



Technical Standard

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Mondi AG.

INSTRUMENT INSTALLATION STANDARD

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1 GENERAL

The purpose of this standard is to specify to the Machine Supplier, Engineering Company, Instrument Supplier and Instrument Installation Contractor the general principles of instrument installation. Deviations from these instructions are permitted only by separate agreement.

The Purchaser reserves the right to select the manufacturer of installation material.

Related, project and mill -specific standards are:

- Numbering and Identification System for Electrification and Automation
- Cabling and Marking Instruction for Electrification and Automation

2 NORMS AND STANDARDS

The installation and equipment must comply with the requirements of current local laws, regulations and safety instructions, especially:

- 250/2021 Sb. „Zákon o bezpečnosti práce v souvislosti s provozem vyhrazeným technických zařízení a o změně souvisejících zákonů“
- NV 190/2022 Sb. „Nařízení vlády o vyhrazených technických elektrických zařízeních a požadavcích na zajištění jejich bezpečnosti“
- NV 194/2022 Sb. „Nařízení vlády o požadavcích na odbornou způsobilost k výkonu činnosti na elektrických zařízeních a na odbornou způsobilost v elektrotechnice“

The installation and equipment shall comply with the Project Electric, Automation and Instrumentation Standards.

The electrical equipment shall conform to applicable IEC standards. Any deviations shall be mentioned in the tender.

The Supplier shall carry out any modifications requested by authorities, free of charge.

The equipment shall fulfil the requirements of the PED (Pressure Equipment Directive (2014/68/EU)).

The equipment which is installed to ATEX area shall fulfil the requirements of the standard IEC 60079-14:2013 (Explosive atmospheres - Part 14: Electrical installations design, selection and erection).

3 SCOPE OF INSTALLATION

3.1 General

The scope of supply shall include, but is not limited to, assembly, erection, wiring, testing and all other services that are necessary to put the instrumentation system in condition ready for service. The installation and small material shall be supplied by the Supplier, comprising installation of the work, specified in Appendix I.

As the producer of the construction waste the Supplier is responsible for the collection, utilization, transport and handling of the construction waste. Supplier shall remove the construction waste from his working areas daily. However, the Purchaser shall be

responsible for providing waste skips/receptacles and for emptying them, except when they contain problem waste.

The Purchaser's administrative requirements shall be included into the Project/Site Manual. The Supplier shall undertake to observe the Project/Site Manual, which shall be drawn up specifically for the project and shall be submitted to and signed for by each Supplier coming to work on the site.

3.2 Installation

The Supplier shall obtain the Purchaser's approval for all equipment, which is not mentioned separately in this standard or instrument installation enquiry specification.

Before starting the work, the Supplier shall examine the conditions with other Suppliers working on site so that transmitters, cables, junction boxes, impulse lines etc. can be installed properly and appropriately, taking into consideration installation of other equipment.

If the Supplier's installation differs from the contract without the Purchaser's noticing it, the Supplier shall make the necessary rectification without delay whenever it has occurred during the installation or guarantee time at no charge to the Purchaser.

The Supplier shall use qualified staff for the installation work. It is expected that foremen will have detailed information about the installation work specified in this standard and instrument installation enquiry specification.

The Supplier shall use only Sub-Suppliers accepted by the Purchaser.

The Supplier shall arrange that foremen will work in co-operation with the piping and electrical Suppliers in order to declare location of process connections, cable trays etc.

The Supplier must participate in meetings at the mill site, which concern instrument installation, commissioning and start-up.

The Supplier must participate in the general safety meetings.

3.3 Materials and Supervision of Material Quantities

The Supplier shall purchase material for his stock (to be located on the mill site) according to this standard and instrument installation enquiry specification, material and component lists and his own estimation for the material not specified in this standard of instrument installation enquiry but required for the complete installation.

This specification is based on unit prices. The quantities of typical installation drawings and other specified objects are estimated and are meant to provide a basis for instrument installation. The final quantities depend on final process data.

The Supplier shall ensure that there is always enough material and equipment in stock so that the installation work is not delayed because of the lack of such material and equipment.

The Supplier should be prepared for the possibility of exceeding of material quantity specifications and he should check the material required from working drawings and material lists.

The Purchaser shall have the right to buy material from the Supplier's stock at the prices mentioned in the unit price lists to provide additional spares where necessary, provided this does not cause delay to the installation work.

Payment will be based on installed work with no allowance for materials on site.

The Supplier shall provide Work Status and Progress Reports with actual labor histogram and plant return status each week on Friday by 09.00 a.m. to the Project Automation Manager at Mill Site. Inventory of on-site stores and deliveries of materials to the Mill Site shall be included in the said reports. The reports shall be written in English or local language (or both) depending of an agreement with the Purchaser.

During the installation work the Supplier shall maintain a record of material installed using the same material denominations and units as in the material lists.

The material lists, the cable lists and the lists of additional and extra work shall be handled in weekly installation progress meetings. The Supplier shall notify the Purchaser, immediately becoming aware of any circumstance which may cause variations or additions to the scope of work and raise the issue at the next weekly installation progress meeting by issuing to Purchaser Request for Change Order giving detailed particulars of the amount of the variations or additions and the grounds which they are based on. Any unclear matters shall be clarified without undue delay.

3.4 Workmanship and Materials

The tasks shall be carried out in a workmanlike manner with materials and workmanship of the best quality. Good engineering practice to the satisfaction of the Purchaser must be adhered to at all times.

Any work which in the opinion of the Purchaser is badly arranged or poorly executed or not in accordance with the contract specification shall be redone in a proper and exact way by the Supplier at no expense to the Purchaser.

The Supplier gives clearance that he has experience in this type of installation work for similar industrial development, and as such, is able to anticipate the type of work, which he may encounter with carrying out this contract, even though such detailed information may not be fully covered in the specification drawings.

3.5 Clearing up when Installation Work is Finished

The scope of instrumentation installation basis for the work and the various material quantities shown in Typical Installation Drawings (hook-ups) including all necessary additional material (different type of connectors, unions, fixing materials, supports, brackets, cable glands, name plates etc. although not specified) needed for complete installation, such installation as specified in this standard and instrument installation enquiry specification. The Unit prices of components shall not be used for price correction of typical installation drawings if the Supplier has not agreed that in writing with the Purchaser.

All the material remaining in the Supplier's stock when the work is finished will be the Supplier's property.

When the installation work is complete, the Supplier shall compile a list for each installation package of the work done. These lists shall be based on the typical installation drawing list.

Cables, tubes, pipes, conduits, cable trays and other installation material will not be measured. The unit prices given by the Supplier shall include a tolerance and wastage allowance. Irrespective of the difference between actual and nominal lengths and quantities on the typical installation drawings the unit prices given by the Supplier shall allow for the complete installation of the actual lengths without the requirement for additional payment by the Purchaser.

3.6 Additional Work

Any work carried out by the Supplier, which is not covered by the unit prices, shall be agreed in writing between the Purchaser and the Supplier before the work is commenced, and shall be the subject of a separate Change Order.

3.7 Miscellaneous

3.7.1 Erection Instructions

The installation shall be done in accordance with the given specifications and instructions and with good installation practice. The details shown in Typical Installation Drawings shall be followed in all cases. All exceptions and deviations from the given instructions shall first be approved by the Purchaser.

3.7.2 Revisions for Installation

The Supplier shall be responsible for making all required modifications and/or revisions without any extra charge for installation work not done in accordance with the instructions and installation documents.

3.7.3 Revisions of As-built Documents

The Supplier shall be responsible for marking all modifications or errors which occur during installation in installation drawings and lists with red pencil and giving these 2 sets of drawings and lists to the Purchaser when the installation is finished.

Certificate of Completion is signed only after the "as built" drawings have been handed over to the Purchaser.

3.7.4 Marking of Equipment and Cables

Instruments, cables, tubes and wires shall be marked in accordance with the instructions.

Instrument components will arrive at the site with a plate showing the instrument tag number (acc. to mill standard) and component code. This identification will be used for erection. If identification is in doubt, the Purchaser shall be contacted.

On completion of the installation, all field instruments and control valves shall have clearly visible plastic nameplates supplied, engraved and installed by the Supplier. These nameplates shall be mounted close to the instrument but not to the instrument itself.

3.8 Delivery Limits

Detailed delivery limits concerning the material and work are indicated in the Typical Installation Drawings.

Delivery limits in general are specified below.

3.8.1 Equipment and Erection Material

Supplied by the Purchaser:

- All instruments, control valves and local gauges which are not specified in this standard or instrument installation enquiry specification
- All Control Systems

Supplied by the Supplier:

All installation material, specified in this standard and instrument installation enquiry specification including but not limited to

- Instrument air headers in solenoid valve and air distribution boxes
- Headers for solenoid valves in solenoid valve and air distribution boxes
- Double air filter sets for solenoid valve and air distribution boxes
- All material required for assembly and installation of junction boxes
- Valves for impulse lines (excluding main isolation valve)
- Impulse pipes
- Fittings
- Mounting and fixing materials, cable trays and conduits between boxes, instruments, valves etc. and main cable tray lines
- Name plates and other marking material
- All signal, power supply, tubing bundle and combination cables
- Cable glands, lugs, terminating materials, cable end protections, clamps, markers, ties, nuts, washers, bolts, screws or other material necessary for the completion of the installation
- All necessary supports for transmitters, cable trays, ladder racks, impulse lines etc.
- Bubble pipes
- Supply, install and remove any scaffolding required for the installation (permission to use other than mobile scaffolding shall be obtained from the installation supervisors of the Purchaser)
- All other items not mentioned in below Item **Not Included in the Scope of Instrument Installation** required for complete installation.

Not Included in the Scope of Instrument Installation:

- Process connections as indicated in the Typical Installation Drawings
- Cable glands of field instruments
- Nuts, bolts, gaskets, washers etc. required for the remote control valves and other line-mounted equipment such as flow sensors as indicated in the Typical Installation Drawings
- Cable tray main lines (will be installed by Electrical Power Installation Supplier)

3.8.2 Installation Work

To be done by the Purchaser:

The Purchaser will supply at the mill site all instruments, control valves and other material specified above in Section 3.8.1 **"Supplied by the Purchaser:"** and will check all Control Systems.

To be done by the Instrument Erection Supplier:

The Supplier's work shall include installation of all instrumentation equipment and materials as shown on the drawings or described in the specifications, and as required to make a complete instrumentation installation, other than the work specified below in Item **Not Included in the Scope of Instrument Installation (Work)**.

The main items of the work are:

- Clarify the locations of process connections etc. in co-operation with other trades (piping, electrical, machine supplier)
- Mounting and erection of the field instruments
- Piping between process and instruments
- Pneumatic tubing and cabling
- Tagging and identification
- Electric cabling and wiring
- Earthing of all equipment required to be earthed
- Cable trays from boxes, instruments, valves etc. to main cable tray lines
- Securing cables on trays and ladder racks
- Mounting of supports and brackets
- Mounting of all boxes in the field
- Rotating of control actuators where necessary (and listing these tags)
- Flushing of supply air pipes of field boxes
- Flushing of purge water lines
- Flushing of impulse pipes
- Cleaning of work area
- Installation progress reporting
- Cutting holes to light weight concrete underneath DCS cabinets
- All other installation not mentioned in below Item **Not Included in the Scope of Instrument Installation (Work)** required for complete installation

Not Included in the Scope of Instrument Installation (Work):

- Installation of process connections according to Typical Installation Drawings
- Installation of all control valves or other line-mounted equipment (magnetic flow tubes, orifice plates etc.)

- Installation of cable tray main lines (included in the contract of electrification erection)

The Supplier's instrumentation supervisor shall, however, be responsible for the overseeing of the above work.

3.9 Optional Services

The following services shall be agreed separately. Cost of these services shall not be included in the unit prices of typical installation drawings.

3.9.1 Acceptance Inspection and Storing

The Supplier is responsible for inspection and storing of instruments supplied by the Purchaser. The work of calibration/storage people is described below.

When instruments supplied by the Purchaser (transmitters, magnetic flow meters, etc.) arrive to the site, acceptance inspection will be made:

- Receipt of goods and off-loading at site, transporting to the correct location
- Checking of project, department and device identification
- Checking of quantities and type numbers
- Visual examination of instruments
- Recording the manufacturer, type and serial number

Inspected instruments will be registered to the Purchaser's computer system. The instruments will be stored to the shelves, from where the Supplier will transport them to required location for the installation.

The supplier separates together with the Purchaser all instruments, valves and process connections, which will be installed by the Piping contractor. Piping contractor signs the devices received and transports them to installation place.

The Piping contractor installs:

- Valves
- Magnetic flow meters and other in-line instruments
- Flow sensors like orifice plates
- Process connections and measuring chambers
- Welded process connections with shut-off valves
- Welded thermo wells.

Supplier shall estimate work based on amount of typical installation quantities / devices supplied by Purchaser.

3.9.2 Calibration

The standard transmitters, indicators and remote control valves will arrive at the mill site calibrated and with tag numbers. The Supplier shall be responsible for checking or changing of calibration and giving new tag numbers to instruments, if needed.

In checking the calibration of instruments, the Supplier shall report any errors in design, type, mechanical damage or calibration. In all cases checking shall include an inspection

to ensure the correct equipment has been supplied and tagged. Unless otherwise specified by the Purchaser, manufacturer's calibration instructions shall be followed, and on completion of calibration the equipment shall perform according to specification.

The calibration ranges, scales, proper actions, set points for alarms and interlocks etc. shall be checked for all instruments and control valves including those mounted on the control panels, auxiliary racks or boxes, excluding the control system (DCS). The accuracy of test equipment shall exceed that of the tested instruments i.e. a test equipment accuracy of ± 0.1 % min. should be used to test to ± 0.25 %. Generally ± 0.05 % for the transmitters, 0.25 % for panel instruments and ± 0.5 % for the local gauges.

All Test and Calibration equipment used shall have a relevant and valid calibration certificate.

The Supplier is responsible for keeping a record of all equipment tested and calibrated. In addition, a tag, complete with the date and signature of the calibrator, shall be secured to all instruments, which have been checked.

Equipment calibrations shall be checked as follow:

- | | |
|---------------------------------------------------|------------------------------|
| – Pressure, diff. pressure and level transmitters | pressure calibrator |
| – Temperature elements and transmitters | checking of program (calib.) |
| – Magnetic flow meter | checking of program (calib.) |
| – Analyzers | checking of program (calib.) |
| – Valves and positioners | only if needed. |

Supplier shall estimate work based on amount of typical installation quantities / devices supplied by purchaser.

3.9.3 Loop Tests after Installation

The Supplier shall carry out testing and all other services necessary to put the instrumentation system in condition ready for service.

The Supplier shall provide all two-way radios (with required permits), instruments, equipment and personnel necessary for testing the instrumentation installation, and shall make sure that such personnel are available during final testing of the process system as considered necessary by the Purchaser to make immediate adjustments.

The Supplier shall check all erection work (installation of field equipment, cabling, connections etc.) included in the scope of the erection.

The Supplier shall carry out complete loop tests after the installation of instrumentation.

Complete functional loop tests and start-up shall be carried out by the team of commissioning. The team consists of the Purchaser and the Supplier members (pairs).

The Supplier shall submit the test results on a test report supplied by the Purchaser.

Visual Examination of Field Instruments

It shall be the Supplier's responsibility to check as follows:

- Installation is in accordance with given information (Typical Installation Drawings or Purchaser's Supervisor) and manufacturer's instructions
- Instruments and cables are properly tagged and marked
- Fixing of the instrument is in accordance with the instructions
- The instrument is correctly located
- Cables are fixed and protected correctly
- Entrances (cable glands) are watertight
- Fittings are tightened properly
- Necessary painting has been done
- There are no other faults or errors.

Test for Signal and Supply Lines and Circuits

It shall be the Supplier's responsibility to check as follows:

- All tubes and wires are connected in accordance with the drawings
- Signals enter the correct instruments
- Air supplies are taken from indicated outlets and all lines are flushed prior to connection to instrument or valve
- Electric power is coming from the indicated breaker to the correct instrument
- There are no leaks in pneumatic signal or supply lines (bubble leak tests to be done if required)
- There are no loose electrical connections
- There are no other faults or errors.

Complete Loop Tests

The Supplier shall check all completely installed loops, with pneumatic and electric supplies connected, including:

- Checking of impulse lines between process and transmitters (filling with liquid if required)
- Checking of zero points of transmitters and gauges (adjustments if required)
- Loop checking by simulating signals between field instruments and DCS operation station (control elements shall be stroked and tests reported).

The commissioning team of the Purchaser will check the functions of the distributed control system.

3.9.4 Commissioning and Start-up Assistance

The Supplier shall note that all tasks concerning commissioning and start-up shall be carried out regardless of working time. This means that the Supplier must be ready to work during those periods 24 hours per day, if necessary.

Commissioning

During operational test runs of the process (with water), complete functional loop tests shall be carried out by the commissioning team including:

- Final adjustment of field instruments
- All real control signals, interlockings and software functions of the Control Systems
- Any damping of the signals
- Any recalibration, for example of transmitter or alarm point settings
- Leak tests for control valves when required.

Start-up Assistance

During start-up, following actions for the Supplier is included:

- Recalibration of transmitters
- All other tests and/or modifications required by the supervisor for the commissioning and start-up of the department.

3.9.5 Commissioning and Start-up Assistance Manpower

These shall be agreed later.

Dep.	Team	Men by Supplier	Commissioning	Start-up assistance

4 INSTALLATION INSTRUCTIONS

Supplier shall make all holes up to and including 50 mm diameter in walls and floor, larger holes will be always done by Civil company in collaboration with Civil Designer.

Supplier shall drill all gland plates as necessary to accept the correct size cable gland.

Welding on to machinery or equipment is not allowed without permission.

If welding is to take place in an area where instrumentation or electrical equipment is already installed, the earth for the welding system must be placed local to component, which is to be welded.

Cable tying:

- All cables shall be tied on bends and crossings to every pole
- In horizontal trays cables are tied every 3 meters
- In vertical tray sections cables are tied every 60 cm
- Cables may be tied in groups not exceeding 10
- Arch clamps suitable for the cable trays material shall be used on cable tying to vertical tray sections
- Plastic coated stainless steel wire can be used on cable tying to horizontal tray sections
- Stainless steel cable ties could be also used for cable tying
- Plastic cable ties shall not be used.

All equipment required to be earthed by the Inspection Authority shall be earthed whether specially mentioned in the drawings or not.

Where cables leave trays or ladder racks, they shall be run in conduit. Conduit material shall be of corrosion resistant (in harsh environment shall use EN 1.4301 or EN 1.4404 material). Protection method of the conduit ends shall be agreed and verified together with the Purchaser before installation works are started.

All cables passing less than 2.7 m above floor shall be protected from mechanical damage.

The Supplier shall observe that when locating instruments or cable trays, he shall not restrict future maintenance and operation of the equipment, nor block transport or walkways. No horizontal sections of cable tray shall be located lower than 2.1 m above walking floor level. The Purchaser reserves the right to request the Supplier to relocate any part which in his opinion does not comply with the general practice of the trade without extra cost to the Purchaser.

Cable trays of width 200 mm and above shall be a prefabricated ladder type, hot dip galvanized or aluminium, consisting of straights, bends, tees and other pieces. In harsh environment like drying machine wet end the cable trays shall be of EN 1.4301 or EN 1.4404 material.

All parts of the trays or supports, which have to be cut, must be treated with corrosion resistant paint.

The Supplier shall supply all necessary material and hardware to support and fix the cable trays and droppers. All necessary holes for fixing bolts etc. shall be made by the Supplier. When supports are connected to floor the leg piece shall be of EN 1.4301 or EN 1.4404 material.

The supports and hangers shall be mounted at sufficient intervals to provide a rigid fixing, and installation shall be designed for a distributed load of 60 kg per meter and a spot load of 80 kg between supports, with a maximum deflection of 1/200.

In process areas, the cables are always connected to the equipment from below.

All stranded wires shall be connected with wire end ferrules. In case spring loaded terminals are used, the stranded wires are also connected without wire end ferrules.

After flushing the air supply lines the corresponding air filters (at the solenoid valve and air distribution boxes and elsewhere) must be opened for service its by-pass lines closed in order to avoid moist and dirt passing to the instruments or pneumatic valves when they are tested.

5

CHANGES IN SCOPE

The Purchaser reserves the right to vary the quantities of material or labor mentioned in this standard and instrument installation enquiry specification. Such changes shall be charged or compensated according to the unit prices.

6 EXPECTATIONS TO THIS SPECIFICATION

The Purchaser reserves the right to request extra work to be done, which may be different from that mentioned in this standard or instrument installation enquiry specification, using the unit prices. If unit prices corresponding to the extra work are not included, the Supplier shall make an offer of the work.

7 TIME SCHEDULE

Detail installation times are shown in The Master Time Schedule.

The building electrical installation work will take place simultaneously with civil construction work and piping and machinery installation. The Supplier shall take this factor into consideration when planning his work.

The Supplier shall ensure that lack of material or manpower will not prevent the installation being completed according to these time schedules.

8 DRAWINGS AND LISTS

Information for the installation work will be supplemented by the Purchaser with the following documents (the time schedule for the supply of the documents will be agreed during the erection contract negotiations):

- P&I diagrams
- Junction box list
- Typical installation drawings
- Typical connection drawings
- Number of installation objects
- Application list
- Junction box wiring diagrams
- Cable list
- Rack room layouts
- Instrument location drawings
- Name plate list
- Loop diagrams for testing.

The above instrumentation drawings are not intended to show complete details of the building construction and other installation work, which affects the instrumentation installation. The Supplier is referred to the architectural, structural, mechanical, piping and electrical drawings for these details. Before proceeding with the installation of instrumentation equipment the Supplier shall familiarize himself with all the features of the building and other installations which may affect the execution of his work.

All other drawings and documents needed by the Supplier shall be provided by the Supplier, e.g. additional cable lists for the work, etc.

The Supplier shall make no claim as a result of additional work caused through his failure to obtain and familiarize himself with such information.