1. **Revision Log**

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| Revision Log | | | | | |
| Revision Level | Revision Date | Section | Description | | Revised By |
| REL | 11012016 | ---- | Initial Release | | JY |
| A | 12142016 | Per descr | 3.0 Define function. 4.2 Product definition 4.5 Controls Requirement | | MJG |
| B | 05/05/2017 | Per descr | Modified : 3.1 Standard for GH, Hart and Saltillo Modified 5.1.1 North American Operations Added: 3.2 Standard for Shanghai North and South 5.1.2 Shanghai Operations | | MJG |
| C | 5/15/2017 | 4.2.1 | 4.2.1. Update part numbers from TL50GYRQ to TL50GYR**BA**Q and cable | | JY |
| D | 3/31/2020 |  | Mass updates, complete re-write to standard | | NT |
| E | 11/9/2020 | 5.2 | Added Light Off requirements to chart | | NT |
| F | 12/1/23 | Header | Replaced GHSP logo with newer version | | B. Balok |
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|  |  |  |  | |  |
| Approval: | | CN: RS, FS | | MX: JH | |
| US: JA | | Other (as req’d): DRW | |

1. **Purpose:** 
   1. To define the global standard for the use of Stack Lights and Opto Touch Buttons within GHSP manufacturing facilities.
2. **Scope:** 
   1. This global standard applies to all GHSP manufacturing facilities.
3. **Definitions:** N/A
4. **References:**
   1. CP-WI-MFG-X301 Global Standard Production Equipment Safety, Ergonomic, and Delivery Checklist
   2. CP-WI-MFG-X322 Global Standard Equipment Functionality
5. **Method:**
   1. **Stack Lights**
      1. **Stack Light Selection**
         * Preferred Brands

*Selection outside the preferred brand requires approval by the Advanced Process Engineer and Global Standards Team*

* + - * + Banner
        + Tayee
    1. **Function Standard for Grand Haven, Hart, Shanghai**

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| **Color Status** | **Typical Functions** | **Light Solid On**  Machine operating status | **Light Flashing 1:1**  Machine operating status |
| **Audible Alarm** | Often used to identify failure mode and or escalation requirement  (plant to determine function) |  |  |
|  | Used to indicate shark attack | Shark attack has been responded to and acknowledged  Machine not in AUTO Mode | Shark attack called, waiting on response acknowledgment  **(HMI manual function)** |
| **All** |
| **Colors** |
|  |
| **Blue** | Used to indicate the machine is  available to run but is not running | Non-machine cycle time exceeded | Line down due to scheduled downtime (i.e. break time, lunch time) |
| **Red** | Used to indicate machine cycle time exceeded or any critical event/machine state condition that has caused a shut down | Machine cycle time exceeded  Machine down  (i.e. e-stop pressed, door opened)  Machine not in AUTO Mode  Machine down fault has been responded to and acknowledged  Machine not in AUTO Mode | Machine down fault, waiting on response acknowledgment  (i.e. critical test failure, defective part indication, light curtain broken)  **(Reset required)**  Operator request for assistance, waiting on response acknowledgment  **(HMI manual function)** |
| **Yellow** | Used to indicate any machine status or warning condition that may not necessarily shut a machine down but may result in capacity requirement reduced | Material downtime  Operator request for it to be down  **(HMI manual function)** | Potential material issue  (i.e. bowl feeder low, reel components low) |
| **Green** | Used to indicate  machine is operating normally | Machine is in AUTO Mode  Part complete | Machine cycle in automation process |

* + 1. **Controls Requirements for Grand Haven, Hart, Shanghai**
       - Controls for function of stack lighting are to be created as tags in the system with the following category levels:
         * Potential material issue (Flashing Yellow) – Any auto sensing material level sensor including but not limited to:

Bowl feeder low

Reel components low

Flow low limit sensor

* + - * + Material downtime (Solid Yellow) – Operator request for machine to be down (HMI manual function) due to no material
        + Machine down fault (Flashing Red) – Any item which requires a reset by management including but not limited to:

Light curtain interrupt

Critical test failure

Defective part indication

Equipment failure

Manual request for assistance

* + - * + Machine cycle time exceeded or machine down (Solid Red) – Any time machine cycle time is exceeded or any item which has taken the machine out of auto mode including but not limited to:

E-stop pressed

Machine door open

Safety interlock dis-engaged

Machine down fault or manual request for assistance has been responded to and acknowledged

* + - * + Line down due to scheduled downtime (Flashing Blue) – Any scheduled downtime including but not limited to:

Start-Up time

Break time

Lunch time

Clean-Up time

* + - * + Non-machine cycle time exceeded (Solid Blue) – Any time non-machine cycle time has been reached and cycle start has not been initiated
        + Audible alarm – Function determined by plant
    1. **Function Standard for Saltillo**

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| **Color**  **Status** | **Typical Functions** | **Light Solid On**  **Machine operating status** | **Light Flashing 1:1**  **Machine operating status** |
| Audible alarm | Often used to identify failure mode and or escalation requirement | Audible alarm to be off after acknowledgement of line down by  Supervisor Acknowledge  QE Acknowledge  Technician Acknowledge  Material Handler Acknowledge | Audible alarm to be on for line down after 5-minute time lapse with no response  (Red or Blue Flashing stack light)  **(HMI Manual Function)**  Operator Request for Assistance |
| **Blue** | Often used to Request  Service from Quality, “Line Down”  Any condition that may impact the quality of the product | Line Down  Shark Attack  QE Acknowledge | Line Down  Shark Attack  QE Required  **(HMI Manual Function)**  Operator Request for Assistance |
| **Red** | Often used to Request  Service from Maintenance, “Line Down”  Any Critical Event or Machine-State Condition that can cause a shut down | Line Down  Machine Failure  Equipment Fault  (Key reset required)  Supervisor Acknowledge  Technician Acknowledge | Machine Down Fault  Machine Down Fault  (Key reset required)  Supervisor Required  Technician Required  Critical Test Failure  Defective Part Indication  Broken Light Curtain  **(HMI Manual function)**  Operator Request for Assistance |
| **Yellow** | Often used to Request  Service from Materials, “Line Down”  Any lack of materials and containers | Line Down  Lack of Material  Lack of Empty Containers  Container Completed  Material Handler Acknowledge | Line Down  Lack of Material  Lack of Empty Containers  Container Completed  **(HMI Manual function)**  Operator Request for Assistance |
| **Green** | Most often used to indicate  machine is operating normally, and capacity requirement is being met | Machine is Ready  Cycle Start Required  Part Complete | Machine Cycle Complete  Good Part Indication |

* + 1. Controls Requirements for Saltillo
       - Controls for function of stack lighting are to be created as tags in the system with the following category levels:
         * Material Handler Support (Flashing Yellow) – Including any item which does not require a key reset by management including but not limited to:

Machine material is running low

No material in the feeding system

Lack of empty containers

Remove completed container

Manual request for assistance

* + - * + Machine/Line down or fault (Flashing red) – Including any item which requires a key reset by management including but not limited to the following:

Critical light curtain interrupt

Critical test failure

Defective part indication

Equipment failure

Manual request for assistance

* + - * + Line down fault (Flashing Blue) – Including any item which requires support for nonconforming condition including but not limited to the following:

Shark Attack

Defective part indication

Manual request for assistance

Etc.

* + - * + Audible alarm (Flashing Red, Yellow, or Blue) – Including any item which requires escalation of Red, Yellow, or Blue indication failure after set interval with no response including but not limited to the following:

Critical support failure

5-minute set point for activation

Manual request for escalated assistance

* + 1. **Important criteria to select device**
       - Environment – Consideration must be given to the installed environment, including key factorssuch as:
         * Temperature/Condensation
         * Exposure to water and direct sunlight (for visibility & UV compatibility of polycarbonate lenses)
         * Excessive vibration or shock loads
         * Hazardous environment
         * Outdoor use, which incorporates any of the previous environmental items.
       - Size – In general, a larger unit is visible from longer distances. To be determined by assembly cell location in the plant based upon 360-degree visibility.
       - Illumination Source – LEDs provide rich color & exceptional brightness at low currents, with exceptionally long life.
       - Audible Buzzer – Most manufacturers offer integral buzzers with their products. Buzzers are usually offered in the 80-105db sound pressure rating and are most useful when they include a means of dampening the sound to fit the installation area. They should be “annoying” but not “deafening” to an operator.
  1. **Opto Touch Button or Indicator Light**
     1. **Function**
        + Opto Touch Button turns off when the E-Stop has been hit or when there is no power to the station.

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| **Color Status** | **Typical Functions** | **Light Solid**  Machine operating status | **Light Flashing Slow**  Machine operating status | **Light Flashing Fast**  Machine operating status |
| **Red** | Operator indication for machine status | Machine fault or light curtain interrupted | Part is rejected |  |
| **Yellow** | Operator indication for machine status | Machine is in MANUAL mode  (If HMI inside light curtain, used to acknowledge movement) | Machine cycling in auto mode |  |
| **Green** | Operator indication for machine status | Part is complete and passed, ok to remove part | Ok to load parts | Ready for cycle start |

1. **Records:** N/A