Descriptive Report

MASTER CONTRACT: 302889
REPORT: 80125659
PROJECT: 80125659

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Report pages issued.

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PRODUCTS

CLASS 2632 03 - FUEL BURNING EQUIPMENT (Gas), Gas Burners, Electrical Equipment for – Accessories
CLASS 2632 83 - FUEL BURNING EQUIPMENT (Gas), Gas Burners, Electrical Equipment for – Accessories- Certified to U.S. Standards

Table 1: System Configuration:

Control Model	Features	Burner Unit	Software Version	HW Revision
Platinum Burner Controller PLABC1 (103031)	Pilot Ignition Control	PLA1	Software Version U1: 1.0.3-499 CRC: 0xFE5524DB Software Version U2: 1.0.3-499 CRC: 0x87598553	80125659 Ed1

Safety Controller for Pilot Ignition module - Platinum Burner Controller PLABC1 utilized inside the burner PLA1 per Table 1, Ambient -40C to 80C, type 2AI, hot surface ignition, pilot ignition, Class C control, 100,000 cycles.

Rated Input:
24Vac with 120Vac Class 2 transformer (Limited energy), 60hz. 50VA.

Rated Output:
Main Valve 12Vdc 200mA, 24Vac 3A Contact,

Pilot Valve 12Vdc 200mA, 24Vac 3A Contact,
Hot Surface Ignitor: 12Vdc 200mA, 24Vac 4A max Contact.

Timing	Minimum	Maximum
Flame failure response time	30 seconds minimum	180 seconds maximum
Recycle time	0 seconds minimum	60 seconds maximum
Pre-purge time	0 seconds minimum	60 seconds maximum
Interpurge	0 seconds minimum	60 seconds maximum
Post-purge time	0 seconds minimum	60 seconds maximum
Ignition activation period	0 seconds minimum	60 seconds maximum
For “proved” ignition systems only:		
Igniter proving time	10 seconds minimum	90 seconds maximum
Trial for ignition period	10 seconds minimum	90 seconds maximum
Valve sequence period	60 seconds minimum	210 seconds maximum
For hot surface ignition devices only:		
Igniter warmup time	1 seconds minimum	15 seconds maximum
Number of ignition trials before hard or soft lockout:	3	

Notes:

1. Above model is Certified as a component model to be used inside Certified enclosed equipment where the suitability of the combination is evaluated by CSA-Group.
2. The Pilot Ignition Control Platinum Burner Controller PLABC1, Model No PLABC1 as indicated at Table 1 is an automatic burner control systems which is provided with software Version as confirmed in software report – 80125660 as Appendix B of this report. The Class C safety function Pilot Ignition Control Platinum Burner Controller PLABC1, Model No PLABC1 is evaluated as ignition and flame sensing for safety control only.
3. Pilot Ignition Control Platinum Burner Controller PLABC1, Model No PLABC1 shall only be installed and serviced by qualified service personnel as per instruction described in installation manual for outdoor application only.

APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No 60730-2-5:14 - Automatic electrical controls for household and similar use - Part 2-5: Particular requirements for automatic electrical burner control systems - First Edition
ANSI Z21.20 / UL 60730-2-5:14 - UL Standard for Safety Automatic Electrical Controls for Household and Similar Use, Part 2-5: Particular Requirements for Automatic Electrical Burner Control Systems - Third Edition
CAN/CSA-C22.2 No 60730-1:13 - Automatic electrical controls for household and similar use - Part 1: General requirements - Fourth Edition
UL 60730-1:09 - UL Standard for Safety Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements - Fourth Edition

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Nameplate adhesive label material approval information:

Submittor's name, model designation, electrical rating, extreme ambient temperatures, date code and CSA monogram are marked in a permanent manner on a CSA accepted adhesive type label.
All markings as required in the applicable standard.

a. Version and date or unique software code is marked on the control board nameplate label in a permanent manner.
b. Refer software report Appendix B, page 1, for current applicable software version number.

ALTERATIONS

Markings as above.

FACTORY TESTS

Each transformer before assembly into the equipment shall be subjected to the following dielectric strength tests for a period of one minute, without breakdown:

An ac potential applied between each winding and the core and metal enclosure, with all other windings grounded to the core and metal enclosure. The test potential shall be:

(a)For windings rated 30V and less, 500V ac.

(b)For windings rated over 30V, twice the max rated voltage of that winding plus 1000V ac.

As an alternative, a potential 20 percent higher may be applied for one sec.

Warning: The factory test(s) specified may present a hazard of injury to personnel and/or property and should only be performed by persons knowledgeable of such hazards and under conditions designed to minimize the possibility of injury.

Manufacturing and Production Tests: Annex DVLL (Bi-National Z21.20-2014/C22.2 No. 60730-2-5-2014)

1. Manufacturer shall use a program to qualify raw materials, parts, assemblies and purchased components: (Cl.DVLL.1). Refer Appendix B for details of the program.

2. The submittor shall ensure that the following factory tests are conducted at the frequency specified and the results are documented and made available for review by CSA field services representatives: (Cl. DVLL.2, DVLL.3 and DVLL.4). Refer Appendix B, for test sheets as confirmed by manufacturer, for documentation of the following test results.

	Test	Clause	Acceptance criteria	Frequency	Pass/Fail
1	Timings	15.5	The timings shall not exceed the manufacturer's specified maximum timings or be less than the manufacturer's specified minimum timings	*100%	P

2	Endurance	17.16.101 17.16.102 17.16.105 17.16.105A	For electronic controls cycled between T_{min} and T_{max} temperatures for 14 days with max declared ratings. Every 24 hour period voltage is reduced to $0.9V_{Rated}$ for 30 minutes and supply voltage is switched off for 30secs. System is tested as follows for max ratings: -45,000 cycles at V_R @ 25C for electronic controls and T_{MAX} for electromechanical controls -2500 @ T_{min} and 1.1 V_R -10,000 and 2,500 for electronic controls @ T_{MIN} and $0.85V_R$ -The remaining number of cycles to complete 100,000 cycles at V_R , I_{MAX} and T_{MAX} -Lock-out reset test for total of 6,000 cycles and at the end of the test timings shall not be adversely affected. Conducted 3,000 flame disappearing and 3,000 cycles flame presence. -Continuous lockout for electro-mechanical controls. Control energized for 48hrs at 1.1 V_R de-energized for 1 hr. The lockout timing shall not exceed declared values.	Once a year	P P P
3	Timings	15.5	The timings shall not exceed the manufacturer's specified maximum timings or be less than the manufacturer's specified minimum timings at the T_{min} and T_{max} operating temperatures, and 85% and 110% of the manufacturers specified rated voltage.	Once a year	P
4	Dielectric strength	13.2	1000 volts ac plus twice the max rated voltage for 1 minute. For safety extra low voltage circuit the above test is conducted at 500 volts ac.	100%	P

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component descriptions marked with either the "(INT)" or "(INT*)" identifiers may be substituted with other components providing the requirements specified under the notes in the "Description" are complied with.

COMPONENT SPECIAL PICKUP

1. Component descriptions marked with the identifier "(CT)" are subject to annual pickup and Conformity Testing.

DESCRIPTION

Notes:

1. Component Substitution
   a) Critical components (those identified by mfr name, cat no), which are NOT identified with either "INT" or "INT*" are not eligible for substitution without evaluation and report updating
   b) The term "INT" means a "Certified" and/or "Listed" (or a "Recognized" and/or "Accepted") component may be replaced by one "Certified" and/or "Listed" by another certification organization

accredited by the appropriate accreditation body or scheme requirements to the correct standard, for the same application; providing the applicable country identifiers are included and requirements in item "d" below are complied with.

c) The Term "(INT*)" means a "Recognized" and/or "Accepted" component may be replaced by a component that is CSA Certified. The applicable country identifiers shall be included, the requirements in item "d" below as well as any "conditions of suitability" for the component (as recorded in this descriptive report) shall be complied with;

d) Components which have been substituted, must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.

e) Substitution of a "Certified" and/or "Listed" component with a component that is "Recognized" or "Accepted" is not permitted without evaluation and report updating.

f) Substitution of a "Recognized" and/or "Accepted" component by one that is not CSA Certified is not permitted without a proper evaluation as well as a report update because the Conditions of Acceptance of the original component may be different than the Conditions of Acceptance of the substitute component.

g) Software changes associated with Appendix B, software report 80125660, Catalyst Electronics LLC will inform CSA-International of any software changes with reference to the model tested in this report and obtain CSA approval before incorporating the new software version.

h) Minimum spacing requirements reference, Standard C22.2 No.60730-2-5:
   i) Table 23 minimum creepage distances for basic insulation and Table 24 creepage distances for operational insulation.
   ii) Table 22, clearances

General:

The following provides more detailed information of the construction of the model and Annex- A check list of the requirements.

QTY	UOM	Catalyst Electronics Part Number	Manufacturer Part Number	Manufacturer	Description	Cert #
1	Each	103038	X901550398001F4	ASCO	ASCO Valve	CSA cert # 112872
		103322	103322	Catalyst Electronics	Enclosure Box	
1	Each	103051	T36A1-1D	Baso	ThermoPile	
1	Each	102941	J952DDA-1D	Baso	J Series Combination Pilot Burner	CSA# 199-M89
1	Ddpends	102953	Y90AA-3225D	Baso	NG Inlet reducer	
		102942	Y90AA-4218D		LP Inlet reducer	
1	Each	103050	Warming Trends 401 Mini Igniter	Coors Tek	CoorsTek Mini-Ignitor 401	CSA/UL Certificate
1	Each	103031	NON-WPV	MacroFab	PCB Board	
1	Each	102937		Catalyst Electronics	Wind Cage Body	
		102938		Catalyst Electronics	Wind Cage Cap	
1	Each	103032		Catalyst Electronics	Potting Box	
1.7	OZ	103033	Tough Seal 21	Key Polymer	Tough seal 21	UL 94 V-0
1	Each	103062	T4-NF02-24	Dormont	Dormont 1/4 in OD Corrugated FlexTube, 7/16-24 Male x Female Compression 2 ft	

4	Feet	102945	FIN0.25BK	TechFlex	1/4 in OD Black FireFlex Sleeve	
1	Each	103055	DT06-2S-EP11	TE Connectivity	Black Automotive 2 Way Plug 16-22 AWG, SHRK BT ADPT	EU REACH Regulation (EC) No. 1907/2006
1	Each	103039	DT04-2P-E004	TE Connectivity	Black Automotive Connector 2 Way Receptacle 16-20 AWG	EU REACH Regulation (EC) No. 1907/2006
1	Each	103060	DT06-2S-E008	TE Connectivity	Grey Automotive 2 Way Plug 16-22 AWG, SHRK BT ADPT	EU REACH Regulation (EC) No. 1907/2006
1	Each	103040	DT04-2P	TE Connectivity	Grey Automotive Connector 2 Way Receptacle 16-20 AWG	EU REACH Regulation (EC) No. 1907/2006
1	Each	103042	DT04-6P	TE Connectivity	Grey Automotive Connector 6 Way Receptacle 16-20 AWG	EU REACH Regulation (EC) No. 1907/2006
2	Each	103056	W2-S	TE Connectivity	Wedge Lock for 2P Plug Housing	EU REACH Regulation (EC) No. 1907/2006
2	Each	103041	W2P-P004	TE Connectivity	Wedge Lock for 2P Receptacle Housing	EU REACH Regulation (EC) No. 1907/2006
1	Each	103043	W6-P004	TE Connectivity	Wedge Lock for 6P Receptacle Housing	EU REACH Regulation (EC) No. 1907/2006
1	Each	103044	DT6P-DC	TE Connectivity	Grey Automotive Connector 6 Way Receptacle 16-20 AWG Dust Cover	EU REACH Regulation (EC) No. 1907/2007
4	Each	103057	0462-201-16141	TE Connectivity	Automotive Connectors DT CON SKT #16 16-20AWG CRP NI	EU REACH Regulation (EC) No. 1907/2008
9	Each		0460-202-16141	TE Connectivity	Automotive Connectors DT PIN SZ 16, 16-20 AWG	EU REACH Regulation (EC) No. 1907/2009
2	Each		19003-0001	Molex	Terminals QK DISCONNECT FEMALE 18-22 AWG	
2	Each		19004-0001	Molex	Terminals INSULATED COUPLER 18-22 AWG male	
1	Each	103045	IPG-2227 (Digi-Key Part # 377-2183-ND)	Bud Industies	Black PG7 Cable Gland	
1	Each	103046	18179	Midland	1/4 in MPT x 1/8 in MPT Compression X MIP Adapter	
1	Each	103029	103029	Catalyst Electronics	Hot Surface Ignitor Bracket	
1	Each	103035	QZ6B-QLED/X/N	QZ Industial	24v Red LED indicator light	
1	Each	100310	Packard PF42450	Packard	24 Volt transformer Class 2	UL E175771
1	Each	100716	CED ORB.664R	Catalyst Electronics	6x6x4 ORBIT Outdoor Electrical Control	
2	inch	103061	H2A0.13BK	TechFlex	1/8 in Black 2:1 Dual Wall Adhesive	
3	inch	103058	H4A0.75BK	TechFlex	3/4 in Black 4:1 Dual Wall Adhesive	

2	Each	102950			10-32 x .1875 in Pan Head Screw	
2	Each	102951			#10 SAE Machine Screw Flat Washer	
2	Each	102949			3/16 Aluminum Pin-Drive Rivet .156-.219 Grip	
1	Each	102948			5/32 Aluminum Rivet .063-.125 Grip	
1	Each	100325	PCS6		6 ft Pigtail	
2	Each	100712	ARL.LPCG507		1/2" .385-.750 Cord Grip (Strain Relief Cord Connector)	
2	Each	100714			16 to 14 AWG 8 Stud Vinyl Insulated Butted Seam Hook Terminal Ground Hook	
3	Each	100715			Weatherproof Wire Nut	

Critical Components for Platinum Burner Controller PLABC1 (103031 PWB)

Name	Description	Designator	Quantity	Manufacturer 1	Manufacturer Part Number 1	Supplier 1	Supplier Part Number 1	Specified Part Only
1N4148WS	DIODE GEN PURP 75V 150MA SOD323F	D1.R_HSI, D1.R_M, D1.R_P, D2.VS1, D2.VS2, D2.VS3, D2.VS4, D7	8	ON Semiconductor / Fairchild	1N4148WS	Digi-Key	1N4148WSFSCT-ND	No
S1B-13-F	DIODE GEN PURP 100V 1A SMA	D3	1	Diodes	S1B-13-F	Digi-Key	S1B-FDICT-ND	No
S110FP	DIODE SCHOTTKY 100V 1A SOD123HE	D5, D9	2	ON Semiconductor / Fairchild	S110FP	Digi-Key	S110FPCT-ND	No
SS16FP				On Semi				No
15V	DIODE ZENER 15V 200MW SOD323F	D6.VS1, D6.VS2, D6.VS3, D6.VS4	4	ON Semiconductor / Fairchild	MM3Z15VB	Digi-Key	MM3Z15VBCT-ND	No
				Nexperia			PZU16B2,115	No
33uH	FIXED IND 33UH 840MA 330 MOHM	L3, L4	2	Abracon	ASPI-4030S-330M-T	Digi-Key	535-12319-1-ND	No
				Laird-Signal Integrity Products			TYA4020330M-10	No
74LVC1G17SE-7	IC BUF NON-INVERT 5.5V SOT353	U10.R_HSI, U10.R_M, U10.R_P, U11	4	Diodes	74LVC1G17SE-7	Digi-Key	74LVC1G17SE-7CT-ND	No
				Diodes Incorporated			74AUP1G34SE-7	No
STM32F302C8T6	IC MCU 32BIT 64KB FLASH 48LQFP	U1, U2	2	STMicroelectronics	STM32F302C8T6	Digi-Key	497-14699-ND	Yes
AZV321KSTR-G1	IC OPAMP GP 1 CIRCUIT SC70-5	U8	1	Diodes	AZV321KTR-G1	Digi-Key	AZV321KTR-G1DICT-ND	No
LMR14006YDDCR	IC REG BUCK ADJ 600MA TSOT23-6	U5, U7	2	Texas Instruments	LMR14006YDDCR	Digi-Key	296-44319-1-ND	No
NCV4264-2CST33T3G	IC REG LINEAR 3.3V 100MA SOT223	U6	1	ON Semiconductor	NCV4264-2CST33T3G	Digi-Key	NCV4264-2CST33T3GOSCT-ND	No

TCAN337GDR	IC TRANSCEIVER 1/1 8SOIC	U3	1	Texas Instruments	TCAN337GDR	Digi-Key	296-44213-1-ND	No
SSM3K339R	MOSFET N-CH 40V 2A SOT-23F	Q1.R_HSI, Q1.R_M, Q1.R_P, Q2, Q3	5	Toshiba	SSM3K339R,LF	Digi-Key	SSM3K339RLFCT-ND	No
PTC 60V 300mA	PTC RESET FUSE 60V 300MA 2920	PTC1	1	Bel	0ZCF0030FF2C	Digi-Key	507-1740-1-ND	No
ALDP112W	RELAY GEN PURPOSE SPST 5A 12V	K1.R_HSI, K1.R_M, K1.R_P	3	Panasonic	ALDP112W	Digi-Key	255-3589-ND	Yes
Relay	RELAY GEN PURPOSE SPST 15A 12V	K2	1	Omron	G5CA-1A-E DC12	Digi-Key	Z2162-ND	Yes
ACS711	SENSOR CURRENT HALL 25A AC/DC	U4	1	Allegro MicroSystems	ACS711KLCTR-25AB-T	Digi-Key	620-1373-1-ND	Yes
STM_JTAG_UART	STM SWD/JTAG interface and UART Rx/Tx ports	J1, J3	2	Samtec Inc.	FW-05-04-G-D-440-120, SAM8909-ND	Samtec Inc., Digi-Key	FW-05-04-G-D-440-120, SAM8909-ND	No
ESD5Z3.3T1G	TVS DIODE 3.3V 14.1V SOD523	D8, D14	2	ON Semiconductor	ESD5Z3.3T1G	Digi-Key	ESD5Z3.3T1GOSCT-ND	No
ESD5Z12T1G	TVS DIODE 12V 25V SOD523	D11, D12, D13	3	ON Semiconductor	ESD5Z12T1G	Digi-Key	ESD5Z12T1GOSCT-ND	No
SMBJ40CD-M3/H	TVS DIODE 40V 63.6V DO214AA	D4, D10.R_HSI, D10.R_M, D10.R_P	4	Vishay	SMBJ40CD-M3/H	Digi-Key	SMBJ40CD-M3/HGICT-ND	No

TEST HISTORY

The following tests were conducted to the requirement of Bi-national Std CAN/CSA C22.2 No.60730-2-5-2014/ANSI Z21.20-2014 (in conjunction with CAN/CSA E60730-1-2013) with acceptable results.

Construction Review:

Construction review performed with satisfactory results.

Test clause	Description of Test	C/W/N/A	Remarks
4.1	Conditions of test	C	Per rating
4.2	Samples requirement	C	Use different samples
4.3.2.1	Instructions for test (ac/ dc)	C	AC
6.11	Automatic cycles (100,000 min for USA/Canada)	C	100,000 cycles
7.0	Information / (Table 7.2)	C	
11.101	Flame detector devices	C	Thermopile
12.2	Moisture and dust resistance	W	Potted
13	Electric strength and insulation resistance	C	
14	Heating	C	
15	Manufacturing deviation and drift (operating times, sequence and flame detector characteristics)	C	

16	Environmental stress	W	-40℃-80C
17	Endurance (total 100,000 min for Canada/USA, or 250K for other)	C	100,000 cycles
17.2.3	Overload	N/A	Fused
17.16.101	Thermal cycling test (additional test for electronic controls only when conducting endurance test, 14 days)	C	14days
17.16.102	Endurance test of automatic and manual action at normal operating rate	N/A	
17.16.103	Vibration test (if declared)	N/A	
17.16.104	Endurance test of automatic action at accelerated rate	N/A	
17.16.105	Lock-out reset test	C	6000cycels (with thermal cycling test)
17.16.106	Components of systems declared for operation at ambient temperature above 125^0C	N/A	
18.2	Impact resistance	N/A	Component only
19	Threaded parts and connections	N/A	
20	Creepage distances, clearances and distances through solid insulation	C	
21	Resistance to heat fire and tracking	N/A	Component only
22	Resistance to corrosion	N/A	Component only
23	Electromagnetic compatibility (EMC) requirements-emissions. Canada ICES 003/USA FCC Part 15	N/A	
24	Components	W	Certified components
25	Normal operation	C	
26	Electromagnetic compatibility (EMC) requirements-immunity	C	80125660 EMC testing report
27	Abnormal operations	C	80125660 SW report
28	Electronic disconnection	C	
Annex DVKK	Requirements for components of burner control systems (for pilot burners, Oxygen depletion safety shutoff and similar systems)	P	Pilot burning
Annex DVMM	Requirements for solid-state oil igniters	N/A	
Annex H	Requirements for electronic systems and components		
H.11.12	Controls using software (Refer Appendix –B, for software report documentation)		
H.26	Electromagnetic compatibility (EMC) requirements –immunity		
H.26.5	Voltage dips and voltage interruptions in the power supply network	C	80125660 EMC test report
H.26.5.4	Voltage variation test	C	80125660 EMC test report
H.26.8	Surge immunity tests	C	80125660 EMC test report
H.26.9	Electric fast transient and burst test	C	80125660 EMC test report
H.26.10	Ring wave test	C	80125660 EMC test report

H.26.11	Electrostatic discharge test	C	80125660 EMC test report
H.26.12	Radio-frequency electromagnetic field immunity	C	80125660 EMC test report
H.26.13	Test of influence of supply frequency variations	C	80125660 EMC test report
H.26.14	Power frequency magnetic field immunity test	W	
H.27	Abnormal operation		
H.27.1.2/ (H27.1.1.1.3 Part-1 Ed4)	Items a to h		
H27.1.2.2 (part-1 Ed4)	Class B control function	N/A	Class C control
	Applicable for the reset from lock-out control function only with reference to 60730-1	C	
H.27. 1.2.5 (part-1)	Circuit and construction evaluation	C	
H.27.1.2.5.1	Test condition	C	
H.27.1.2.5.2	Test criteria	C	
H.27.1.2.5.3	Assessment	C	
H.27.1.3.102	Systems for non-permanent operation/ Systems without self checking feature	C	
H.27.1.3.102.1 (Part 1-Ed4 H.27.1.2.3.2)	First fault	C	
H.27.1.3.102 .2 (Ed 4 H.27.1.2.3.3)	Second fault	C	
H.27.1.3.103	Systems for permanent operation/ Systems with self checking feature	N/A	
H.27.1.3.103.1 (Ed4 H.27.1.2.3.2)	First fault	N/A	
H.27.1.3.103.2 (Ed 4 H.27.1.2.3.3)	Second fault	N/A	
H.27.1.3.104 (Ed4 H.271.2.4.2)	Faults during lock-out or safety shut-down (for permanent and non permanent operation)	C	
H.27.1.3.105		N/A	
H.27.1.3.106		N/A	
H27.1.4 Ed 4 H.27.1.1.5)	Electronic circuit fault condition /Table H.27.1	C	
Comment	FMEA: The submittor has submitted FMEA test package. The following components were selected and tests conducted in addition to the above. Functional safety including software tests: Refer appendix-B for further details.		
	Guidance on the use of electronic disconnection		
H.28.1	Main features of solid state switching devices		
H.28.2	Application of solid state switching devices		

Appendix – A

Check list w.r.t. ANZI 21.20.CAN/CSA C22.2 No. 60730-2-5-2014

Clause	Requirement	Remarks	Verdict
1.101DV	Used with CAN/CSA E60730-1/ UL60730-1, Edition 4		P
1.1DV.2	Devices such as thermoelectric flame supervision, oxygen depletion safety shut of systems and other components, are covered in Annex DVKK		N/A
1.2DV	The primary circuit is a two wire, one side grounded system, nominal voltage not greater than 120V.	Component only	N/A
6.1.3	Not applicable		N/A
6.3.101	burner control system		P
6.3.102	flame detector		P
6.3.103	programming unit		P
6.3.104	ignition device	Hot surface ignition	P
6.3.105	electronic high-voltage ignition source		N/A
6.3.106	flame sensor	Thermopile	P
6.4.1	Not applicable		N/A
6.4.3	Addition:		
	burner control systems are classified as having Type 2 action		P
6.4.3.12	Not applicable		N/A
6.4.3.101	Non-volatile lock-out …….(Type 2.V)		P
6.4.3.102	volatile lock-out…….. …(Type 2.W)		P
6.4.3.103	non-permanent operation .(Type 2.AC)	24 hours restart	P
6.4.3.104	permanent operation …….(Type 2.AD)		N/A
6.4.3.105	spark supervision ……..(Type 2.AE)	By flame sensing	N/A
6.4.3.106	air/pressure flow supervision (Type 2.AF)		N/A
6.4.3.107	position-checked external devices (Type 2.AG)		N/A
6.4.3.108	visible light flame simulation check (Type 2.AH)		N/A
6.4.3.109	proved hot surface igniter ..(Type 2.AI)	Type 2.AI	P
6.7.1	Replace “Control with a switch head” by “System and system components”		N/A
6.7.2	Replace” Control with a switch head” by “System and system components.”		P
6.10	According to number of cycles of actuation (M) of each manual action		N/A
6.10.5	Not applicable		N/A
6.10.6	Not applicable		N/A
6.10.7	Not applicable		N/A

6.11	Addition:		
	The minimum value is 100,000 automatic cycles for Canada and USA	100,000 cycles	P
	6.11. 4 to 6.11.12 are not applicable		N/A
6.15.3	Not applicable		N/A
6.16	Not applicable		N/A
6.101	According to type of burner	Fuel burning	P
6.102	According to type of pilot	Pilot	P
6.103	According to type of ignition	Hot surface ignition	P
6.104	According to starting fuel rate		N/A
7.0	INFORMATION		
Table 7.2 Item no.	Replace the following items by:		
4	nature of supply, (a.c. or d.c.); (Method: C)	clause: 4.3.2, 6.1	P
6	purpose of system or system component (Method D):	clause: 4.3.5, 6.3	P
7	the type of load controlled by each circuit; (Method D):	clause: 6.2, 14, 17.3.1, 27.1.2	P
15	degree of protection provided by enclosure; (Method D):	clause: 6.5.1, 6.5.2, 11.5	P
17	which of the terminals are suitable for connection of external conductors, and if they are suitable for line or neutral conductors, or both; (Method D) ..... :	clause: 6.6, 7.4.2, 7.4.3	P
22	temperature limits of the system and system components, if T_{min} lower than 0 °C, or T_{max} other than 60 °C; (Method D):	clause: 6.7, 14.5, 14.7, 17.3;	P
23	temperature limits of mounting surfaces (Ts); (Method D):	clause: 6.12.2, 14.1, 17.3;	N/A
26	number of cycles of actuation (M) for each manual action; (Method X):	clause: 6.10; (minimum 6,000 cycles cl. 17.16.105)	N/A
28	Not applicable		N/A
31	method of mounting the system and each system component; Method D):	clause: 4.1.1, 11.6;	P
34	details of any limitation of operating time; clause: (Method D):	6.4.3.103,6.4.3.104,14,17;	P
37	Not applicable		N/A
38	Not applicable		N/A
40	additional features of Type 2 actions; (Method D):	clause: 6.4.3;	P
41, 42, 44	Not applicable		N/A
46	operating sequence; (Method D):	clause 2.3.13, 11.3.108,15;	P
48	Not applicable		N/A
50	System or system components intended to be delivered exclusively to the equipment manufacturer; (Method X):	clause: 7.2.1, 7.2.6;	N/A
52	Not applicable		N/A
57	Not applicable		N/A

101	maximum flame detector response time (if applicable); (Method D)	clause 2.3.103,	P
102	minimum flame detector self-checking rate (if applicable); (Method D):	clause 2.3.106, 15;	N/A
103	maximum flame failure lock-out time (if applicable); (Method D):	clause 2.3.107,15;	N/A
104	maximum flame-failure re-ignition time (if applicable); (Method D):	clause 2.3.108,15	P
105	maximum ignition time (if applicable); (Method D) ..... :	clause 2.3.111,15;	P
106	maximum main flame establishing period (if applicable); (Method D):	clause 2.3.113,15;	P
107	maximum pilot-flame establishing period (if applicable); (Method D):	clause 2.3.114,15;	P
108	maximum post-ignition time (if applicable); (Method D):	clause 2.3.115,15;	N/A
109	maximum pre-ignition time (if applicable); (Method D):	clause 2.3.116,15;	P
110	Void		
111	minimum post-purge time (if applicable); (Method D):	clause 2.3.118.1,15;	P
112	minimum pre-purge time (if applicable); (Method D):	clause 2.3.118.2,15;	P
113	minimum recycle time (if applicable); clause 2.3.120,15; (Method D):	clause 2.3.118.2,15;	P
114	maximum start-up lock-out time (if applicable); (Method D):	clause 2.3.125,15;	N/A
115	minimum waiting time (if applicable); (Method D) ..... :	clause 2.3.126,15;	N/A
116	type of burner; (Method D):	clause 6.101;	P
117	type of pilot; (Method D):	clause 2.101.2, 2.101.4, 2.101.7, 2.101.9, 2.101.11, 6.102	P
118	type of ignition; (Method D):	clause 2.101.1, 2.101.3, 2.101.6, 2.101.8, 6.103;	P
119	See annex H		P
120	means for protecting setting of timings; (Method X):	clause 11.3.4;	N/A
121	See annex H		P
122	resistance to vibration; (Method D):	clause 17.1.3;17.16.103;	N/A
123	1S1 (signal for presence of flame); (Method D)	clause 2.3.104.1,15.5,15.6,15.7;	P
124	S2 (signal for absence of flame); (Method D):	clause 2.3.104.2,15.5,15.6,15.7;	P
125	S_{max} (maximum flame signal, if applicable); (Method D):	clause 2.3.104.3,15.5,15.6,15.7;	P
126	Electronic high-voltage ignition spark gap; (Method D):	clause 11.3.107, 13.2.101;	N/A

127	Other system components for use with the submitted components to provide a complete system; (Method D):	clause 2.2.101,2.2.102,2.2.104,2.2.106;	P
128	For each valve opening period, the maximum time (if applicable); (Method D):	clause 2.3.127, 11.3.113, 11.3.114,15.5;	P
129	Maximum valve sequence period (if applicable); (Method D):	clause 2.3.128,11.3.112,15.5 p);	P
130	S3 (signal for presence of flame during visible light simulation test); (Method X):	Clause 2.3.104.4,11.3.110;	N/A
131	For proved igniters, the characteristics (energy, current, voltage, resistance, temperature, etc.) which establish that the proved igniter has the energy to ignite the fuel; (Method D):	clause 2.3.117;	P
132	proved igniter operating value (Minimum and/or maximum, as applicable); (Method D):	clause 2.3.117.1,15.7,17.16.108,H.27.1.3;	P
133	maximum igniter proving time (if applicable); (Method D):	clause 2.3.117.2,15.5;	P
134	maximum igniter failure response time (if applicable); (Method D):	clause 2.3.117.3,15.5;	N/A
135	type of lock-out; (Method D):	clause 2.3.112, 11.3.108, H.27.1.3.101;	P
136	See annex H		
7.2.9	T_{max} other than 60^0 C for ambient temperature limits for switch heads		N/A
8	PROTECTION AGAINST ELECTRIC SHOCK		P
	This clause of part 1 is applicable except as follow:		P
	Additional sub clauses:		
8.1.101	High-voltage ignition sources		N/A
	Provision made for protection against contact with high-voltage ignition sources having any of the following characteristics:		P
	a) for continuous spark ignition (pulses within the mains frequency range): -the maximum voltage is higher than 10 kV (peak), and/or _____(kV): -the maximum current is higher than 0,7 mA (peak) _____(mA):	15kV	N/A
	b) for pulse spark ignition: (see figure 101) - the charge of an individual ignition pulse exceeds 100 μC, and _____(μC): -the duration, (d), is greater than 0,1 s, and - the interval (i) between individual ignition pulses is less than 0,25 s (s)____(s):		N/A

	Either the system manufacturer provides a warning that is visible when the high-voltage ignition source is mounted as in normal use, or		N/A
	the equipment manufacturer is advised of the need to provide such protection or a warning		N/A
8.3	Capacitor (not applicable)		N/A
9	PROVISION FOR PROTECTIVE EARTHING		
	This clause of part 1 is applicable	Component only	P
10	TERMINALS AND TERMINATIONS		P
	This clause of part 1 is applicable except as follows:		P
10.2	Terminals and terminations for internal conductors		P
10.2.4	Flat push-on connectors		P
	Additional sub clauses:		
10.2.4.101	Direct plug-in connections		N/A
	Systems for direct plug-in connection to a sub-base withstand the forces of normal insertion and withdrawal: compliance with part 2-5 not impaired		N/A
	Compliance checked by performing 10 insertions and withdrawals		N/A
	After this test, no significant displacement or damage occurs		N/A
11	CONSTRUCTION REQUIREMENTS		P
	This clause of part 1 is applicable except as follows:		P
11.1	Materials		P
11.1.12	Not applicable		N/A
11.3	Actuation and operation		P
	Setting by the manufacturer		P
	Replacement:		
11.3.4	Adjustment means used for the setting of timings:		N/A
	secured by means providing protection against access by uninstructed persons or	Component only	N/A
	- declared as requiring such protection in the application		N/A
	Compliance checked by inspection		N/A
	Where sealing is used: inspection done before and after the tests of clause 17		N/A
11.3.5	Contacts - general		P
	Additional sub clauses:		
11.3.5.101	At least two switching elements to directly de-energize the safety valve terminals provided	Two elements	P

	Single relay operating two independent contacts is considered as one switching element.		N/A
11.3.5.101.1	Measures to prevent common mode errors		P
	Requirements are under consideration		P
11.3.9	Pull-cord actuated control		N/A
	Not applicable		
11.3.101	Burner control circuits		
	Circuits employing burner control systems in earthed supply systems, two-wire, one-side nominally earthed		P
	Devices intended to open such a circuit are connected to the unearthed side of the supply circuit		P
11.3.102	Circuits employing burner control systems used in unearthed two-wire systems, all devices intended to open such circuits are connected to the same side of the supply circuit		N/A
11.3.103	Circuits employing burner control systems used in earthed three-phase supply systems: four-wire		N/A
	Devices intended to open such circuits: connected to all three phases		N/A
11.3.104	Circuits employing burner control systems used in unearthed three-phase supply systems three-wire		N/A
	Devices intended to open such circuits are connected to two or three phases		N/A
11.3.105	If the system initiates a signal to energize the fuel flow means at less than 85% rated voltage for a.c. and less than 80% rated voltage for d.c. the system complies with the following	Class 2 Transformer	P
	a) in the running position: proceeds to safety shutdown or		P
	operates with the timings measured at declared ambient temperatures as declared in table 7.2, requirements 101 to 104		P
	b) in any other position: operating sequence comply with the declarations of table 7.2, requirement 46		P
	Start-up lock-out time: not exceed twice the value declared in table 7.2, requirement 114		P
	Compliance to clause H.26.5.4		P
11.3.106	If the failure results in a flame before the fuel flow means are energized		P
	system provides a safe start check that will cause a), b), or c) to occur		P

	a) System fails to start the operating sequencer		P
	b) System locks out within the time declared in table 7.2, requirement 103		P
	c) System remains in pre-purge		P
	For systems which incorporate electronic devices, the compliance criteria is determined by the tests of clause H.27		P
	For systems not subject to the tests of H.27: flame signal simulated and introduced at the start of the flame establishing period until a), b) or c) occurs		P
11.3.107	Systems declared as Type 2.AD: performs a self-check at least once every hour in running position		N/A
	Systems declared in table 7.2, requirement 102: self-checking rate evaluated as part of the declared sequence and timings		N/A
	requirement evaluated in clauses 15, 17 and H.27.1.3.102 to H.27.1.3.103.2 inclusive		N/A
11.3.108	Declared operating sequence: operated as intended		P
11.3.108.1	Electric circuit of the actuating means of the lock-out device: checked during each start-up sequence		P
11.3.108.2	Fuel flow means: not energized before the ignition device	Logic and sequence	P
11.3.108.3	Re-ignition: permitted when system is in running position only	Logic and sequence	P
11.3.108.4	Automatic recycle: permitted when system is in running position only		P
11.3.108.5	If no flame is detected at the end of the first or second start-up lock-out time: lock-out performed		P
	If declared: system may recycle or allow re-ignition	Logic and sequence	P
11.3.108.6	If no flame detected at the end of flame failure lock-out time: lock-out performed		P
	If declared operating sequence includes recycle or re-ignition: recycle or re-ignition allowed	Logic and sequence only Logic	P
11.3.108.7	After a safety shutdown or after a volatile lock-out reset: only system restart is allowed		P
11.3.109	If wiring diagram indicates an input from external limiter or cut-out: operation of external device leads at least to safety shutdown		P
	Compliance is checked by examination of the circuit design		P

11.3.110	Visible light flame simulation test		
	Flame detectors classified as Type 2.AH: check to discriminate between flame simulation and flame signals originating from real flame		N/A
	Examples of suitable checks are		
	check for the presence of a flame signal that is greater than or equal to S3 prior to the signal to energize the fuel flow means during each start-up sequence		N/A
	If such a signal is detected: system proceeds to lock-out or interrupts the start-up sequence; for the above test,S3 is less than S2; or		N/A
	after performing a controlled shutdown: system checks for the presence of a flame signal which is less than or equal to S2		N/A
	If such a signal is detected: system proceeds to lock-out or prevents the next start-up sequence		N/A
11.3.111	System goes to lock-out at the end of the valve sequence period (multi try systems)		P
11.3.112	For multi try systems, further valve open periods may be initiated either as a result of loss of supervised flame during the running position or		P
	failure to prove supervised flame during the declared valve sequence period		P
11.3.113	For multi try systems: valve open periods may have different values during the valve sequence period		P
11.4	Actions		
11.4.3	Type 2 action (Replacement)		
	Any Type 2 action: designed so that the manufacturing deviation and drift of its operating value, operating time or operating sequence is within the limits declared in table 7.2, requirement 46, 101 to 115 inclusive, and 123 to 125 inclusive		P
11.4.15	Not applicable		N/A
11.4.101	Type 2.V action:		N/A
	so designed that a restart can only be accomplished by a manual reset of the system		N/A
	- provided with reset mechanism classified as Type 2.J		N/A
	Compliance is checked by inspection and by test		N/A
11.4.102	Type 2.W action		P
	so designed that a restart can only be accomplished by either a manual reset or		P

	by an interruption of the power supply and its subsequent restoration		P
	Compliance is checked by inspection and by test		P
11.4.103	remotely mounted reset buttons: short circuit between connecting cables or between the connecting cables and earth not result in a reset		N/A
11.4.104	Systems classified as Type 2.AE: spark supervision prior to energizing of the fuel flow means performed		N/A
11.4.105	Systems classified as Type 2.AF: check for correct function of ext. air pressure/flow control performed		N/A
	If positive external air pressure/flow control signal is detected prior to start-up: safety shut-down or lock-out or		N/A
	system fails to start If insufficient external air pressure/flow detected during the purge time or		N/A
	- when the system is in the running position: safety shut-down or lock-out performed		N/A
11.4.106	Systems classified as Type 2.AG which perform position checks during or prior to the start-up sequence: continue with the operating sequence only after these position checks have been successfully performed		N/A
	Compliance with 11.4.103 to 11.4.106 inclusive: checked by inspection and by test		N/A
11.4.107	Systems classified as Type 2.AI; prior to energizing of the fuel flow means: hot surface igniter supervision performed		P
11.10	Equipment inlets and socket-outlets		N/A
11.10.2	Not applicable		N/A
11.11	Requirements during mounting, maintenance and servicing	Technical personnel	P
11.11.6	Not applicable		N/A
11.13	Not applicable		N/A
	Additional sub clauses:		
11.101	Flame detector constructional requirements		P
11.101.1	Flame detector devices using infrared sensors: react to flicker property of the flame only		N/A
11.101.2	Flame detector devices using ionization sensors: make use of the rectification property of the flame only		N/A

11.101.3	Flame detector devices using UV-tubes: sufficient checks for ageing of the UV-tubes provided		N/A
11.101.4	Open circuit of the flame sensor or connecting cables: resulting in a loss of flame signal		P
11.101.5	Flame detectors using UV sensors other than UV tubes: not react to infrared light		N/A
	when the sensor is illuminated with ≤ 10 lux at a color temperature of 2856 K (spectrum being cut off below the wavelength of 400 nm by means of a filter): not indicate a signal for the presence of flame		N/A
11.101.6	Sensors for visible light: not allowed if illumination intensity is lower than 0,5 lx during operation		N/A
	Sensors for visible light: no detect-of-flame signal during operation below an illumination intensity of 0,5 lx		N/A
	Compliance with 11.101.1 to 11.101.6 inclusive is checked by inspection, test and/or measurement		N/A
12	MOISTURE AND DUST RESISTANCE	Potted	N/A
	This clause of part 1 is applicable		N/A
12.2.2DV	Complies to 12.2.8DV and 12.2.8.1DV after the humidity treatment of 12.2.7DV		N/A
12.2.3DV	Not applicable		N/A
12.2.7DV	Before the humidity treatment is carried out sample is conditioned: for 4 hrs @ 15.5+/- 2.7^{0}C		N/A
	Immediately after the humidity treatment the electric strength is carried out		N/A
12.2.8DV	Conditions for the humidity test conducted in a humidity chamber: -Relative humidity 95+/- 4% -temperature 40 +/- 2^{0}C -conducted for 48hrs		N/A
	Samples operated at rated voltage and cause a or b or c to occur: a. Control act to interrupt flow of fuel b. Control shall complete cycle of operation and will fail to start or lock out on the subsequent cycle c. The control continue to operate with declared safety timings		N/A
	If a or b occurs 12.2.8.1 is conducted		N/A
12.2.8.1DV	Samples conditioned for 24 hrs at Relative humidity 50+/- 4%		N/A

	-temperature 40 +/- 2^{0}C followed by conditioned for 48hrs at relative humidity 88+/- 4% -temperature 40 +/- 2^{0}C		
	Acceptance criteria: While being operated at above conditions at rated voltage the timings shall meet clause 15.		N/A
13	ELECTRIC STRENGTH AND INSULATION RESISTANCE		P
	This clause of part 1 is applicable except as follows:		P
13.1	Insulation resistance of in-line cord, free-standing and independently mounted controls		P
	Not applicable		N/A
13.2	Electric Strength Test		P
	Additional sub clauses:		
13.2.101	Electric strength of the HV side of an electronic HV ignition source: checked by the tests of 13.2.102 to 13.2.103, conducted after the humidity treatment of 12.2.7 and 12.2.8	HIS unit	N/A
13.2.102	Supply terminals of the electronic HV ignition source connected to a variable voltage supply at rated frequency		N/A
	Output voltage is measured with the spark gap as declared in requirement 126 of table 7.2		N/A
	Output voltage measured at 1,0 VR ..(kV):		N/A
	Output voltage measured at 1,1 VR ..(kV):		N/A
	Then the electronic HV ignition source is subjected to the following tests:		N/A
	a) connections to the output terminals removed		N/A
	- voltage not exceeding VR applied.....(V):		N/A
	- input voltage gradually increased until 150% of output voltage measured in 13.2.102 (at 1,0 VR) and maintained for 1 min; or.....(V):		N/A
	b) with the input voltage at 1,1 VR, the electrode gap is increased from that declared in requirement 126 of table 7.2 until:		N/A
	- either 150% of the output voltage measured in 13.2.102 (at 1,0 VR) is achieved or.....(kV):		N/A
	- until the output voltage no longer increases, whichever occurs first		N/A
	This output voltage is maintained for 1 min; or		N/A

	c) if test methods a) and b) cannot be applied, a test method is agreed between manufacturer and test authority in order to achieve 150% of the output voltage measured in 13.2.102 at 1,0 VR or the highest possible output voltage for the device		N/A
	This output voltage is maintained for 1 min		N/A
	Compliance is determined by measuring the output voltage with 1,1 VR applied to the input terminal and with the spark gap restored to that declared in requirement 126 of table 7.2, if applicable		N/A
	Measured output voltage, within ± 10% of the value measured in 13.2.102 at 1,1 VR .....(kV):		N/A
	For 13.2.102 a), b), and c), flashovers which occur at an air gap provided to protect the circuitry are ignored		N/A
	Glow discharges at the output terminal are neglected		N/A
14	HEATING		P
	This clause of part 1 is applicable except as follows:		P
14.3	Not applicable		N/A
14.4.2	Not applicable		N/A
	14.4.3.1 to 14.4.3.3 Not applicable		N/A
14.4.3.4	Modification:		
	Replace “other automatic controls, “by “systems”.		P
14.4.4	Not applicable		N/A
14.5.1	Modification:		N/A
	Replace “switch head “by “systems”.		P
14.6	Modification:		
	Replace” switch head” by “system”		P
14.6.2	Not applicable		N/A
14.7	Modification:		
	Replace “switch head “by “systems”.		P
	Modification to table 14.1:		N/A
	The section entitled “Accessible surfaces of handles, knobs, grips and the like used for carrying and transporting the control “is not applicable		N/A
15	MANUFACTURING DEVIATION AND DRIFT		P
	This clause of Part 1 is replaced as follows:		P
15.1	Adequate consistency of manufacture relevant to declared operating times, operating sequences, flame detector		P

	operating sequences, flame detector operating characteristics, and proved igniter operating value verified (includes all safety timings)		
15.2	Compliance is checked by the tests of this clause		P
15.3	Appropriate operating time, operating sequence, flame detector operating characteristics and proved igniter operating value, recorded for the sample		P
15.4	Three tests conducted for each operating time, each operating sequence, flame detector operating characteristics and each proved igniter operating value declared		P
15.5	Operating times		P
	Each of the following operating times which are declared applicable in table 7.2, are measured at		P
	voltage of 0,85Vr a.c. or 0,8Vr d.c. .....(V):	20.4Vac	P
	at a temperature of Tmin..... (°C):	-40C	P
	Measurements taken also at		
	voltage of 1,1 Vr.....(V):	26.4Vac	P
	at a temperature of Tmax ..... (°C):	80C	P
	None of the times recorded exceed the declared maximum times nor is less than the declared minimum times		P
	a) flame detector response time ..... (s):		N/A
	b) flame detector self-checking rate..... (s):		N/A
	c) flame failure lock-out time..... (s):		N/A
	d) flame failure re-ignition time (relight time)..... (s):		N/A
	e) ignition time ..... (s):	0~60s	P
	f) main flame establishing period ..... (s):		N/A
	g) pilot flame establishing period ..... (s):		P
	h) post-ignition time..... (s):		N/A
	i) pre-ignition time ..... (s):		N/A
	j) void;		N/A
	k) post-purge time ..... (s):	0~60s	P
	l) pre-purge time..... (s):	0~60s	P
	m) recycle time..... (s):	0~60s	P
	n) start-up lock-out time..... (s):		N/A
	o) waiting time..... (s):		P
	p) valve opening period..... (s):		N/A
	q) valve sequence period..... (s):	60~210s	P
	r) igniter proving time ..... (s):	10~90s	P
	s) igniter failure response time..... (s):		P
15.5DV	The following additional items apply:		P
	t) trial for ignition period (s):	10~90s	P
	u) inter-purge time (s):	0~60s	P
	v) lock-out time (s):	60s	P

	w) flame failure response time (s):		P
	x) ignition activation period (s):		N/A
	y) automatic restart time(s):		N/A
15.7	Flame detector operating characteristics and proved igniter operating value		P
	Operating characteristics of flame detectors and proved igniter operating value are measured under the following conditions:		P
	a) at VR.....(V):	24Vac	P
	at (20±5)°C ..... (°C):	25C	P
	b) at 0,85 VR .....(V):	20.4Vac	P
	at 0°C or Tmin, whichever is lower (_____°C)	-40C	P
	c) at 1,1 VR (_____(V)	26.4Vac	P
	at 60 °C or Tmax, whichever is higher(_____°C)	85C	P
	Measured values: as declared in table 7.2 requirements 123, 124, 125, and 132	0.7uA	P
	Details of the measuring equipment arranged by the manufacturer and the test house to be supplied		P
	Lamp used for response to the visible range of light: colour temperature of 2856 K(_____K):		N/A
	The preceding paragraph is not applicable in the USA and Canada.		N/A
16	ENVIRONMENTAL STRESS		N/A
	This clause of part 1 is applicable except as follows:	Potted	N/A
16.2.1	Replacement: Control maintained at a temperature - -20 ^{0}C $^+$/- 2C for a period of 6 hrs. - 70 ^{0}C $^+$/- 5C for a period of 4 hrs		N/A
16.2.4	Appropriate tests of Clause 15 (for safety timings) repeated at room temperature after each of the above tests		N/A
	Acceptance: Values in these tests, do not differ from the values (including safety timings) declared in Table 7.2		N/A
17	ENDURANCE		P
	This clause of part 1 is applicable except as follows:		P
17.1	General requirements		P
	Replacement:		
17.1.1	Systems withstand the mechanical, electrical and thermal stresses in normal use without excessive wear or other harmful effect		P

17.1.2	Compliance checked by the tests indicated in 17.1.3		P
17.1.3	Test sequence and conditions		P
17.16	Additional sub clauses for electronic systems:		
	- thermal cycling test specified in 17.16.101 for 14 days.	14 days and 100,000 cycles	P
	- vibration test of 17.16.103 (if declared)		N/A
	- endurance test of automatic action at accelerated rate specified in 17.16.104: Conducted at V_R, I_R and T_{MAX}		P
	Number of operations performed during 17.16.101, 17.16.102 and 17.16.104: recorded	100,000	P
	When the actual number of automatic cycles completed is equal to the number declared in table 7.2 requirement 27, the following sequence is performed:		P
	- lock-out reset test of 17.16.105		P
	- endurance test of 17.16.106.1, if applicable		P
	- electrical strength requirements specified in 17.16.107		P
	- evaluation of compliance specified in 17.16.108	Type 2Y	P
	Tests of 17.16.101 to 17.16.105 may be combined		P
	17.3 (except 17.3.1) to 17.15 Not applicable		N/A
17.16	Tests for particular purpose systems		P
	Additional sub clauses:		
17.16.101	Purpose of the test: cycle components of electronic circuit between extremes of temperature as in normal use		P
	The following conditions form the basis of the test:		P
	Duration of test: - thermal cycling test for 14 days. (d)	14days and 100,000 cycles	P
	Electrical conditions		P
	System loaded at VR, the voltage being increased to 1,1 VR except for 30 min during each 24 h period of the test, the voltage is reduced to 0,9 VR		P
	VR; 1,1 VR; 0,9 VR ,_____(V)	24Vac; 21.6Vac	P
	Change of voltage not synchronized with the change of temperature		P
	Each 24 h period also includes at least one period of 30 s during which the supply voltage is switched off		P
	c) Thermal conditions		P

	Ambient temperature and/or mounting surface temperature varied between Tmax and Tmin	-40C-80C	P
	The rate of ambient and/or mounting surface temperature change of about 1 °C/min and the extremes of temperature maintained for 1 h	1C/min	P
	temperature gradient.....(°C/min):	1C/min	P
	extreme duration..... (min):	50,000mins	P
	d) Rate of operation: System cycled through its operational modes at rate up to six cycles/min..... (_____ cycles/min):	2-10 cycles/min	P
17.16.102	Endurance test of automatic and manual action at normal operating rate		N/A
17.16.102.1	Test sequence and conditions		N/A
	Terminals loaded with the max. current and the min. power factor declared		N/A
	The system and its flame detector are tested under the following conditions:		N/A
	a) Number of operation: 45000		N/A
	test voltage equal to V_R (_____V)		N/A
	temperature (20±5) °C(_____°C) Test performed at T_{MAX} (for electro-mechanical system)		N/A
	b) Number of operation: 2500		N/A
	test voltage: 1,1 VR or 1,1 the upper limit of rated voltage range (_____V)		N/A
	temperature Tmax (____°C)		N/A
	c) Number of operation: 2500		N/A
	test voltage: 0,85 VR or 0,85 the lower limit of rated voltage range for a.c. and 0,80 VR or 0,80 the lower limit of rated voltage range for d.c.....(V):		N/A
	temperature Tmin (_____°C):		N/A
17.16.103	Vibration test		N/A
	If declared in table 7.2, requirement 122, the device is subjected to the vibration test of IEC 60068-2-6 as follows:		N/A
	Cycling rate: as declared(_____cycle/min)		N/A
	Test voltage: 1,1 VR (_____V)		N/A
	Frequency range: 10-150 Hz (_____Hz)		N/A
	Acceleration amplitude: 1 g or higher if declared (_____g)		N/A
	Sweep rate: 1 octave/min(_____octave/min)		N/A
	Cycles: 10 cycles		N/A
	No. of axes: 3, mutually perpendicular .....(x,y,z):		N/A

17.16.104	Endurance test of automatic action at accelerated rate		P
	test voltage: V_R (_____V)	24Vac	P
	test current: I_R (_____A)	500mA	P
	test temperature: T_{MAX} (_____°C)	80C	P
	The following done to accelerate the test time of test: i.) substitution of components of the electronic circuit previously found acceptable under abnormal operation test of clause H.27: ii.) modification of control circuits to eliminate the portions of control programming that do not affect the operating time of the system or system component iii.) applying additional heating or external cooling to the thermal timers in a manner that not alter normal operating characteristics of the timer other than timing		P
	Total number of cycles performed during 17.16.101, 17.16.102 and 17.16.104 recorded are minimum 100,000 cycles. (_____cycles)1 Note: cl. 17.1.3, Table 7.2 requirement 27	100,000cycles	P
17.16.105	Lock-out reset test		P
	System tested under following lock-out conditions, mounted as declared in table 7.2, requirement 31. (Minimum 6,000 cycles)	Together with thermal cycling test	P
	i. first half of the declared cycles min 3,000 (see requirement 26 and note 101 to table 7.2): Without flame presence		P
	ii. second half of the declared cycles min 3,000: Flame disappearing during operation		P
	iii. During the tests: system operated in such a way that the normal start-up sequence is performed		P
	iv. Repetitions of the sequence: compatible with the method of operation and dependent on the cycling rate, if declared.		P
17.16.106	Components of systems which are declared for operation in an ambient temperature above 125°C.		N/A
17.16.106.1	Endurance test		N/A
	Components declared in table 7.2, requirement 22, for ambient temperature higher than 125°C, but not subjected to		N/A

	this temperature during the tests of 17.16.101 to 17.16.104, the system components are mounted as declared in table 7.2, requirement 31 (_____^{0}C).		
	Components are placed in a test chamber and cycled for the declared number of cycles (_____cycle)		N/A
	During "ON" cycle, temperature of components raised to within +5% of the max operating temp.(_____°C)		N/A
	During "OFF" cycle, test chamber heat source interrupted and components cooled naturally or by passing air as specified by, until temperature is reduced to 125°C or less as necessary (_____°C)		N/A
17.16.107	Electric strength conducted to the requirements of cl. 13.2. (Exception: samples are not subjected to humidity treatment before the electric strength test.		P
17.16.108	Acceptance criteria:		P
	After completion of tests of 17.16.101 to 17.16.107 inclusive, sample retested according to clause 15 including safety timings.		P
	Operating times, operating sequence, flame detector operating characteristics, and proved igniter operating value: Meets all safety timings as declared in table 7.2		P
	For systems providing electronic disconnection (Type 1.Y or 2.Y), meet requirement of H.11.4.16		P
18	MECHANICAL STRENGTH		P
	This clause of part 1 is applicable except as follows:		
18.2	Impact resistance		N/A
	Not applicable		
	18.5 to 18.8 Not applicable		N/A
19	THREADED PARTS AND CONNECTIONS		N/A
	This clause of part 1 is applicable		N/A
20	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH SOLID INSULATION		P
	This clause of part 1 is applicable except as follows:		P
	Addition:		
	HV side of electronic HV ignition sources: requirements of clause 20 not applicable		N/A

21	RESISTANCE TO HEAT, FIRE AND TRACKING	V-0 PCB	N/A
	THIS CLAUSE OF PART 1 IS APPLICABLE		N/A
22	RESISTANCE TO CORROSION		N/A
	THIS CLAUSE OF PART 1 IS NOT APPLICABLE IN NORTH AMERICA. FOR EMISSIONS USA FCC PART 15 / CANADA ICES 003		N/A
23	ELECTROMAGNETIC COMPATIBILITY (EMC) REQUIREMENTS – EMISSION		N/A
	THIS CLAUSE OF PART 1 IS APPLICABLE		N/A
24	COMPONENTS		P
	THIS CLAUSE OF PART 1 IS APPLICABLE		P
25	NORMAL OPERATION		P
	THIS CLAUSE OF PART 1 IS APPLICABLE		P
26	ELECTROMAGNETIC COMPATIBILITY (EMC) REQUIREMENTS – IMMUNITY		P
	Meets requirements per Cl. H.26	See clause H.26	P
27	ABNORMAL OPERATION		P
	This clause of part 1 is applicable except as follows:		P
27.3	Over-voltage and under-voltage test		P
	Not applicable		N/A
28	GUIDANCE ON THE USE OF ELECTRONIC DISCONNECTION	Type 2Y	P
	THIS CLAUSE OF PART 1 IS APPLICABLE		
A	ANNEX A – INDELIBILITY OF MARKING		P
	This annex of part 1 is applicable		P
D	ANNEX D – HEAT, FIRE AND TRACKING		
	This annex of part 1 is applicable in USA and Canada		N/A
G	ANNEX G – HEAT AND FIRE RESISTANCES TESTS	Metal enclosure	N/A
	ANNEX H – REQUIREMENTS FOR ELECTRONIC CIRCUITS		P
H.7	Information in addition to Table 1 provided except:		P
	H52 – Not applicable		N/A
	H58a – Not applicable		N/A
	H58b – Not applicable		N/A
	H60 – Not applicable		N/A
	71 – Not applicable		N/A

	Addition:		
	119 – Defined state “out of operation”; (Method X)	clause H.26.8.2	P
	H121- Effect on solid-state outputs for motors, transformers, valves, etc. as a result of the tests of clause H.26; (Method X)	clause H.26.2	P
	136 - Software fault/error detection time(s) for controls of software class C; (Method X)	clause H.27.1.3.102, H.27.1.3.103	P
H.11	Constructional requirements		
H.11.12	Controls using software	Refer Appendix B for complete software evaluation report.	P
H.11.12.1	Addition:		
	Control function classified as software class C: i.) Control function identified after SW fault analysis (req. 68 of table 7.2) and ii.) The HW analysis of H.27, iii.) If such a failure could impair compliance with H.27.1.3.101:	Class C software	P
H.11.12.2	Addition:		
	Systems using software class C structures required		P
	Monitoring of software class C functions: Tested monitoring function		P
H.11.12.6	Replacement:		
	During hardware development the following applies: One of the combinations (i-p) of analytical measures of table H.11.12.3.5 is incorporated.		P

H.11.12.8.1	Replacement:		
	Detection of an error for software class C function the following is applicable: Results in one of the responses of H.27.1.3.101		P
	Independent means capable of performing this response is provided.		P
H11.12.12	Addition:		
	Additional sub clause: (reference cl. 11.3.4)		
H.11.12.101	If time slot monitoring is used the following applies:		P
	i.) Sensitive to both upper and lower limit of the time interval		P
	ii.) Shift of the upper and/or lower limit during fault assessment is taken into account		P
H.17	Endurance		
	This clause of part 1 is not applicable. Refer cl. 17.16.101		P
H.26	Electromagnetic compatibility (EMC) requirements – immunity	EMC tested with 120Vac per Class 2 transformer provided.	P
H.26.1	Modification:		
	The third paragraph is not applicable		P
H.26.2	Replacement:		
	Compliance checked according to the criteria described in H.26.5 to H.26.12 inclusive		P
H26.5	Voltage dips and voltage interruptions in the power supply network	Appendix C	P
H26.5.2	Test values	Appendix C	P
	Replacement:		
	when tested in accordance with H.26.5.3: system tolerates voltage dips, short interruptions and voltage variations in the supply so that:	Appendix C	P
	a) for the values of Table H.101 criteria a): continues to function in accordance to the requirements of this standard		P
	- neither proceeds to safety shutdown or lock-out, nor resets from lock-out		P
	b) for the values of Table H.101 criteria b): either it performs as in a) or		P
	- it may proceed to safety shutdown followed by a system restart, or		P
	- if in volatile lock-out it: may proceed to a system restart		P
	After supply restoration: system restart complies with the requirements for a start-up sequence		P

	Requirement b) can be ignored, provided that the power failure is less than 60 s and occurs within 60 s after call for heat		P
	On restoration of the power: program may be continued from the point at which it was interrupted		P
	Shortened start-up sequence: allowed provided that the power failure occurs within 60 s after the end of the start-up sequence and is shorter than 60 s		P
Table H.101	Assessment criteria a)		
	- ΔU: 100%; duration: half-cycle of supply waveform :		P
	- ΔU: 100%; duration: one cycle of supply waveform:		P
	Assessment criteria b)		P
	- ΔU: 30%; duration: 2,5 cycles..... :		P
	- ΔU: 60%; duration: 2,5 cycles..... :		P
	- ΔU: 100%; duration: 2,5 cycles..... :		P
	- ΔU: 30%; duration: 25 cycles..... :		P
	- ΔU: 60%; duration: 25 cycles..... :		P
	- ΔU: 100%; duration: 25 cycles..... :		P
	- ΔU: 30%; duration: 50 cycles..... :		P
	- ΔU: 60%; duration: 50 cycles..... :		P
	- ΔU: 100%; duration: 50 cycles..... :		P
	Test performed in accordance with H.26.5.3		P
H26.5.3	Replacement:		
	System tested in accordance with IEC 61000-4-11		P
	Supply voltage reduced according to the values shown in Table H.101		P
	Voltage dips, short interruptions and voltage variations: performed three times in each of the following operating conditions at random phase with respect to mains frequency		P
	a) during pre-purge or waiting time		N/A
	b) during start-up lock-out time(s)		N/A
	c) in the running position		P
	d) in the lock-out position		P
	waiting time of at least 10 s observed between voltage dips, short interruptions and voltage variations test..... (s):		P
H26.5.4	Voltage variation test		P
	Replacement:		P
	Control tolerates short-term supply voltage variations		P
	Compliance checked by the test of H.26.5.4		P
H26.5.4.1	Purpose of the test		P

	Purpose of the test: verify immunity of the control against voltage change		P
	Control operates according to the functional specification (see 11.3.105) at least within the voltage tolerance band of the rated voltage +10/-15 %		P
	below –15 % of the rated voltage: control in safe state		P
H26.5.4.2	Duration and procedure		P
	Duration of voltage changes and time for which the reduced voltages are to be maintained: see Table H.26.5.4.2 and Figure H.26.5.4.2		P
	Constant rate of voltage change; allowed stepped voltage .....(V per s):	0.2V/s	P
	Steps positioned at 0 crossing and		P
	- not larger than 10 % of VR.....(V):	12Vac	P
	Steps under 1 % of VR: considered as constant rate of change	1.2Vac	P
	Control in the running position: supplied at VR, or at the lowest rated voltage of a rated voltage range. (V):	0V	P
	After approx. 1 min: power supply voltage reduced such that control ceases to respond to safety related inputs and/or drive safety related outputs		P
	Value of supply voltage recorded.....(V):	120Vac	P
Table H.26.5.4.2	Timing of short-term supply voltage variations		P
	Voltage test level: Recorded value - 10 % .....(V):	108V	P
	Time for decreasing voltage: 60 s ± 20 % .....(s):	60s	P
	Time at reduced voltage: 10 s ± 20 % ..(s):	10s	P
	Time for increasing voltage: 60 s ± 20 % .....(s):	60s	P
	Voltage test level: 0 V.....(V):	0Vac	P
	Time for decreasing voltage: 60 s ± 20 % .....(s):	60s	P
	Time at reduced voltage: 10 s ± 20 % ..(s):	10s	P
	Time for increasing voltage: 60 s ± 20 % .....(s):	60s	P
	In the voltage range from VR to 1,05 times of the recorded value: control conforms to 11.3.105 a)	126Vac	P
	In the voltage range between 85 % VR and 1,05 times of the recorded value: control conforms to 11.3.105 b)	102Vac	P
	precautions taken to ensure that signals that can initiate a safety action and the presence of which normally may be		P

	independent of the supply voltage are present at any level of the supply voltage		
	Signal simulated to prevent de-energizing safety relevant output(s) as result of disappearance of such input signals		P
H.26.5.4.3	Addition:		P
	Each of the above tests repeated three times in each of the operating conditions indicated in H.26.5.3		P
	After the tests, the system:		P
	a) continues to function in accordance with the requirements of this standard		P
	- neither proceeds to safety shutdown or lock-out, nor it resets from lock-out, or	See appendix C	P
	b) either performs as in a) or		P
	- it may proceed to safety shutdown followed by a system restart, or	See appendix C	P
	- if in volatile lock-out it may proceed to a system restart	See appendix C	P
H26.5.5	Deleted		N/A
H26.5.6	Deleted		N/A
H26.8	Surge immunity test		P
H26.8.2	Test values		P
	Addition:		P
	System tolerates voltage surges on the mains supply and relevant signal terminals, so that, when tested in accordance with H.26.8.3:		P
	a) for the values of Table H.26.8.2 installation class 2, it continues to function in accordance with the requirements of this standard		N/A
	It neither proceeds to safety shutdown or lock-out nor it resets from lock-out		N/A
	b) for the values of Table H.26.8.2 installation class 3 for all listed tests, either it performs as in a) or		N/A
	- it may proceed to safety shutdown, which may be followed by a system restart, or		N/A
	- if in volatile lock-out it may proceed to a system restart		N/A
	c) for the values of Table H.26.8.2 installation class 4 with line to earth on power supply only, either it performs as in a) or b) or		P
	it goes into the defined state “out of operation” as declared in accordance with Table 7.2 Item 119		P

	For compliance criteria a) and b), after the tests of this clause: surge protectors not destroyed		P
H26.8.3	Test procedure		P
	Replacement of the second paragraph:		P
	Test carried out by subjecting the system to five pulses and with voltage and current values listed in Table H.26.8.2 at intervals of not less than 60 s		P
	Five pulses of each polarity (+, –) and each phase angle as described in IEC 61000-4-5 delivered in the following order:		P
	a) 2 pulses with the system in lock-out position		P
	b) 1 pulse with the system in running position		P
	c) 2 pulses randomly applied during start-up sequence		P
	If declared length of cable not exceed 10 m: tests on interface cables not carried out	Less than 10m	N/A
	VDR used as surge protective devices: comply with IEC 61643-1		N/A
	VDR selected to withstand impulses corresponding to the installation class level		N/A
	Controls with surge protective device arresters incorporating spark gaps: test repeated at a level that is 95 % of the flashover voltage		N/A
H26.9	Electrical fast transient/burst test		P
	Replacement:		
H26.9.2	Test levels		P
Table H.26.9.2	Test level for electrical fast transient burst		P
	L1, L2, PE	L, N, Earth	P
	Operating conditions: a)		N/A
	Severity level in accordance with IEC 61000-4-4: 2		N/A
	Voltage peak: 1 kV; Repetition rate: 5 KHz..... :		N/A
	Operating conditions: b)		P
	Severity level in accordance with IEC 61000-4-4: 3		P
	Voltage peak: 2 kV; Repetition rate: 5 KHz..... :		P
	Operating conditions: c)		N/A
	Severity level in accordance with IEC 61000-4-4: 4		N/A
	Voltage peak: 4 kV; Repetition rate: 5 KHz..... :		N/A
	I/O ports		N/A

	Operating conditions: a)		N/A
	Severity level in accordance with IEC 61000-4-4: 2		N/A
	Voltage peak: 0,5 kV; Repetition rate: 5 KHz..... :		N/A
	Operating conditions: b)		N/A
	Severity level in accordance with IEC 61000-4-4: 3		N/A
	Voltage peak: 1 kV; Repetition rate: 5 KHz..... :		N/A
	Table in H.26.9 of IEC 60730-1 (1999): applicable		N/A
H.26.9.3	Test procedure		P
	System tolerates electrical fast/transient bursts on the mains supply and signal lines, so that, when tested in accordance with H.26.9.2		P
	a) for the value of operating conditions a): it continues to function in accordance with the requirements of this standard		P
	It neither goes to safety shutdown or lock-out, not it resets from lock-out		P
	b) for the values of operating conditions b): either it performs as in a) or		N/A
	- it may proceed to safety shutdown which may be followed by a system restart, or		N/A
	- if in volatile lock-out it may proceed to a system restart		N/A
	c) for the values of Table H.26.9.2 severity level 4, either it performs as in a) or b) or		N/A
	it goes out of operation into a defined state as declared in accordance with Table 7.2 Item 119		N/A
	Test performed for 20 cycles; system in running position for a minimum of 30 s within each cycle		N/A
	Test also performed for a minimum of 2 min with the system in the lock-out position and		N/A
	- with the system in stand-by position		N/A
H26.10	Ring wave test		N/A
H26.11	Electrostatic discharge test:	Appendix C	P
	Replacement:		P
H.26.11. and 101	Test and operating conditions		P
	Test is carried out in accordance with IEC 61000-4-2.		P
H.26.11.102	Test conditions		P
	Assessment criteria: a)		N/A
	Severity level: 2 (level _____)		N/A
	Contact discharge: 4 kV(_____kV)		N/A

	Air discharge: 4 kV (_____kV)		N/A
	Assessment criteria: b)		P
	Severity level: 4 (level _____)		P
	Contact discharge: 8 kV(____kV)		P
	Air discharge: 15 kV(_____kV)		P
	The system has to be tested in each of the following conditions:		P
	– start position		P
	– running position		P
	– lock-out position		P
H.26.11.103	Operating conditions/compliance		P
	when tested in accordance with H.26.11 system tolerates electrostatic discharges as follow		P
	a) for severity level 2: continues to function in accordance with the requirements of this standard		P
	- It neither goes to safety shutdown or lock-out, nor it resets from lock-out		P
	b) for the values of operating conditions b): either it performs as in a) or		P
	- it may proceed to safety shutdown which may be followed by a system restart, or		P
	- if in volatile lock-out it may proceed to a system restart		P
H26.12	Radio-frequency electromagnetic field immunity	Appendix C	P
	Replacement:		P
H.26.12.2.1	Test levels for conducted disturbances		P
Table H.26.12.2.1	Test levels for conducted disturbances on mains and I/O lines		N/A
	Assessment criteria a)		N/A
	Severity level: 2..... :		N/A
	150 kHz – 80 MHz: 3 V.....(V):		N/A
	ISM and CB bands: 6 V .....(V):		N/A
	Assessment criteria b)		N/A
	Severity level: 3..... :		P
	150 kHz – 80 MHz: 10 V.....(V):		P
	ISM and CB bands: 20 V .....(V):		P
	Tests on interface cables: not carried out if length of cable declared as not exceeding 1 m	Less than 1m	N/A
H.26.12.2.2	Test procedure		
	Addition:		
	System swept through complete frequency range at least once for each of the following positions:		P
	– start position		P
	– running position		P
	– lock-out position		P

	System subjected to two sweeps of the frequency range from min to max at the indicated severity level		P
	One sweep performed in lock-out condition		P
	The other sweep performed during the remainder of the operating sequence		P
H.26.12.2.101	Compliance		
	System tolerates conducted electromagnetic fields when tested in accordance with H.26.12.2.1		P
	a) for the values of Table H.26.12.2.1, criteria a): it continues to function in accordance with the requirements of this standard		P
	It neither goes to safety shutdown or lock-out, nor it resets from lock-out		P
	b) for the values of Table H.26.12.2.1, criteria b): either it performs as in a) or		P
	- it may proceed to safety shutdown followed by an system restart, or		P
	- if in volatile lock-out it may proceed to an system restart		P
H.26.12.3	Radiated electromagnetic fields immunity evaluation		P
H.26.12.3.1	Test level for radiated electromagnetic fields		P
	Replacement:		P
Table H.26.12.3.1	Immunity to radiated electromagnetic fields		P
	Assessment criteria a)		P
	Severity level: 2..... :		P
	80 MHz - 1 000 MHz: 3 V/m ..... (V/m):		N/A
	ISM and GSM bands: 6 V/m ..... (V/m):		N/A
	Assessment criteria b)		
	Severity level: 3..... :	Appendix C	P
	80 MHz - 1 000 MHz: 10 V/m ..... (V/m):	Appendix C	P
	ISM and GSM bands: 20 V/m ..... (V/m):	Appendix C	P
H.26.12.3.2	Test procedure		P
	Addition:		P
	System swept through the complete frequency range at least once for each of the following positions:		P
	– start position	Appendix C	P
	– running position	Appendix C	P
	– lock-out position	Appendix C	P
	Additional subclause:		P
H.26.12.3.101	Compliance		P
	System tolerates radiated electromagnetic fields when tested in accordance with H 26.12.3.2:		P

	a) for the values of Table H.26.12.3.1, criteria a): it continues to function in accordance with the requirements of this standard	Appendix C	P
	It neither goes to safety shutdown or lock-out, nor it resets from lock-out	Appendix C	P
	b) for the values of operating conditions b): either it performs as in a) or	Appendix C	P
	- it may proceed to safety shutdown which may be followed by a system restart, or	Appendix C	P
	- if in volatile lock-out it may proceed to a system restart	Appendix C	P
H.26.13	Test of influence of supply frequency variations		P
	This sub clause of Part 1 is applicable except as follows:		P
H.26.13.2	Test levels		
	Addition, after Table H.26.13.2:		P
	System tolerates supply frequency variations when tested in accordance with H.26.13.3:		P
	a) for the values of Table H.26.13.2, test level 2: it continues to function in accordance with the requirements of this standard		N/A
	It neither goes to safety shutdown or lock-out, nor it resets from lock-out		N/A
	Variation in programmed timings: not exceeding the percentage of applied frequency variations		N/A
	b) for the values of Table H.26.13.2, test level 3: either it performs as in a) or		P
	- it may proceed to safety shutdown which may be followed by a system restart, or		P
	- if in volatile lockout it may proceed to a system restart		P
H.26.13.3	Test procedure		P
	Addition:		P
	Test performed at least once in each of the following positions:		P
	– start position		P
	– running position		P
	– lock-out position		P
	Add the following new sub clause:		P
H.26.14	Power frequency magnetic field immunity test		N/A
	This sub clause of Part 1 is applicable except as follows:		N/A
H.26.14.2	Test levels		N/A
	Addition, after Table H.26.14.2:		N/A

	System tolerates power frequency magnetic fields when tested in accordance with H.26.14.3:		N/A
	a) for the values of Table H.26.14.2, severity level 2: it continues to function in accordance with the requirements of this standard		N/A
	It neither goes to safety shutdown or lock-out, nor it resets from lock-out		N/A
	b) for the values of Table H.26.14.2, severity level 3: either it performs as in a) or		N/A
	- it may proceed to safety shutdown which may be followed by a system restart, or		N/A
	- if in volatile lockout it may proceed to a system restart		N/A
H.26.14.3	Test procedure		N/A
	Addition:		N/A
	Test performed at least once in each of the following positions:		N/A
	– start position		N/A
	– running position		N/A
	– lock-out position		N/A
H.26.15	Evaluation of compliance		P
	Not applicable		N/A
H27.	Abnormal operation		
	This clause of part 1 is applicable except as follows:		
	Replacement:		
H.27.1.2	System operated under the following conditions:		
	a) at 1,1 times the rated supply voltage	26.4Vac	P
	b) loaded as in the test of 17.3.1		P
	c) in an ambient temperature of (20±5)°C	25°C	P
	d) electrical supply: having a fuse rating such that the result of the test is not influenced by the operation of the fuse		P
H.27.1.2	Protection against internal faults to ensure functional safety		
H.27.1.2.1	Design and construction requirements		P
H.27.1.2.1.1	Fault avoidance and fault tolerance		P
	Controls incorporating control functions providing class B or C function are designed according to H.27.1.2 taking into account the failure modes of Table H.21 and H.11.12 for software (if applicable)	Class C	P
	Systematic errors are avoided and random faults Have been dealt with proper system configuration		P

	For custom chips where applicable measures taken to minimize systematic errors.		N/A
	The system configuration is either:		
	a) inherently failsafe or		P
	b) components with direct safety-critical functions (gas valve drivers, microprocessors with associated circuits etc.) are guarded by safeguards in accordance to H.11.12 software class B or C	Class C	P
	safeguards are built into hardware and can be supplemented by software		P
	safeguards can cause a completely independent safety-shut-down	Dual MCUs	P
	Time slot monitoring is sensitive to both an upper and a lower limit of the time interval.		P
	In a class C control function if a single fault in a primary safeguard can render the safeguard inoperative, a secondary safeguard is provided The reaction time of the secondary safeguard is in accordance with Clause H.27.1.2.3.	Within safety timing	P
	Note 1: Reaction time is equal or smaller than the fault tolerating time	Within safety timing	P
	Note 2 :secondary guarding is realized by: a) physically separate circuit monitoring the primary safeguard, or b) watch dog guarded by the microprocessor, or c) ROM test guarding a RAM test	a) or b)	P
	Components are dimensioned on the basis of the worst-case conditions which can arise in the control, as stated by the manufacturer	Spacing checked	P
H.27.1.2.1.2	Documentation		
	The documentation is based on H.11.12.3		P
	The functional analysis of the control and the safety related programs under its control are documented in a clear hierarchical way in accordance with the safety philosophy and the program requirements.		P
	Minimum documentation provided for assessment:		
	a) Description of the system philosophy, the control flow, data flow and timings.	Design documents and software report Appendix B	P
	b) Clear description of the safety philosophy of the system with all	Design documents and software report Appendix B	P

	safeguards and safety functions clearly indicated. Sufficient design information is provided to enable the safety functions or safeguards to be assessed		
	c.) Documentation for any software within the system		P
	Programming documentation is supplied in a programming design language declared by the manufacture.	Assembly Language	P
	Safety related data and safety related segments of the operating sequence are identified and classified according to H.11.12.3	Design documents and software report Appendix B	P
	There is a clear relationship between the various parts of the documentation	Document check list	P
H.27.1.3	Replacement:		
	With each fault described in table H.27.1, simulated or applied to one circuit component at a time: system complies with:		P
	- items a) to g) inclusive		P
	- applicable sub clauses of H.27.1.3.102 to H.27.1.3.105 inclusive; and		P
	- requirements of software class C (if applicable)	Class C	P
	a) no emission of flames, hot metal or hot plastics, and no explosion results		P
	For systems with enclosures, compliance is determined by the following test		P
	Enclosure wrapped in cheese cloth for Canada and USA (tissue wrapping paper)		P
	System operated to steady state or for one hour, whichever occurs first..... (h):		P
	No burning of the wrapped tissue paper		P
	Inside the enclosure some parts may temporarily glow, and there may be a temporary emission of smoke or flame		N/A
	b) temperature for supplementary insulation and reinforced insulation: not exceeding 1,5 times the relevant values specified in clause 14, except in the case of thermoplastic material		N/A
	No specific temperature limit for supplementary insulation and reinforced insulation of thermoplastic material: temperature recorded for the purpose of clause 21		N/A
	c) Void		N/A
	d) System complies with the requirements of clause 8 and sub clause 13.2 for basic insulation		P

	e) No deterioration of the various parts of the system that would result in non-compliance with the requirements of clause 20		P
	f) No rupture of a fuse in the supply, external to the system under test and as described in H.27.1.2 d), unless an internal protective device, that is accessible only after the use of a tool, also operates		P
	An internal protective device is deemed not to be required if the sample still complies with the following requirements after replacement of the fuse of the supply:		P
	- items a), b) and d) of H.27.1.3		P
	- requirements of clause 20 for the clearances and creepage distances from active parts to accessible surfaces		P
	g) Output waveform as declared in table 7.2, requirement 56	Relay output	P
	h) For proved igniter systems, the igniter operating value not exceeds or is less than the declared values (table 7.2, requirement 132)		P
	Additional sub clauses:		P
H.27.1.3. and 101	Compliance		P
	Automatic systems comply with sub clauses H.27.1.3.102 to H.27.1.3.105 inclusive and with the requirements of software class C (if applicable)		P
H.27.1.3. and 102	Systems for non-permanent operation/systems without self-checking feature	24 hours shut down	P
H.27.1.3. and 102.1	First fault		P
	Any first fault (see Table H.27.1) in any one electronic component or any one fault together with any other fault arising from the first fault results in either:		P
	a) proceeding to safety shut-down within the fault/error detection time - Table 7.2, Item 136 (terminals de-energized) and it remains in this condition as long as the fault appears; or		P
	b) proceeding to lock-out within the fault/error detection time - Table 7.2, Item 136 provided that subsequent reset from lock-out under the same fault condition results in lock-out; or		P

	c) continuing to operate, the fault being identified during the next start-up sequence, the result being a) or b); or		P
	d) remaining operational in accordance with clause 15		P
H.27.1.3. and 102.2	Second fault		P
	If when appraised according to the test conditions and criteria of H.27.1.3, the first fault results in the system remaining operational in accordance with Clause 15 any further independent fault considered together with the first fault resulting in either H.27.1.3.102.1 a), b), c) or d)		P
	Second fault: only evaluated when a start-up sequence has been performed between the first and the second fault		P
	A third independent fault is not considered		P
H.27.1.3. and 102.3	During the start-up phase and shut-down phase (if applicable), the first and second fault analysis methodology of H.27.1.3.102.1 and H.27.1.3.102.2 is used		P
H.27.1.3. and 103	System for permanent operation / system with self-checking feature		N/A
H.27.1.3. and 103.1	First fault		N/A
	Any first fault (see Table H.27.1) in any one electronic component or any one fault together with any other fault arising from the first fault results in either:		N/A
	a) the system proceeding to safety shut-down within the fault/error detection time - Table 7.2, item 136 and		N/A
	it remains in this condition as long as the fault appears; or		N/A
	b) the system proceeding to lock-out within the fault/error detection time - Table 7.2, item 136, provided that the subsequent reset from lock-out under the same fault condition results in returning to lock-out; or		N/A
	c) the system remaining operational in accordance with clause 15		N/A
H.27.1.3. and 103.2	Second fault		N/A
	If when appraised according to the test conditions and criteria of H.27.1.3, the fault results in the system remaining operational in accordance with Clause 15, any further independent fault considered		N/A

	together with the first fault results in either H.27.1.3.103.1 a), b) or c)		
	During assessment: second fault not considered to occur within 1 h of the first fault		N/A
	A third independent fault is not considered		N/A
	Concerning the specific factual analysis, systematic assessment of the safety concept structure may be taken into account		N/A
H.27.1.3. and 104	Systems for permanent and non-permanent operation: faults during lock-out or safety shut-down		P
	If lock-out or safety shut-down occurs: additional fault assessment performed in that stage		P
	Whenever lock-out or safety shut down is reached without an internal fault: assessment according to H.27.1.3.104.1 and H.27.1.3.104.2 performed		P
	Whenever lock-out or safety shut down is reached with an internal fault: additional single fault assessment according to H.27.1.3.104.2 performed		P
H.27.1.3. and 104.1	First fault introduced during lock-out or safety shut-down		P
	Any first fault (together with any other fault arising from that fault) in any one component (see Table H.27.1) induced in lock-out or safety shut-down position, results in either:		P
	a) system remains in lock-out or safety shut-down, valve terminals remaining de-energized; or		P
	b) system becoming inoperative with all valve terminals remaining de-energized; or		P
	c) in case of a subsequent restart: system during one single restart resulting in a) or b) under the condition that the valve terminals are energized not longer than the safety time		P
	If the cause of the original lock-out or safety shut-down condition no longer remains: system may perform a full restart		P
	Second fault assessment carried out in accordance with H.27.1.3.102.2 or H.27.1.3.103.2		P
H.27.1.3. and 104.2	Second fault during lock-out or safety shut-down		P
	Any second fault in any one component induced in the lock-out or safety shut-		P

	down position: resulting in either H.27.1.3.104.1 a), b) or c)		
	During assessment: second fault not considered to occur within 24 hours after the first fault		P
H.27.1.3. and 105	Checking circuits		
	H.27.1.3.102 to H.27.1.3.103.2, inclusive not applicable to part of circuit associated with the checking requirement of 11.101.3 or to external devices connected to the system		P
H.27.1.3. and 106	Effect of internal faults assessed by simulation and/or examination of the circuit design		P
	Faults are considered to have occurred at any stage of the programmed sequence		P
H.27.1.4	Electronic circuit fault conditions		P
	Replacement:		
	For the purpose of clause H.27, the applicable failure modes are given in Table H.27.1		P
Table H.27.1	Electrical/electronic component fault modes		P
	See appended table H27.1		P
Table H.27.1DV D2 (Relays)	For Canada and USA, the short circuit mode is excluded for relays when successfully tested and certified to cl. 17(foot note 7 is not applicable)		P
Footnote 8	Additional measures are taken to avoid contact welding, or	Certified component	N/A
	Additional measures taken to react safely to contact welding.	Certified component	N/A
Annex J	ANNEX J – REQUIREMENTS FOR CONTROLS USING THERMISTORS		N/A
Annex DVKK	REQUIREMENTS FOR COMPONENTS OF BURNER CONTROL SYSTEMS(Normative)	Pilot burning	P
Annex DVMM	REQUIREMENTS FOR SOLID- STATE IGNITERS. (Normative)		N/A
Annex E	MANUFACTURING AND PRODUCTION TESTS		N/A

Appendix B

See software report 80125660 for detail.

Appendix –E

Manufacturing and Production tests documents

Purpose

This Information Sheet provides requirements to be followed by Catalyst Electronics LLC, Located at 1472 West Maple Ave. Unit B, Denver, Colorado 80223, United States for conducting manufacturing and production tests and in maintaining a detailed quality program in the manufacturing of the certified product in accordance to Annex DVLL of Standard C22.2 No 60730-2-5-2014/Z21.20-2014/UL 60730-2-5-2014.

This Information Sheet shall be acknowledged and endorsed by Catalyst Electronics LLC before CSA Group completes the project and confirms the product meets the requirements of standard C22.2 No 60730-2-5-2014/Z21.20-2014/UL 60730-2-5-2014.

Scope

This Information Sheet covers requirements for control of programs and test procedures specified in standard C22.2 No 60730-2-5-2014/Z21.20-2014/UL 60730-2-5-2014. This includes the records to be kept by the manufacturer. The manufacturer shall use a program to qualify raw materials, parts, assemblies and purchased components.

General

Test results must have a certain degree of accuracy before they can be accepted. The accuracy of test results is directly linked to the accuracy of the measuring instrument used. Before any test is performed, the instrument shall be checked and/or calibrated.

The manufacturer shall ensure the test results of the manufacturing and production tests are available at the authorized CSA factory for review by the CSA Field Service Representative.

Endorsement

In consideration of the covenants and agreements herein contained, and other good and valuable consideration having been received, Catalyst Electronics LLC agrees to notify CSA Group of any changes to the mutually accepted above program, between manufacturer and CSA Group that also includes test schedules.

Kevin O'Connor – Manufacture Representative

May 17, 2023

Date

Project 80125659

Edition one.

Construction Review:

Construction review performed with satisfactory results.

This Edition supersedes all previous editions.

---End of Report---