Sections 11010/14800
Window Washing Systems/
Powered Platforms

Window Cleaning/Suspended Maintenance Equipment & Fall Protection Systems

MASTER SPECIFICATION FOR CANADA

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SPEC NOTE: This guide specification is basic and must be adapted to suit the requirements of individual projects. It is written in accordance with the CSC/CSI Three Part Section Format. Square brackets [ ] indicate choice, alternatives, data required or need for the specifier to make a decision.

PART 1 - GENERAL

1.1 General Requirements

.1 Comply with the conditions of the Contract and Division 1 - General Requirements.

1.2 Section Includes

.1 Work of this section includes the design, supply and installation of window cleaning/suspended maintenance equipment

1.3 Related Sections

.1	Unloading and hoisting of equipment to roof	Section [01500]
.2	Cast-in-place concrete, including installation of embedded items	Section [03300]
.3	Precast concrete	Section [03400]
.4	Structural Steel	Section [05120]
.5	Open Web Steel Joists	Section [05210]
.6	Metal Deck	Section [05310]
.7	Catwalks	Section [05516]
.8	Roofing	Section [07500]
.9	Flashing	Section [07600]
.10	Sealants	Section [07900]
.11	Rigging access doors in walls	Section [08111]
.12	Continuous track stabilization on exterior of building	Section [08800]
.13	Installation of intermittent stabilization on exterior of building	Section [03450]
.14	Hot & Cold water supply, faucets and drain at [every] roof level	Section [15400]
.15	Three phase 208 volts, 60 Hertz service at [every] roof level	Section [16050]

SPEC NOTE: Re 1.3.16. Specify independent protected main line power and weatherproof Hubbell Twist-Lock 208 volts, 3 phase, 60 Hertz, 30 amperes receptacle for all power requirements except for a permanent powered platform which requires 230 volts (HBL2620SW, NEMA No. L6-30R for rental powered platforms, and HBL2720SW, NEMA No. L15-30R for permanent powered platforms). Consideration to be given to including a power booster to maintain 230 volts. Power to be located no more than 30 m (100'-0") from window cleaning/suspended maintenance equipment location. Outlets to experience no more than 3% voltage drop under full load current. Pro-Bel wall or roof anchors may be employed for strain relief. Contact Pro-Bel for requirements.

.16	Weatherproof power supply outlets with strain relief anchors	Section [16132]

1.4 References

.1 All products or equipment listed herein to conform to:

.1 Ontario Occupational Health and Safety Act Window Cleaning Regulation 859/90 as amended by 523/92, and 213/91 as amended by 631/94 (Construction Projects).

.2 CAN/CSA-Z91-02 "Health and Safety Code for Suspended Equipment Operations".

.3 CAN/CSA-Z271-98 "Safety Code for Suspended Elevating Platforms".

.4 Ontario Building Code 1997, 4.1.10.8. Anchor Systems on Building Exterior - to be provided where any portion of the roof is more than 8 m (26'-3") above adjacent ground level, for both maintenance and window cleaning operations.

.5 Workers' Compensation Board of British Columbia Occupational Health & Safety Reg., 296/97 as amended by 185/99, General Hazard Requirements, Parts 11 (Fall Protection) and 13 (Ladders, Scaffolds and Temporary Work Platforms).

.6 Nova Scotia Department of Labour Occupational Health and Safety Act, Schedule "A" Fall Protection and Scaffolding Regulations.

.7 CSA S16.1 "Steel Structures for Buildings".

.8 CSA S136 "Design of Steel Structural Members, Light Gauge".

.9 CISC 2 "Standard Practice for Steel, Structural, for Buildings".

.10 CSA W59 "Welded Steel Construction," and CSA W47 "Certification of Companies for Fusion Welding of Steel Structures".

.11 CAN3-S157-M83 "Strength Design in Aluminum".

.12 CAN3-S244-1969 "Welded Aluminum Design".

.13 CSA-W47.2 - 1967 "Aluminum Welding Qualification Code".

.14 CSA G164 "Galvanizing, Hot Dip, of Irregularly Shaped Articles".

1.5 Design Requirements

.1 Design window cleaning/suspended maintenance system to suit building and in accordance with plans, specifications, standards, and regulations/codes contained in sections 1.4 and 1.9.

.2 Locate anchorages to suit suspension equipment that will be used on the building with respect to items such as reach, rigging, spacing, roof edge condition, and similar items.

.3 Design all anchor components to provide adequate attachment to the building and suited to current window cleaning/ suspended maintenance practices. Ensure compatibility with industry standard equipment.

.4 Ensure all anchor components conform to proper engineering principles and have been designed by a Professional Engineer qualified in the design of window cleaning/suspended maintenance equipment, its application and safety requirements.

.5 Design system fall arrest safety anchors and equipment supports to comply with the following structural requirements:
1. Supports for Suspended Platforms: davits, rigging sleeves and monorails are used for suspending a powered platform from storage and rigging/working locations on the building. These supports and the structure to which they are attached are typically designed to 1000 lbs (4.45 kN) vertical service load plus impact with a factor of safety as per AISC requirements and/or ACI or other applicable construction codes, and to 4 times the rated load against fracture or detachment (i.e. 4 to 1 stability factor).
2. Fall Arrest Safety Anchors: fall arrest safety anchors are desigend to a typical maximum fall arresting force of 1800 lbs (8.0 kN) when wearing a body harness with a factor of safety of 2 without any permanent deformation and to 5000 lbs (22.2 kN) against fracture or detachment.

1.6 Shop Drawings and Engineering Certification

.1 Submit shop drawings showing complete layout and configuration of complete window cleaning/suspended maintenance system, including all components and accessories. Clearly indicate design and fabrication details, window "drops", hardware, and installation details.

.2 Shop drawings to include installation and rigging instructions and all necessary Restrictive and Non-Restrictive Working Usage Notes and General Safety Notes.

.3 Shop drawings to be reviewed by a professional engineer, and upon request, complete with calculations and/or test reports.

1.7 Qualifications

.1 Manufacturer: Work of this Section to be executed by manufacturer specializing in the design, fabrication and installation of window cleaning/suspended maintenance systems having a minimum of 5 years documented experience.

.2 Loading and safety assurance: Work of this Section to meet the requirements of governing codes and jurisdiction and to comply with properly engineered loading and safety criteria for the intended use.

.3 Insurance: Manufacturer to carry specific liability insurance (products and completed operations) in the amount of $5,000,000.00 + to protect against product/system failure.

.4 Welding to be executed by certified welders in accordance with CSA W59 and CSA W47.2 requirements.

1.8 Maintenance Data

.1 Submit 1 copy of system Equipment Manual & Inspection Log Book, with "Initial Inspection - Certification for Use" and "Inspection Sign-Off" forms completed.

.2 Submit 2 copies of a reduced plastic laminated as-built shop drawing showing equipment locations and details. This drawing is to be posted near exits onto the roof.

1.9 Regulatory Requirements

.1 Comply with the following regulations:

.1 Ontario Occupational Health and Safety Act Window Cleaning Regulation 859/90 as amended by 523/92, and 213/91 as amended by 631/94 (Construction Projects).

.2 CAN/CSA-Z271-98 Safety Code for Suspended Elevating Platforms and CAN/CSA-Z91-02 Health and Safety Code for Suspended Equipment Operations.

.3 Ontario Building Code 1997, 4.1.10.8. Anchor Systems on Building Exterior - to be provided where any portion of the roof is more than 8 m (26'-3") above adjacent ground level, for both maintenance and window cleaning operations.

.4 Workers' Compensation Board of British Columbia Industrial Health & Safety Regulations, Section 8, Places of Employment - General Requirements, and Section 74, Window Cleaning General Requirements.

.5 Nova Scotia Department of Labour Occupational Health and Safety Act, Schedule "A" Fall Protection and Scaffolding Regulations.

PART 2 - PRODUCTS

2.1 Manufacturer

.1 This specification is based on systems currently being manufactured by PRO-BEL ENTERPRISES LTD. Toll free: 1-800-461-0575. Telephone: 905-427-0616, Fax: 905-427-2545, info@pro-bel.ca.

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.2 Other manufactured products meeting this specification may be substituted provided that manufacturers show proof of product insurance. Equipment details to be approved by the architect and/or consultant. Companies, such as miscellaneous metal fabricators, who are not normally engaged in the design and manufacture of window cleaning/suspended maintenance equipment are not permitted to bid.

2.2 Equipment

SPEC NOTE: List type and quantity as required. Material clauses for gantry systems, rolling ladders, climbing monorails, and powered roof cars are not included here as their use in projects is unusual. Contact Pro-Bel for complete data regarding this equipment.

.1 [_____]

.2 [_____]

.3 [_____]

2.3 Safety & Tie-Back Anchors

SPEC NOTE: Delete items not required.

.1 Safety U-bars: [Type 304 stainless steel with yield strength of 240 MPa (35 Ksi)] [mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164]. U-bar to be not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.

.2 Securement bolts: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164.

.3 Hollow steel section (HSS) piers: mild steel, Type 300W with yield strength of 350 MPa (50 Ksi). Wall thickness to suit application, [hot dipped galvanized to CSA G164] [with Pro-Bel Protex 2.4 mm (3/32”) thickness, black colored, two-component TPU polyurethane/polyurea coating system].

.4 Base plate and all other sections: [galvanized] [Pro-Bel Protex coated] mild steel as above with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.

SPEC NOTE: Re 2.3.5. Specify aluminum flashing for BUR or modified bitumen roofs only (membrane above or below insulation). For single ply roofs, flashing to be in accordance with membrane manufacturer's instructions. Specify conformable mastic tape and heat-shrink rubber collar flashing for EPB Series roof anchors (BUR or modified bitumen roofs) or s.s. cap for PB series roof anchors (any type roof).

.5 Seamless spun aluminum flashing (for steel pier anchors): Type 6061-T6 alloy to ASTM B221 with deck flange flashed in to CRCA recommendations. Seal top of aluminum flashing with [conformable mastic tape and torch applied heat-shrink rubber collar flashing] [detachable watertight stainless steel cap].

.6 Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164 or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).

2.4 Ground Rigged Davits

SPEC NOTE: Delete items not required.

.1 Davit booms: Aluminum sections of engineered length and size to suit application, equipped with: carrying handles; [stainless steel rolling trolley] [stainless steel friction trolley] [galvanized fixed shackle] on outboard end; prominently displayed, non-corrosive data plate clearly stating Maximum Service Capacity of boom, Manufacturer's Name, Serial No. and Manufacturing Date; and designed to carry minimum vertical service load of 4.5 kN (1,000 lbs.), i.e. rated load.

.2 Davit masts: Round tubular [aluminum][steel] section capable of rotating through 360°; carrying handles; connecting pins.

SPEC NOTE: Re 2.4.3. U-bar safety (lifeline) anchors secured to davit bases are optional. If lifeline anchors are required farther back on the roof, see Pro-Bel Safety & Tie-back Anchors Specification.

.3 Davit arms:
1. Davits to be demountable, portable, capable of being easily and quickly broken down into pieces weighing no more then 36.3 kg (80 lbs) for ease of carrying.
2. A davit or part of a davit weighing more than 36.3 kg (80 lbs) to be provided with a means for its transport, which shall keep the center of gravity of the davit at or below 915 mm (36") above the safe surface during transport.
3. Davits or davit components that require more than 36.3 kg (80 lbs) lifting effort to raise the arm into postion to be provided with a mechanical means for hoisting them into postion.
4. Davit arm booms equipped with rolling trolleys or friction trolleys to have stops to ensure trolley cannot become detached from boom.

.4 Davit bases: Round, hollow steel section piers of mild steel, Type 350W with yield strength of 350 MPa (50 Ksi), [hot dip galvanized to CSA G164] [with Pro-Bel Protex 2.4 mm (3/32”) thickness black colored two-component TPU polyurethane/ polyurea coating system] [with] [without] 19 mm (3/4") diameter U-bar safety anchor, and securement to suit application.

.5 Tethers: All pins and loose pieces to be secured using 3 mm (1/8") stainless steel cable complete with easily inserted lead connectors to avoid loss.

.6 Plate and all other sections: [Galvanized] [Pro-Bel Protex coated] mild steel as per davit bases above with yield strength of 300 MPa (44 Ksi).

SPEC NOTE: Re 2.4.7. For 300 series bases specify aluminum flashing for BUR or modified bitumen roofs only (membrane bove or below insulation). For single ply roofs, flashing to be in accordance with membrane manufacturer's instructions.

.7 Seamless spun aluminum flashing (for davit bases): Type 6061-T6 alloy to ASTM B221 with deck flange flashed in to CRCA recommendations. Seal top of aluminum flashing with conformable mastic tape and torch applied heat-shrink rubber collar flashing.

.8 Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164 or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).

2.5 Roof Rigged Davits

SPEC NOTE: Delete items not required.

.1 Davit booms: Aluminum sections of engineered length and size to suit application, equipped with: carrying handles; [stainless steel rolling trolley] [stainless steel friction trolley] [galvanized fixed shackle] on outboard end; prominently displayed, non-corrosive data plate clearly stating Maximum Service Capacity of boom, Manufacturer's Name, Serial No., and Manufacturing Date; and designed to carry minimum vertical service load of 4.5 kN (1,000 lbs.), i.e. rated load.

.2 Davit masts: Round tubular [aluminum][steel] section capable of rotating through 360°; carrying handles; connecting pins; erection winch; turning handles; transport wheels.

SPEC NOTE: Re 2.5.3. U-bar safety (lifeline) anchors secured to davit bases are optional. If lifeline anchors are required farther back on the roof, see Pro-Bel Safety & Tie-back Anchors Specification.

.3 Davit arms:
1. Davits to be demountable, portable, capable of being easily and quickly broken down into pieces weighing not more then 36.3 kg (80 lbs) for ease of carrying.
2. A davit or part of a davit weighing more than 36.3 kg (80 lbs) to be provided with a means for its transport, which shall keep the center of gravity of the davit at or below 915 mm (36") above the safe surface during transport.
3. Davits or davit components that require more than 36.3 kg (80 lbs) lifting effort to raise the arm into postion to be provided with a mechanical means for hoisting them into postion.

4. Davit arm booms equipped with rolling trolleys or friction trolleys to have stops to ensure trolley cannot become detached from boom.
5. Tall roof rigged davits shall be designed with hoisting winches to safely raise and lower arms and dolly wheels to roll davit arms into place.

.4 Davit bases: Round, hollow steel section piers of mild steel, Type 350W with yield strength of 350 MPa (50 Ksi), [hot dip galvanized to CSA G164] [with Pro-Bel Protex 2.4 mm (3/32") thickness black colored two-component TPU polyurethane/ polyurea coating system], , [with] [without] 19 mm (3/4") diameter U-bar safety anchor, and securement to suit application.

.5 Tethers: All pins and loose pieces to be secured using 3 mm (1/8") stainless steel cable complete with easily inserted lead connectors to avoid loss.

.6 Plate and all other sections: [Galvanized] [Pro-Bel Protex coated] mild steel as per davit bases above with yield strength of 300 MPa (44 Ksi).

.7 Flashing (for davit bases): Flashing to be in accordance with membrane manufacturer's recommendations.

.8 Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164 or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).

2.6 Outrigger Beams

SPEC NOTE: Delete items not required.

.1 Outrigger beams: [aluminum I-beams] [galvanized steel I-beams] [galvanized hollow steel sections] with non-corrosive, prominently displayed data plate clearly stating Maximum Service Capacity of beam, Manufacturer's Name, Serial No. and Manufacturing Date; and designed to carry minimum vertical service load of 4.5 kN (1,000 lbs); of engineered length and size to suit application complete with [shackle] [friction U-bar] [trolley] on outboard end. Beams equipped with rolling trolleys or friction trolleys to have stops to ensure trolley cannot become detached from beam.

SPEC NOTE: Some very long outrigger beams are designed specifically for bosun's chair with descent control equipment. For this restrictive application, vertical service load will be less than 4.5 kN (1,000 lbs). Consult with Pro-Bel for recommendations.

.2 Safety U-bars: [Type 304 stainless steel with yield strength of 240 MPa (35 Ksi)] [mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164]. U-bar to be not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.

.3 Outrigger base/roof anchor hollow steel section (HSS) piers: mild steel as above with yield strength of 350 MPa (50 Ksi). Wall thickness and securement to suit application, [hot dipped galvanized to ASTM A123/A 123M-2000] [with Pro-Bel Protex 2.4 mm (3/32") thickness, black coloured, two component TPU polyurethane/polyurea coating system].

.4 Swivel-type beam bases: round hollow section (HSS) piers of mild steel, Type 350W with yield strength of 350 MPa (50 Ksi) [hot dipped galvanized to CSA G164] [Pro-Bel Protex coated]; capable of easily rotating through 360° under load; with connecting pins; safety U-bar as above.

.5 Beam dolly: [galvanized steel] [aluminum] with pneumatic type rubber wheels, sized to suit beam.

.6 Tethers: all pins and loose pieces to be secured using 3 mm (1/8") stainless steel cable complete with easily inserted lead connectors to avoid loss.

.7 Base plate and all other sections: [galvanized] [Pro-Bel Protex coated] mild steel as above with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.

SPEC NOTE: Re 2.6.8. Specify aluminum flashing for BUR or modified bitumen roofs only (membrane above or below insulation). For single ply roofs, flashing to be in accordance with membrane manufacturer's instructions. Specify conformable mastic tape and heat-shrink rubber collar flashing for EPB Series roof anchors (BUR or modified bitumen roofs).

.8 Seamless spun aluminum flashing (for steel pier anchors): Type 6061-T6 alloy to ASTM B221 with deck flange flashed in to CRCA recommendations. Seal top of aluminum flashing with conformable mastic tape and torch applied heat-shrink rubber collar flashing.

.9 Securement and miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164 or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).

2.7 Monorails

SPEC NOTE: Delete items not required.

.1 Monorails and mounting: designed to carry minimum vertical service load of 4.5 kN (1,000 lbs); fabricated using [aluminum extrusions to CAN3-S157-M83 and CAN3-S244-1969] [Cold rolled hollow steel sections, Type 350W with yield strength of 350 MPa (50 Ksi) and tensile strength of 450 MPa (65 Ksi), galvanized to CSA G164 "Standard Specification for Zinc Coating (Hot Dipped Galvanizing) of Iron and Steel Products"].

.2 Monorail finish: exterior finish to be [mill] [anodized] [galvanized] [polyester or polyurethane powder coated baked enamel of color as selected from manufacturer's standard colors or custom color]. Interior finish to be [epoxy] [hybrid powder coated] [enamel painted on site].

.3 Capacity/Data plates: rail entry systems to be equipped with prominently displayed, non-corrosive plate clearly stating Maximum Service Capacity, Manufacturer's name, Serial No. and Manufacturing Date.

.4 Trolleys: equipped with heavy-duty rollers and 16 mm (5/8") diameter U-bar safety anchors;[exterior finish to be Type 304 stainless steel.] [Interior finish to be powder coated mild steel to match monorail.] Design trolleys to run freely under load with minimum discontinuity at rail splices and provide end stops to ensure trolley cannot become detached from the rail. Stops to be removable for service.

.5 Safety U-bars: [Type 304 stainless steel with yield strength of 240 MPa (35 Ksi)] [mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164]. U-bar to be not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.

.6 Securement bolts: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164.

.7 Hollow steel section (HSS) piers: galvanized steel as above with yield strength of 350 MPa (50 Ksi). Wall thickness to suit application.

.8 Tethers: all pins and loose pieces to be secured using 3 mm (1/8") stainless steel cable complete with easily inserted lead connectors to avoid loss.

.9 Base plate and all other sections: galvanized mild steel as above with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.

2.8 Rigging Sleeves

SPEC NOTE: Delete items not required.

.1 Safety U-bars: [Type 304 stainless steel with yield strength of 240 MPa (35 Ksi)] [mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164]. U-bar to be not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.

.2 Securement Bolts: [mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164] [Type 304 stainless steel with yield strength of 240 MPa (35 Ksi)].

.3 Straight suspension bars: 19 mm (3/4") diameter mild steel with yield strength of 240 MPa (35 Ksi), hot dipped galvanized to CSA G164.

.4 Hollow steel section (HSS) sleeves: galvanized mild steel as per 2.8.1 above with yield strength of 350 MPa (50 Ksi) of wall thickness to suit application, and as follows:
1. wall mounted rigging sleeves: Fabricate with flip-up hinged door to accommodate push/pull outrigger.
2. curved rigging sleeves: Bend with smooth radius finish to protect suspension or safety lines from chafing.

.5 Hollow steel section (HSS) piers: galvanized steel as above with yield strength of 350 MPa (50 Ksi). Wall thickness to suit application.

.6 Base plate and all other sections: galvanized mild steel as above with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.

.7 Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164 or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).

2.9 Horizontal Cable Lifeline System

SPEC NOTE: Delete items not required.

.1 Hollow steel (HSS) pier supports: galvanized mild steel as above with yield strength of 300 MPa (50 Ksi). Wall thickness to suit application.

.2 Base plate and all other sections: galvanized mild steel as above with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.

.3 Securement bolts: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164.

.4 Safety U-bars: [Type 304 stainless steel with yield strength of 240 MPa (35 Ksi)] [mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164]. U-bar to be not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.

SPEC NOTE: Re 2.9.5. Specify aluminum flashing for BUR or modified bitumen roofs only (membrane above or below insulation). For single ply roofs, flashing must be in accordance with membrane manufacturer's instructions. Specify conformable mastic tape and heat-shrink rubber collar flashing for PBE series roof anchors (BUR or modified bitumen roofs) or s.s. cap for PB series roof anchors (any roof type).

.5 Seamless spun aluminum, flashing (for steel pier supports): Type 6061-T6 alloy to ASTM B221 with deck flange flashed in to CRCA recommendations. Seal top of aluminum flashing with conformable mastic tape and torch applied heat-shrink rubber collar flashing.

.6 Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164 or Type 304 stainless steel with yield strength of 240 MPa 35 Ksi).

"Hands-Free" Horizontal Lifeline System

SPEC NOTE: The following material clauses are for the "Hands-Free" Horizontal Lifeline System.

.7 Cable: 8 mm (5/16") dia. Type 316 stainless steel with minimum breaking strength of 85 kN (19,125 lbs.), complete with permanently swedged cable ends.

.8 Data Plate: cable system entry points to be equipped with prominently displayed non-corrosive data plate clearly stating Maximum Service Capacity and Number of Users.

.9 Standard intermediate support brackets: multi-position Type 316 stainless steel with reinforcing end caps and suitable for installation at any height. Secured using 13 mm (1/2") dia. fasteners.

.10 Mobile Intermediate support brackets: multi-position, Type 316 stainless steel for working both sides of sloped roof at ridge point.

.11 Corner Units: manufacturer's standard flexible corner units as required.

.12 End terminal hardware: stainless steel swedged termination at one end and stainless steel tensioner with shock absorber at other end.

.13 Lanyard cable runner: Type 316 stainless steel with automatic runner bypass for continuous "hands-free" operation that can be inserted or removed anywhere on the cable.

.14 Harness: manufacturer's standard "hands-free" full body harness and lanyard complete with shock absorber.

Double Lanyard (DL) Horizontal Lifeline

SPEC NOTE: The following material clauses are for the Double Lanyard (DL) Horizontal Lifeline.

.7 Cable: 8 mm (5/16") dia. galvanized steel with minimum breaking strength of 85 kN (19,125 lbs.), complete with matching permanently swedged or mechanically swedged cable ends.

.8 Data plate: cable system entry points to be equipped with prominently displayed non-corrosive data plate clearly stating Maximum Service Capacity and Number of Users.

.9 Tensioner: steel turnbuckle, same material as cable.

.10 Harness: manufacturer's standard full body harness with double lanyard and shock absorbers.

2.10 Horizontal Trolley Rail System

SPEC NOTE: Delete items not required.

.1 Horizontal rails and mounting: designed to carry minimum vertical service load of 4.5 kN (1,000 lbs); fabricated using [aluminum extrusions to " Standard Specifications for Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes] [Cold rolled steel sections, Type 300W with yield strength of 300 MPa (44 Ksi) and tensile strength of 450 MPa (65 Ksi), galvanized to CSA G164. Provide end stops to ensure trolleys cannot become detached from the rail. Stops to be removable for service.

.2 Monorail finish: exterior finish to be [mill] [anodized] [galvanized] [polyester or polyurethane powder coated baked enamel of color as selected from manufacturer's standard color or custom color]. Interior finish to be [epoxy] [hybrid powder coated] [enamel painted on site].

.3 Capacity/Data plates: rail entry systems to be equipped with prominently displayed, non-corrosive plate clearly stating Maximum Service Capacity, Manufacturers name, Serial No. and Manufacturing Date.

.4 Trolleys: equipped with heavy duty rollers and 16 mm (5/8") diameter U-bar safety anchors; [exterior finish to be Type 304 stainless steel]. Design trolleys to run freely under load with minimum manipulation.

.5 Safety U-bars: [Type 304 stainless steel with yield strength of 240 MPa (35 Ksi)] [mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164]. U-bar to be not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.

.6 Securement bolts: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164.

.7 Hollow steel section (HSS) piers: galvanized steel as above with yield strength of 50 Ksi (300 Mpa). Wall thickness to suit application.

.8 Tethers: All pins and loose pieces to be secured using 3 mm (1/8") stainless steel cable complete with easily inserted lead connectors to avoid loss.

.9 Base plate and all other sections: galvanized mild steel as above with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.

SPEC NOTE: Re 2.10,J. Specify aluminum flashing for BUR or modified bitumen roofs only (membrane above or below insulation). For single ply roofs, flashing to be in accordance with membrane manufacturer's instructions.

.10 Seamless spun aluminum flashing (for roof mounted steel pier anchors: Type 6061-T6 alloy to ASTM B221 with deck flange flashed into CRCA recommendations. Seal top of aluminum flashing with conformable mastic tape and torch applied heat-shrink rubber collar flashing.

.11 Miscellaneous bolts, nuts, and washers: mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized to CSA G164 or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).

2.11 Permanent Powered Platforms

SPEC NOTE: Delete items not required.

SPEC NOTE: Equipment supports and the structure to which they are attached must be designed to support the rated working load which is the combined static weight of the workers, materials and the total weight of the suspended permanent powered platform. Generally the support equipment is designed to support this increased weight. The reactions will have to be adjusted for supports (davits, monorails, outriggers, etc.) to reflect the increased loads. Contact Pro-Bel for requirements.

.1 Suspended platform: Type 6061-T6 aluminum alloy to ASTM B221-2000 mill and powder coated finished modular platform system to ASME A120.1-2001 of engineered length and width to suit application based on load bearing frame, with non-slip, aluminum deck, soft rubber wall rollers, and caster wheels. [Provide integral, detachable 915 mm (3'-0") long single work cage at one end complete with all necessary appurtences for the use intended.]

.2 Frame and rails: side frames and connecting frames to be structural aluminum, galvanized mild steel or powder coated steel; guard rails and guard rails posts to be square, thick wall aluminum extrusions with rails a minimum of 915 mm (36") above deck level at working side of platform and 1067 mm (42") at non-working side. A 90 mm (3-1/2") high toe-board to be provided around circumference of platform with spaces between toe-board and guardrails covered with expanded aluminum screen, excluding front of platform between mid-rail and top rail.

.3 Stirrups: structural aluminum, hot-dip galvanized steel or powder coated steel fitted with manufacturer's standard hoist unit, top limit switch assembly and striker plate, and high "fair lead".

.4 Wire winders: [electric powered] [passive type] with single or twin drum built into stirrups, to allow drums to wind evenly to prevent loose wires and jamming; capacity and dimension to suit application.

.5 Cable storage bin: fitted to rear guard rail, capacity and dimensions to suit application.

.6 Upper limit switch assembly: fitted on top of each stirrup, designed to cut electric power supply to hoist when switch contacts striker plate on suspension rope at top limit of travel.

.7 Electro mechanical overload system: integral with each hoist preset to safe working load plus 25%, designed to operate limit switch and cut power supply if overloading of platform should occur.

.8 Lower limit trip bar assembly: consisting of hinged aluminum bar at each end of underside of working face of platform, designed to operate limit switch and interrupt electric power supply to both hoists in the event bar is pushed upwards by any obstruction on the building facade during descent, but still allowing platform to be operated in upward direction.

.9 Main and auxiliary control boxes: electric control gear for both hoists and wire winder motors contained in central control box and mounted to rear guardrail. Standard layout to contain:
.1 UP/DOWN "HOLD TO RUN" switches;
.2 hoist selector switch LEFT/RIGHT/BOTH (optional);
.3 bottom trip bar over-ride button;
.4 emergency stop button;
.5 platform self-leveling system;
.6 power on indicator light;
.7 three phase protection and light indicator;
.8 locking facility on main switch;
.9 hand wheel for manual hoist operation;
.10 watertight electrical "quick" connections.

.10 Hoist unit: platform to be powered by two UL listed traction type hoists with the following features:
.1 30 amp 230 volt 60 Hertz hoist with lift capacity to suit platform weight and live load.
.2 10.7 m/min. (35 ft./minute) speed;
.3 slack rope safety device acting on safety rope;
.4 electro mechanical overload system;
.5 electro mechanical main brake;
.6 "no power" controlled emergency descent system;
.7 hoist protection cover (optional).

SPEC NOTE: Re 2.11.11. Specify four wire ropes for buildings over 91.4 m (300'-0"). If two wire ropes are specified, separate life-line anchors are required for workers. See Pro-Bel Safety & Tie-back Anchors literature.

.11 Steel wire rope: platform to be supplied complete with [two] [four] galvanized high tensile steel wire ropes of length as required. Each rope to be fitted with 1.4 kg (3 lb.) SWL safety hook with thimble talurit clamp and a brazed "bullet-end". Construction 6 x 19 Seale & IWRC, standard diameter 8 mm (5/16").

.12 Electrical supply cable: trailing supply cable to be fitted with male CEE plug for connection to the central control box and supplied with cable support clamp, length as required. Power cords for buildings over 107 m (350'-0") to be equipped with reinforced core.

.13 Portable fire extinguisher: to be securely attached to platform.

.14 Accessories (Optional):
.1 water container fitted at rear guard rail;
.2 tool-outlet fitted on central control box.

.15 Powder coated finish: treatment to consist of steel sandblasted to SA3 requirement, metalized hot zinc sprayed (thread quality dia. 3.8 mm Zn-Al 850, coating thickness 40 microns), and standard blue powder coating (polyester PR 31-TR 5015 HR-58-200-F, coating thickness 60 to 80 microns).

SPEC NOTE: Re 2.12 See Pro-Bel Stabilization Systems literature (Specification) and include requirements here, including quantity of stabilizer ties.

2.12 Platform Stabilization (Tie-In Guides):

PERMANENT POWERED PLATFORMS

SPEC NOTE: The following clauses are written for inclusion at the end of Part 2, the materials section of a Pro-Bel Permanent Powered Platform specification. It is recommended that all buildings more than 40 m (130'-0") in height employing a permanent installation has either a continuous stabilization system (mullion tracks), or an intermittent stabilization system (buttons or detent pins) at every third floor or 15.3 m (50'-0") whichever is less, to protect workers against high winds.

SPEC NOTE: Re 1. Below. Ensure strict co-ordination between mullion manufacturer and suspended access equipment manufacturer to avoid joint alignment problems. In curtain wall specification, specify the exterior of the building is to be designed to provide a positive and continuous means of engagement between the suspended platform and the building during full vertical travel of the platform on the face of the building. Tie-in guide dimensions for internal track to be minimum 25 mm (1") opening with minimum inside dimensions of 64 mm wide X 64 mm deep (2-1/2" wide by 2-1/2" deep). Cope out or design tracks so that platform trolleys can be inserted at both top and bottom of building.

.1 Continuous Stabilization: Provide guide roller/sliding shoe assembly at each end of bottom of platform designed to provide continuous engagement between platform and internal tracks. Co-ordinate design with curtain wall manufacturer to ensure smooth operation.

.2 Intermittent Stabilization Anchors:

.1 Buttons: Locate buttons every third floor or 15.3 m (50'-0") whichever is less, in line with platform suspension points. Buttons to be Pro-Bel stainless steel or other corrosion resistant material 38 mm dia. X 5 mm thickness (1-1/2" dia. X 3/16" thickness) with Allen head recess, complete with threaded s.s. building anchor insert of size and configuration to suit building facade and sufficient quantity adjustable s.s. stabilizer ties. The design load for stabilization components such as tie-in guides/buttons/detent pins are designed for a working load of 1.33 kN (300 lbs) per AISC requirements and/or other applicable codes and to 2.67 kN (600 lbs) against fracture or detachment. Bolts and any other connecting hardware to be made of stainless steel or hot dipped galvanized steel.

SPEC NOTE: Re 2. below. Specify detent pins only where flush building appearance is critical.

.2 Detent Pins: Locate detent pin inserts every third floor or 15.3 m (50'-0") whichever is less in line with platform suspension points. Detent pins to be Pro-Bel stainless steel or other corrosion resistant material 8 mm or 10 mm (5/16" or 3/8" dia.) tie handles with spring loaded ball lock, to suit building facade; include sufficient quantity adjustable s.s. stabilizer ties. The design load for stabilization components such as tie-in guides/buttons/detent pins are designed for a working load of 1.33 kN (300 lbs) per AISC requirements and/or other applicable codes and to 2.67 kN (600 lbs) against fracture or detachment. Bolts and other connecting hardware to be made of stainless steel or hot dipped galvanized steel.

NON-PERMANENT (TEMPORARY) PLATFORMS

SPEC NOTE: The following clauses are written for inclusion at the end of the "Materials" section of a Pro-Bel Davit Systems or Outrigger Beam Systems specification. It is recommended that all buildings more than 40 m (130'-0") in height is designed with a stabilization system, to protect workers against high winds.

.1 Intermittent Stabilization Anchors:

.1 Buttons: Locate buttons at every floor level except for the bottom three floors in line with platform suspension points. Buttons to be Pro-Bel stainless steel or other corrosion resistant material 38 mm dia. X 5 mm (1-1/2" dia. X 3/16" thickness) with Allen head recess, complete with threaded s.s. building anchor of size and configuration to suit building facade and sufficient quantity adjustable s.s. stabilizer ties. The design load for stabilization components such as tie-in guides/buttons/detent pins are designed for a working load of 1.33 kN (300 lbs) per AISC requirements and/or other applicable codes and to 2.67 kN (600 lbs) against fracture or detachment. Bolts and any other connecting hardware to be made of stainless steel or hot dipped galvanized steel.

SPEC NOTE: Re 2. below. Specify detent pins only where flush building appearance is critical as pin holes are not as easy to locate as buttons during maintenance operations.

.2 Detent Pins: Locate detent pins at every floor level except for the bottom three floors in line with platform suspension points. Detent pins to be Pro-Bel s.s. or other corrosion resistant material 8 mm or 10 mm X 50 mm long (5/16" or 3/8" dia. X 2" long) tie handle with spring loaded ball lock, quantity to suit. The design load for stabilization components such as tie-in guides/buttons/detent pins are designed for a working load of 1.33 kN (300 lbs) per AISC requirements and/or other applicable codes and to 2.67 kN (600 lbs) against fracture or detachment. Bolts and other connecting hardware to be made of stainless steel or hot dipped galvanized steel.

SPEC NOTE: If the building has been designed with davit bases to suit roof rigged davit arms, locate buttons/detent pins every third floor or 15.3 m (50'-0") whichever is less in line with davit base suspension points.

PART 3- EXECUTION

3.1 Examination

.1 Examine surfaces and areas upon which the work of this section depends. Report to the Contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions, which would cause defective installation of products, or cause latent defects in workmanship and function.

.2 Verify site dimensions.

.3 Commencement of work will imply acceptance of prepared work.

3.2 Installation

.1 Install equipment in accordance with approved shop drawings and manufacturer's recommendations.

.2 Co-ordinate installation with work of related trades.

.3 Install all work true, level, tightly fitted and flush with adjacent surfaces as required.

.4 Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal or vandalism.

SPEC NOTE: Re 3.2.5. Specify for furnish only projects if required.

.5 Manufacturer to assist and/or supervise installation of window cleaning/suspended maintenance equipment installed by others.

.6 Structural steel to receive safety anchors to have adequate bearing surface as indicated on shop drawings and/or to ensure 100% weld.

3.3 Final Adjusting and Inspection

.1 Adjust and leave equipment in proper working order.

.2 Complete "Initial Inspection - Certification for Use" form included in Equipment Manual & Inspection Log Book.

3.4 Testing

.1 All anchors relying upon chemical adhesive fasteners to be 100% tested on site using load cell test apparatus in accordance with manufacturer's recommendations.

End of Section