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| Version | Date | Description of Revisions |
| 1 | January 22, 2020 | Initial release (BM) |
| 2 | June 5, 2020 | Revised Group #5 Table (BM) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## General

### This specification defines the requirements for mechanical identification of facilities piping systems including flammable materials, fire fighting (protection), dangerous substances, other chemical substances and process and drainage piping.

## Related Sections

### *[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

### *Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

### *Contractor is responsible for coordination of the Work.*

### *This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]*

### *[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### *[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### *[List Sections specifying related requirements.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

#### Section 01300 – Submittals

#### Section 09900 – Painting and Protective Coatings

#### Section 15100 – Plumbing Piping

#### Section 15760 – Terminal Heat Transfer Units

#### Section 15830 – Fans

## References

### Canadian General Standards Board (CGSB):

#### CAN/CGSB 24.3-92 - Identification of Piping Systems.

#### CAN/CGSB 1-GP-12C-90, Standard Paint Colors: Chromaticities And Luminous Reflectances

### WHMIS - 2015

### ASME A13.1-2015, Scheme for the Identification of Piping Systems

### MECP Standard for Pipe Identification in Water and Wastewater Plants in Ontario, August 1989

### Section 35 - Development and Maintenance of Asset Inventory and Tagging Guideline

### Design Guidelines for Drinking-Water Systems 2008

### Design Guidelines for Sewage Works 2008

## Measurement and Payment

### The lump sum price tendered shall include all labour, equipment, and materials necessary to fabricate, supply and install piping identification for all work completed under the Contract, to the satisfaction of the Consultant.

### The Region may withhold a portion of payment until piping identification has been reviewed, approved and installed.

### All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in Schedule ‘A’ of the Bid Form.

## Submittals

### The following documents and drawings shall be submitted by the Contractor for approval prior to fabrication:

#### Pipe labelling schedule in accordance with Section 3.2 of this Specification.

#### Product data: Provide manufacturers catalog literature for each product required.

#### Manufacturer's instructions: Indicate special procedures and installation requirements for each product required.

# PRODUCTS

## Identification Systems

### For existing facilities, consultation with the Consultant and the Region is required to determine what identification system will apply to new items of Work.

### For new facilities, use the identification system specified in this Section.

### Before starting Work, obtain written approval of the identification system to be used from the Consultant.

## General Requirements

### The identification of material contained in a piping system shall be by the use of paint and/or labels. Painting shall be in accordance with Section 09900 – Painting and Protective Coatings.

### The markings applied to piping systems shall conform to all relevant Acts and Regulations.

## Label Materials

### Piping and tubing 19mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

### All other piping: pressure sensitive vinyl/polyester with protective undercoating, waterproof contact adhesive undercoating, suitable for continuous operating temperatures of 150°C and intermittent temperatures of 200°C.

### Labels shall be designed to suit indoor and outdoor use, with built in ultraviolet inhibitors.

### The identification marking material shall have good weathering, moisture and wrinkling resistance and adhesion properties.

## Classification by Content

### For Hazardous Products which are defined by WHMIS -2015, supply and install WHMIS hazard symbols as required by the Ministry of Labour.

### Piping shall be identified according to the groupings below, further defined in Section 3.5 of this Specification.

#### **Group #1 – Flammable Materials**: For piping systems containing flammable gases or liquids - gasoline, fuel oil, digester gas, acetylene, propane, etc.

#### **Group #2 – Fire Fighting (Protection)**: For piping systems containing firefighting substances - water, carbon dioxide, etc.

#### **Group #3 - Dangerous Substances**: For other piping systems containing dangerous (highly hazardous) substances - chlorine gas, hydrofluosilicic acid, other concentrated acids or caustics, etc. - i.e. - strongly corrosive, strongly toxic, temperature greater than 80°C (175°F) including steam, pressure greater than 700 kPa (100 psi).

#### **Group #4 - Other Chemical Substances**: For other piping systems containing chemical substances (not highly dangerous) - chlorine solutions, sodium hypochlorite, alum, polyelectrolytes, lime solutions, fluoride solutions, etc. - i.e. - mildly corrosive, mildly toxic, temperature less than 80°C (175°F), pressure less than 700 kPa (100 psi).

#### **Group #5 - Process and Drainage**: For process and drainage piping systems, one colour for water being protected, one for sludges and one for other water and drainage systems. Within each group, there are colour gradations to reflect the degree of contamination.

## Label Background Colour

### Materials contained in a piping system shall be identified by markings of background colour applied on the piping system. The minimum width of the labels shall be 25mm.

### The extent of background colour marking shall be long enough to accommodate the full length of the legend.

### The colours used to identify materials contained in a piping system shall be in accordance with Table 2-2.

## Label Legend

### Material contained in a piping system shall be identified by a legend made of clearly legible letters (block capitals) and/or numbers, giving the name or identifier of the material. The legend shall be placed on the background colour marking and shall be in black or white to contrast with the background colour.

### For any material, if applicable, the words “Liquid” or “Gas” may be included as part of the legend.

### The minimum height of the legend shall be 13mm. For identification of small pipes (less than 19mm diameter) the use of tags or wall markings is recommended. See Table 2-1 for further height recommendations.

Table 2-1: Height of Legend Letters and Numbers

|  |  |  |
| --- | --- | --- |
| **Outside Diameter of Pipe or Covering (mm)** | **Length of Colour Field, mm** | **Height of Letters and Numbers, mm** |
| 19 to 32 | 200 | 13 |
| 38 to 51 | 200 | 19 |
| 64 to 150 | 300 | 32 |
| 200 to 250 | 600 | 64 |
| Over 250 | 800 | 89 |
| Ducts | 800 | 89 |

## Arrows Showing Direction of Flow

### Arrows shall be used to indicate the direction of flow, double arrows being used for reversible flow. The arrows shall be large enough to be readily distinguishable and shall be the same colour as the legend.

### The arrow shall be placed on the same background colour as the legend marking and shall be in black or white to contrast with the background colour.

### If the outside diameter of the pipe or insulation is less than 75mm, the arrow shall be 100mm long x 50mm high.

### If the outside diameter of pipe or insulation is 75mm and greater, the arrow shall be 150mm long x 50mm high.

### The legend and arrows shall be on separate labels.

## Colours

### Background, Legend, and Arrow Colours

#### Background colour, legend colour, and arrow colour to tables Group #1 to Group #5.

#### All colours listed are per CGSB standard 1-GP-12C:1990. A summary of the CGSB colour numbers is shown in Table 2-2.

#### Where not listed, obtain direction from the Consultant.

Table 2-2: Colour Code Numbers for Process and Chemical Piping

|  |  |  |
| --- | --- | --- |
| **Colour** | **CGSB 1-GP-12c number** | **Sherwin-Williams Colour (if available)** |
| Mid Grey | 501-103 | MC65 Tower Gray |
| Light Grey | 501-108 | MC69 Pewter |
| Dark-Blue | 502-103 | MC90 Indigo |
| Light Blue | 502-106 | MC87 Grey Blue |
| Mid Blue | 502-208 | MC88 Harbor Blue |
| Light Green | 503-323 |  |
| Dark-Brown | 504-102 | MC37 Sienna |
| Mid-Brown | 504-107 | MC55 Clove |
| Light Brown | 505-206 | MC10 Light Buff |
| Yellow | 505-101 | Safety Yellow |
| Light-Yellow | 505-103 |  |
| Orange | 508-102 | Safety Orange |
| Red | 509-102 | Safety Red |
| Black | 512-101 | Safety Black |
| White | 513-101 | Safety White |

## Identification of Ductwork Systems

### Identification for ductwork shall consist of 25mm high, painted, black, stenciled lettering to indicate the system the duct is associated with and the duct service, e.g. “SYSTEMS SUPPLY”, and stenciled directional arrows to indicate airflow. On insulated ducts, apply the lettering to a rectangular painted white background. Manufactured adhesive backed identification conforming to the requirements above may be used in lieu of paint.

## Language

### Identification shall be in English.

# EXECUTION

## Abandoned Piping

### It is recommended that abandoned or unused piping be thoroughly cleaned of all material residue and stripped of previous identification. It should be re-labelled “NOT IN USE”. If unable to clean thoroughly, include the re-labelling “PREVIOUSLY CONTAINED \_\_\_\_\_\_\_\_\_\_\_”.

## Pipe Labeling Schedule

### Refer to the supplement at the end of this Section for the pipe labeling schedule.

### Requirements:

#### The pipe labeling schedule containing all pipe labeling information is required for every project, and shall be prepared using the template provided by the Region.

### Content

#### All pipe identification labels shall be uniquely identified on the labeling schedule.

#### The labeling schedule shall at a minimum include the following fields:

##### Label Count

##### Legend Text

##### Service/Contents

##### Background Colour

##### Legend and Arrow Colour

##### Label type, in accordance with Section 2.3.

##### Remarks

## Application of Pipe Labels

### Apply identification labels and directional arrows, at a minimum:

#### On long straight runs in open areas at not more than 6m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

#### At beginning and end points of each run and at each piece of equipment in run.

#### On both sides of valves.

#### On all branch fittings and elbows.

#### On both sides where pipes and ducts pass through walls, floors and ceilings.

#### Where circumstances make contents or direction of flow doubtful.

#### At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.

### Identification shall be easily and accurately readable from usual operating areas and from access points.

### Position of identification shall be approximately at right angles to the most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt. When piping systems are located near ceilings or above an employee’s line of sight, identification shall be placed on the bottom of piping systems where clearly visible (see Figure 3-1). On vertical pipes, markers shall be placed on the side where visibility is best.

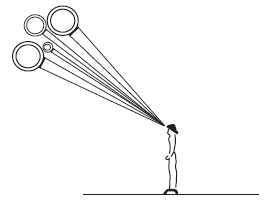


Figure 3-1: Visibility of Piping Identification

### Provide identification only after all painting has been completed. Painting to be in accordance with Section 09900 – Painting and Protective Coatings.

### Identification of all Assets shall be in accordance with the Section 35 - Development and Maintenance of Asset Inventory and Tagging Guideline.

## Application of Duct Labels

### Exposed Ductwork: Identify exposed ductwork in locations as follows:

#### At the start and end of every duct run.

#### Adjacent to each damper and similar accessory.

#### At each piece of connecting equipment.

#### On both sides of every duct passing through a floor, wall or partition, unless otherwise specified in the Contract Documents.

#### At 6m intervals on duct runs exceeding 6m in length.

#### On each side of branch connections.

#### At least once in each room, and at least once on duct runs less than 6m in length.

### Concealed Ductwork: Identify concealed ductwork in locations as follows:

#### At points where ducts enter and leave rooms, shafts, furred spaces, and similar areas.

#### At maximum 6m intervals on piping and ductwork above suspended accessible ceilings, and at least once in each room.

#### At each access door location.

## Colour Legend

*[Consultant Note: If modifications or additions to the piping systems and label background colours are required, the tables below are to be revised and finalized in consultation with the Region.]*

Group # 1 Flammable Materials Colour Legend

|  |  |  |  |
| --- | --- | --- | --- |
| **Piping System** | **Label Background Colour** | **Letter Colour** | **Maximum Label Intervals** |
| Propane Gas | Orange | Black | 3m |
| Natural Gas |
| Hydraulic Fluid |
| Fuel Oil |
| Acetylene |
| Digester Gas |
| Diesel Fuel |
| Gasoline |
| [] |
| [] |

Group # 2 Fire Fighting (Protection) Colour Legend

|  |  |  |  |
| --- | --- | --- | --- |
| **Piping System** | **Label Background Colour** | **Legend Colour** | **Maximum Label Intervals** |
| Standpipe System | Red | White | 3m |
| Sprinkler System |
| Halon Fire Protection |
| Carbon Dioxide Fire Protection |
| Fire Suppression Foam |
| [] |
| [] |

Group # 3 Dangerous Substances Colour Legend

|  |  |  |  |
| --- | --- | --- | --- |
| **Piping System** | **Label Background Colour** | **Legend Colour** | **Maximum Label Intervals** |
| Chlorine Gas | Yellow | Black | 3m |
| Boiler Feed |
| Boiler Blow Off |
| High Temperature Domestic Water |
| Low Pressure Stream |
| Low Pressure Condensate |
| High Pressure Steam |
| High Pressure Condensate |
| Phosphoric Acid |
| Sulfuric Acid |
| Ferric Chloride |
| Ammonia |
| Hydrofluosilicic Acid |
| [] |
| [] |

Group # 4 Other Chemical Substances Colour Legend

|  |  |  |  |
| --- | --- | --- | --- |
| **Piping System** | **Label Background Colour** | **Legend Colour** | **Maximum Label Intervals** |
| Chlorine Solutions | Light Yellow | Black | 3m |
| Sodium Hydroxide |
| Neutralizers (Soda Ash, Sodium Bisulfate, Hydrochloric Acid) |
| Dechlorinating Agent |
| Foaming Reduction Agent |
| Coagulants (Polyaluminum Chloride, Alum) |
| Sodium Silicate |
| Sodium Hypochlorite |
| Citric Acid |
| Carbon Dioxide |
| Fluoride |
| Potassium Permanganate |
| Antiscalant Chemical |
| Glycol Solution |
| Polymer Solution |
| [] |
| [] |

*Group # 5 Process and Drainage Colour Legend*

|  |  |  |  |
| --- | --- | --- | --- |
| **Piping System** | **Label Background Colour** | **Legend Colour** | **Maximum Label Intervals** |
| Non-Potable Water/Drainage & Effluent | Light Grey | White | 6m |
| WTP Settled Backwash/WWTP Supernatant and Centrate | Light Brown | White |
| WTP Backwash Waste/WWTP RAS WAS and Digester Sludge | Mid Brown | White |
| WTP Sludges/WWTP Raw Sludge and Scum | Dark Brown | White |
| Raw Water/Sanitary Waste | Mid Grey | White |
| Finished/Potable Water | Light Blue | White |
| Settled Water | Mid Blue | White |
| Raw Water | Dark Blue | White |
| Process Air | Bright Green | White |
| [] | [] | [] |
| [] | [] | [] |

## Supplement

### The supplement listed below, attached following “END OF SECTION”, forms a part of this Section

#### Pipe Labeling Schedule

**END OF SECTION**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Label Count | Legend Text | Service/Contents | Label Type | Label Background Colour | Label Legend and Arrow Colour | Remarks |
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