



PROJECT: GLAXO CANADA  
MACHINE: PMA 10  
CONTRACT NO. 8103  
TITLE: SYSTEM FUNCTIONAL SPECIFICATION  
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Date 7-10-90

FOREWORD

This Functional Specification is to meet the requirements of the Works Order/User specification of Niro-Fielder Contract 8103 - GLAXO CANADA PMA 10.

### CONTROL SYSTEM DESCRIPTION

The machine will incorporate a variable speed AC Impeller drive motor and a two speed AC Granulator motor.

The machine is to be suitable for use in a Class 1, Zone 1, Group 11A and 11B area and therefore all of the equipment in the hazardous area will be suitably certified and/or protected.

The impeller and granulator motors will be approved for Class 1, Zone 1 usage.

All controls and indicators in the hazardous area will be intrinsically safe (ie interfaced to the control system via suitable I.S. barriers).

The electrical equipment to be used will be the Niro-Fielder American Standard:-

Fuses	-	Gould
Switchgear	-	Allen Bradley
Indicators/Pushbuttons	-	Allen Bradley
Barriers	-	MTL
Signal Converters	-	Amelec
Timers	-	Tele Control
Meters	-	IMO
Inverter	-	Allen Bradley

The system will incorporate one synoptic. This synoptic (the operator station), will be situated upon the machine base adjacent to the bowl.

All Impeller/Granulator controls and indicators will be situated upon the operator station synoptic.

## CONTROL SYSTEM OPERATION

The system will have Manual operation only.

The following sections will describe the operation of the machine and the function of its controls.

CONTROL SYSTEM FUNCTIONAL SPECIFICATION

CONTENTS

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SECTION 8	-	PRODUCT TEMPERATURE INDICATOR

## SECTION 1

### MOTORS

#### 1.0 Motor Details

Two motors will be fitted to the machine:-

<u>Function</u>	<u>Capacity(kW)</u>	<u>Speed(rpm)</u>	<u>Starter</u>
Impeller Motor	2.2 (2.9HP)	60 - 600	Dol
Granulator Motor	0.2/0.4 (0.3/0.5HP)	3600/1800	Dol/Dol

#### Indicators and Controls

Indicators	-	Impeller motor ammeter	
	-	Granulator motor ammeter	
	-	Impeller speed	
	-	Impeller running (I) - LED	(Red)
Controls	-	Impeller start (I) pushbutton	(Green)
	-	Impeller set speed potentiometer	
	-	Granulator Slow/Off/Fast selector switch	
	-	Motors Stop pushbutton	(Red)

#### 1.1 Impeller Motor Ammeter

The Impeller motor ammeter will indicate the current drawn by the Impeller motor.

#### 1.2 Granulator Motor Ammeter

The Granulator motor ammeter will indicate the current drawn by the Granulator Motor.

#### 1.3 Impeller Speed Indicator

The Impeller speed indicator will indicate the speed, in Revolutions Per Minute, (R.P.M.), of the Impeller blade.

#### 1.4 Impeller Start (I) Pushbutton

When pressed, and providing all sequence and safety interlocks are correct, the Impeller motor will start and the Impeller will rotate at the required speed set on the set speed potentiometer, (see section 1.5).

When the Impeller motor is running the Impeller running LED will illuminate.

1.5 Impeller Set Speed Potentiometer

The required speed for the Impeller to run at will be set on this potentiometer. The speed can be varied between 60 and 600 RPM.

1.6 Motors Stop (0) Pushbutton

When pressed this will stop both the Impeller and the Granulator motors.

1.7 Granulator Speed Selector Switch

The Granulator speed selector switch is a three position switch:

- Slow (I) - 1800 RPM
- Off (0)
- Fast (II) - 3600 RPM

The Granulator motor will not run unless the Impeller drive motor is running.

If a speed is selected prior to starting the Impeller drive motor then the Granulator motor will run in the desired speed when the Impeller drive motor is started.

1.8 Additional Motor Controls and Indicators

The following equipment will be housed in the Switchgear cabinet:-

- (i) Impeller hour counter - This will run whenever the Impeller drive motor is energised.

## SECTION 2

### PROCESS TIMER

#### 2.0 Controls and Indication

- Timer
- Timer select/reset pushbutton (Yellow)
- Timer running indicator (Yellow)

#### 2.1 Timer

The timer will be a pneumatic multirange device with a hold facility

#### 2.2 Timer Select/Reset Pushbutton

This will be a latch 'in' type - pneumatic device.

When pressed and released the timer will be selected.

When pressed and released a second time, the timer will reset back to zero.

#### 2.3 Timer Running Indicator

This will be a pneumatic device.

It will indicate when the timer is operating.

#### 2.4 Operation

When the timer is selected and the Impeller motor is running the timer will time. Upon reaching zero a pressure switch will activate. Activation of this pressure switch will stop both the Impeller and Granulator motors and disable them until the timer has been reset.

## SECTION 4

### DISCHARGE VALVE

#### 3.0 Controls and Indicators

Discharge	-	Open valve pushbutton	(Green)
controls	-	Valve open indicator	(Green)
	-	Close valve pushbutton	(Green)
	-	Valve Closed indicator	(Green)

All pushbuttons and indicators will be pneumatic.

#### 3.1 Discharge Plug Indicators

The indicators will show the selected position of the discharge plug.

#### 3.2 Discharge Pushbuttons

When pressed, the discharge plug will operate in the direction selected.

## SECTION 5

### SOLENOID VALVES

#### 5.0 Air Supply Solenoid Valve (Energise to Open valve)

When the safety keys are in position in the key exchange unit on the operator station synoptic and the Emergency stop pushbutton is released this solenoid will energise and compressed air will be supplied to the machine.

Whenever the safety keys are removed from the key exchange unit or the Emergency stop pushbutton is activated then the solenoid will de-energised.

#### 5.1 Safety Lock Solenoid Valve

When the impeller motor stops and the safety timer has timed out, the Safety Lock Solenoid will be energised to allow the safety keys to be removed.

When the impeller motor is started the solenoid will be de-energised to lock the safety keys in position.

## SECTION 4

### SAFETY LOCKS

- 4.0 Two safety interlock key exchange units will be fitted to the Operator Station Synoptic.
- 4.1 Safety interlocks will be fitted to the both the bowl and the discharge chute covers.
- 4.2 The machine will only be operable when both keys have been inserted into the key exchange unit on the Operator Station Synoptic, (and the Emergency Stop is not latched in).
- 4.3 To open either the bowl cover or discharge chute cover:
- (i) Switch off the Impeller drive motor, (if running).
  - (ii) Wait for the safety lock delay timer to reach zero, this delay timer allows time for the Impeller to stop rotating before releasing the safety lock keys.
  - (iii) Remove the keys from the key exchange unit on the Operator Station Synoptic and unlock the bowl or discharge chute cover.
- 4.4 The safety lock solenoid, (electrical), will de-energise whenever either motor is running. This will stop the safety keys from being removed until the motors have stopped and a time delay has elapsed.

## SECTION 6

### PRESSURE SWITCHES

#### 6.0 Air Supply Pressure Switch (Contact closed when air pressure correct)

This switch will activate when the compressed air supply pressure is above 4.5 bar, the switch will de-activate when the pressure drops below 4.0 bar. If the air pressure is not correct the machine will be disabled.

Mounted in the Switchgear cabinet.

#### 6.1 Process Timer Pressure Switch

Activates, (contact opens) when the process timer reaches zero.

This disables both the Impeller and Granulator motors.

## SECTION 7

### EMERGENCY STOP

#### 7.0 Emergency Stop Pushbuttons

The system will include one Emergency stop pushbutton, it will be situated as described below:-

- (i) Below the Operator Station Synoptic.

When the emergency stop is activated the operation of the machine will be disabled.

## SECTION 8

### PRODUCT TEMPERATURE INDICATOR

#### 8.0 Product Temperature Indicator

The product temperature indicator will be an analogue meter situated on the Operator Station Synoptic, (temperature range of 0 - 100 °C). The sensing device will be a PT100 type temperature probe located in the side of the bowl.