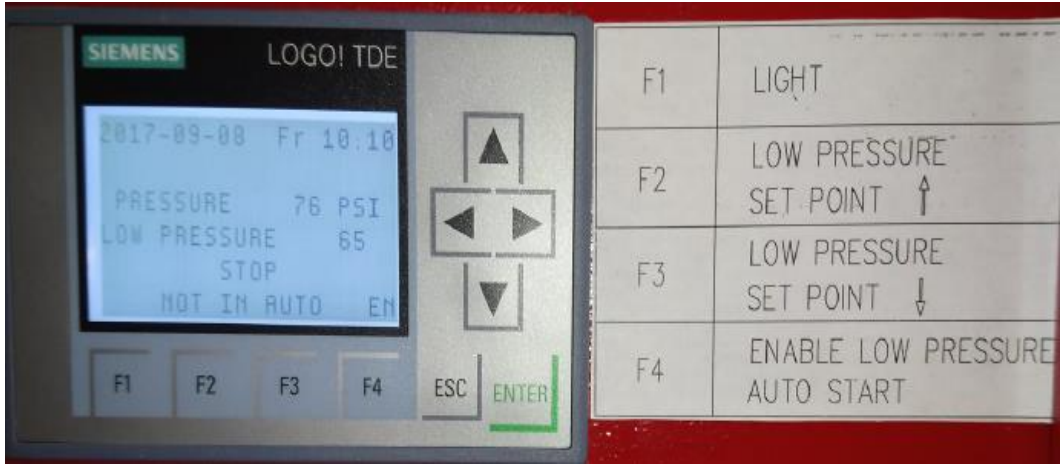
  15DAYS - 60DAYS (STORAGE IN SD CARDS)

  PLC INSTALL INSIDE CONTROLLER



FOR RECORDING OF DATE, TIME, SYSTEM PRESSURE, LOW PRESSURE SETTING, RUN/STOP/ NOT-IN AUTO, AND FAULT (PHASE LOSS/MAIN SUPPLY FAILED/OVER CURRENT AND STARTER FAULT)

- OP3-Modus with RS485 connection

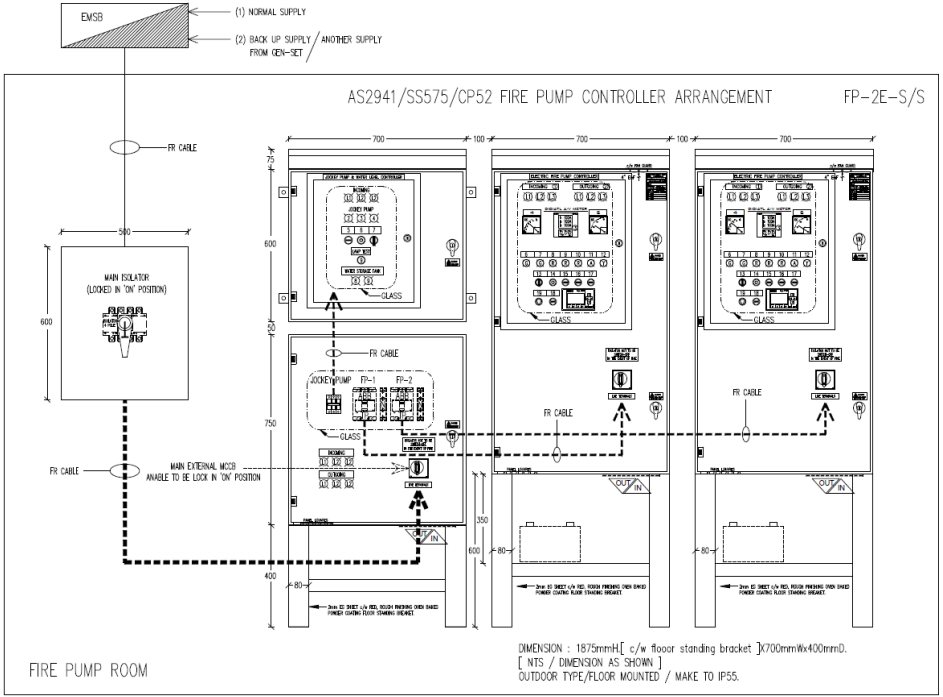


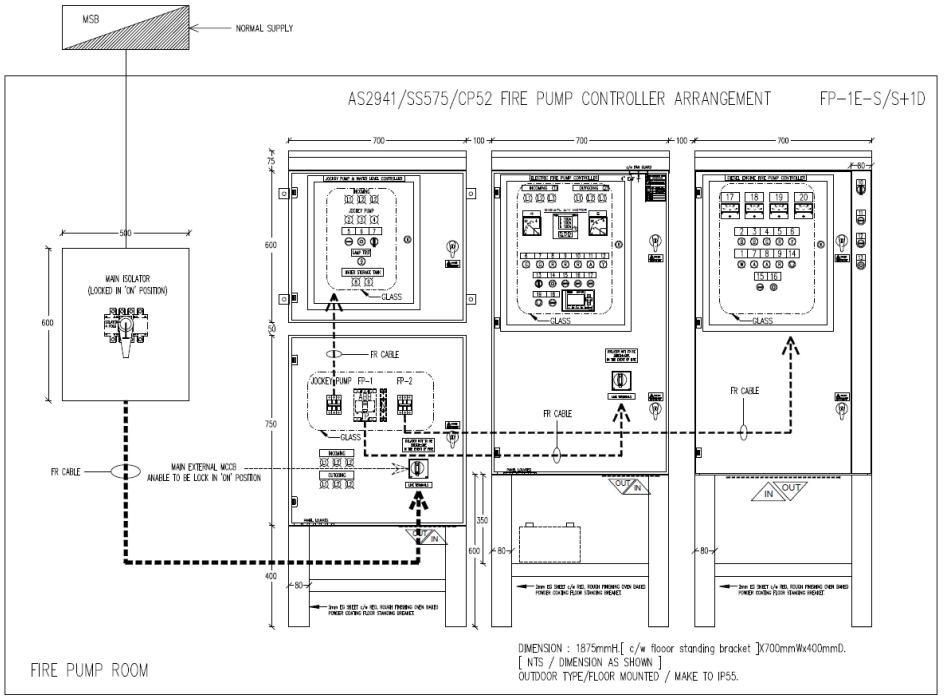
- LCD SCREEN INSTALL ON CONTROLLER DOOR-

  FOR SETTING , CALIBRATION, RS485 INTERFACE AND DATA MONITORING.

- BY PRESSING F4 KEY, SHOWING “EN”

  THE PUMP WILL AUTO START AT LOW PRESSURE SET POINT OVERRIDE THE PRESSURE SWITCH CONTROL.


EMSB
(1) NORMAL SUPPLY
(2) BACK UP SUPPLY FROM GEN-SET / ANOTHER SUPPLY
AS2941/SS575/CP52 FIRE PUMP CONTROLLER ARRANGEMENT
FP-2E-S/S
FR CABLE
MAIN ISOLATOR (LOCKED IN 'ON' POSITION)
JOCKEY PUMP FP-1 FP-2
MAIN EXTERNAL MCCB ANABLE TO BE LOCK IN 'ON' POSITION
GLASS
OUT
IN
FIRE PUMP ROOM
DIMENSION : 1875mmH.[c/w floor standing bracket]X700mmWx400mmD.
[NTS / DIMENSION AS SHOWN]
OUTDOOR TYPE/FLOOR MOUNTED / MAKE TO IP55.

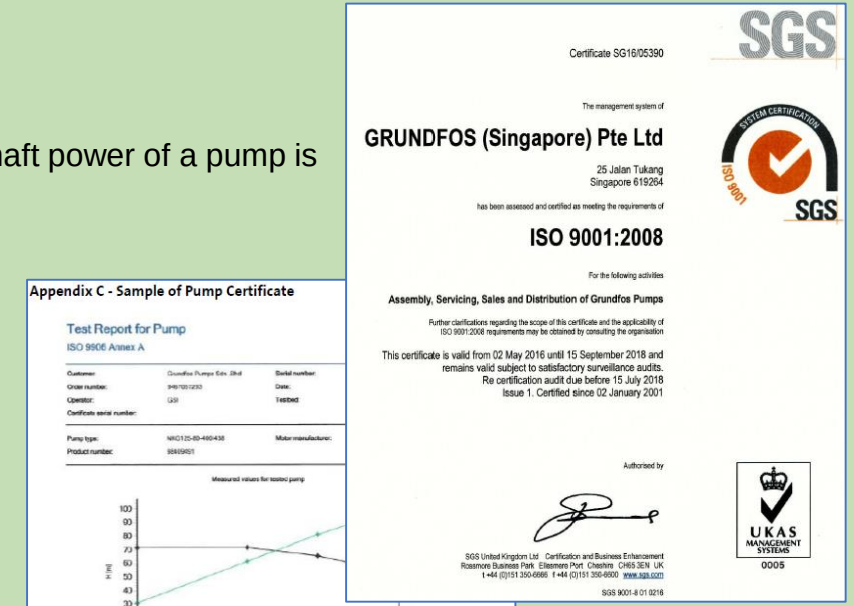

MSB
NORMAL SUPPLY
AS2941/SS575/CP52 FIRE PUMP CONTROLLER ARRANGEMENT
FP-1E-S/S+1D
FR CABLE
MAIN ISOLATOR (LOCKED IN 'ON' POSITION)
JOCKEY PUMP FP-1 FP-2
MAIN EXTERNAL MCCB ANABLE TO BE LOCK IN 'ON' POSITION
GLASS
OUT
IN
FIRE PUMP ROOM
DIMENSION : 1875mmH.[c/w floor standing bracket]X700mmWx400mmD.
[NTS / DIMENSION AS SHOWN]
OUTDOOR TYPE/FLOOR MOUNTED / MAKE TO IP55.

Grundfos Pump Testing & Certificates

- Witness performance test in Grundfos Test Bed
  - ➢ To prove the tested flow rate, total head, pump efficiency and shaft power of a pump is satisfactory under ISO 9906.

- **NK Testbed** - End-suction Test Bed is a specially designed productions tester for Q/H test of pump models ranging from End-Suction (Single Stage) pumps (DN32 -> DN300). It is able to facilitate Testing of Flow up to 2000m³/h and Total Differential Head up to 20 Bar.

- **GIGA Test Bed** – GIGA Test bed is a specially designed production tester for Q/H test of Horizontal Split-case and End-Suction pumps (DN50 -> DN500). One of the largest test bed in Grundfos and it is able to facilitate testing of flow up to 4000m³/h and total differential head up to 20 Bar.


Certificate SG16/05390

SGS

The management system of

GRUNDFOS (Singapore) Pte Ltd

25 Jalan Tukang
Singapore 619264

has been assessed and certified as meeting the requirements of

ISO 9001:2008

For the following activities

Assembly, Servicing, Sales and Distribution of Grundfos Pumps

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the organisation

This certificate is valid from 02 May 2016 until 15 September 2018 and remains valid subject to satisfactory surveillance audits.
Re certification audit due before 15 July 2018
Issue 1. Certified since 02 January 2001

Authorised by

SGS United Kingdom Ltd Certification and Business Enhancement
Rossmore Business Park Ellesmere Port Cheshire CH65 3EN UK
t +44 (0)151 350-6666 f +44 (0)151 350-6600 www.sgs.com

SGS 9001-8 01 0216

UKAS MANAGEMENT SYSTEMS
0005

Appendix C - Sample of Pump Certificate

Test Report for Pump

ISO 9906 Annex A





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MODULAR PUMPSET TESTING , TEST AS A COMPLETE ASSEMBLY



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FIRE PUMP MODULAR SYSTEM

PRE-ASSEMBLY AND TEST ON A COMMON MANIFOLD



Model : CAE-HR-BS VER 01

The Fire Hosereel Boosters set are simple and reliable system, consisting of 2 Pumps , connected in parallel and mounted on a common skid base.

The Fire Hosereel Boosters set are supplied as complete, pre-assembled and tested system including suction and discharge manifolds, isolating valves, non-return valves, pressure switches and gauges.

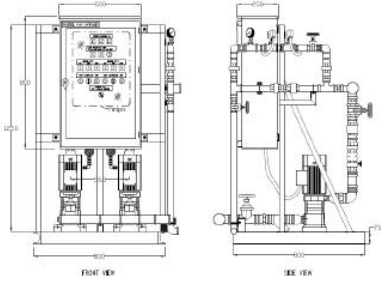
The controller comes with motor protection , incoming indication, water level sensor with high/low level indication, Run/stop/trip indication for each pump , auto/off/manual selector , manual start/stop pusbutton and duty/standby selector switch.

Standard Features

- IP55 ENCLOSURE (SUITABLE FOR OUTDOOR USAGE)
- 2 PUMPS OPERATION (1 DUTY + 1 STANDBY)
- TEST RACK WITH PRESSURE GAUGE AND SWITCHES

Optional Features

- DATA LOG (PRESSURE , PUMP STATUS, DATE AND TIME RECORDING)
- HOUR RUN METER FOR EACH PUMP
- VOLT/AMP/POWER METER FOR CONTROLLER





System Operation

When the hose is opened, Water will be drawn from the system. The pressure will drop to the first cut-in pressure level, and the duty pump will be activated.

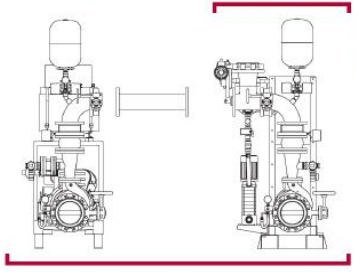
When the water demand increases, the stand-by pump will cut-in until the performance of the pumps in operation corresponds to the demand.

As the water demand falls, the discharge pressure will rise to the first cut-out pressure level and the pressure switch will cut-out one pump . as water demand continuous to falls, the other pump will eventually cut-out, and in preparation for the next demand cycle.

FIRE PUMP SYSTEMS



Example of a single pumping unit



Example of a pumping set with two pumps

System Operation

In the event of a fall in pressure, the Jockey Pump will automatically start, its control operation is via the pressure switch.

Should the flow provided not sufficient to cope with the demand, the Duty Main Fire Pump will automatically be started via the pressure switch and continue to operate until manually stopped.

The standby Main Fire pump will automatically start, should the Duty Main Fire Pump Failed. Once the standby Main Fire Pump start. it continue to operate until manually stopped.

C A E ENGINEERING PTE LTD

Model :

CAE-FP-2E/1ED/2DD VER 01

The Fire Pump System are simple and reliable system, consisting of 1 Jockey Pump and 2 Main Pumps , connected in parallel and mounted on a common skid base.

The Fire Pump Systems are supplied as complete, pre-assembled and tested system including suction and discharge manifolds, isolating valves, non-return valves, pressure switches and gauges.

The controller comes with IP55 enclosure incoming and outgoing indication. Phase reversal, loss alarm. Pump on demand, overcurrent, failed to start, run and stop indication. Batt charger DC voltage and ampere display. Auto/off/manual selector, manual start, stop and lamp test pushbutton. Buzzer with mute pushbutton. Duty/standby selector switch. Voltage free contact for remote monitoring.

Equipment supplied as standard

- JOCKEY PUMP
- 2 MAIN FIRE PUMPS (1 DUTY + 1 STANDBY)
- FIRE PUMP CONTROLLERS
- INTER-CONNECTING MANIFOLD
- TEST RACK WITH PRESSURE SWITCHES/TRANSDUCER, GAUGES AND VALVES.

Optional Features

- DATA LOG (PRESSURE , PUMP STATUS, DATE AND TIME RECORDING)
- PRESSURE VESSEL TANK
- VOLT/AMP/POWER METER FOR CONTROLLER

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UL/FM FIRE PUMPSET





AS2941 FIRE PUMPSET

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	NFPA20 , UL LISTED , FM APPROVED , PSB/SETSCO LISTED PUMPSET	AS2941 , PSB/SETSCO LISTED PUMPSET
1	LISTING IN Q AND H + MODEL	LISTING IN MODEL
2	TEST AND LIST BY INDIVIDUAL VENDOR, THEN ASSEMBLY BY PUMP MANUFACTURER	TEST AS A COMPLETE ASSEMBLY
3	DUTY POINT (CAN BE 90-140% OF RATED FLOW)	DUTY POINT ONLY
4	MIN OF 65% OF HEAD AT 150% FLOW	MIN. 80% OF DUTY HEAD AT 130% FLOW
5	MAXIMUM OF 140% OF HEAD AT SHUT OFF	MAXIMUM OF 140% OF HEAD AT SHUT OFF
6	NEMA FRAME, SF OF 1.15	IEC FRAME, SF OF AT LEAST 1.15
7	ODP, NEMA 2	TEFC , IP55
8	DIESEL TANK IS SIZE BASED ON 1GAL PER HORSEPOWER	DIESEL TANK IS SIZE BASED ON 6HRS OF CONSUMPTION
9	STANDARD ON DATA LOGGER	OPTION FOR DATA LOGGER
10	CONTROLLER BUILT WITH EMERGENCY START MECHANISM - DOL STARTING (600-800% OF FLA)	CONTROLLER NOT BUILT WITH EMERGENCY START MECHANISM
11	NO REQUIREMENT ON MONITOR BATTERY C/W CHARGER SHALL BE PROVIDED TO MAINTAIN THE MONITORING AND ALARM FUNCTION OF THE ELECTRIC CONTROLLER	MONITOR BATTERY C/W CHARGER SHALL BE PROVIDED TO MAINTAIN THE MONITORING AND ALARM FUNCTION OF THE ELECTRIC CONTROLLER FOR 72HRS

Thank You For Your Attention

Questions ?



C A E ENGINEERING PTE LTD

GRUNDFOS AUTHORISED DEALER

GRUNDFOS