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|  | Requirements for detailed design and as-built documentation | | | |  |
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**Table of Contents**

[1. INTRODUCTION 2](#_Toc54860099)

[2. ABBREVIATIONS 2](#_Toc54860100)

[3. Electronic DOCUMENTATION 3](#_Toc54860101)

[3.1. Electronic documentation requirements 3](#_Toc54860102)

[4. DOCUMENTATION IN PAPER VERSION 4](#_Toc54860103)

[4.1. Requirements for documentation in the paper version 4](#_Toc54860104)

[5. Civil INDUSTRY (black color segregator) 5](#_Toc54860105)

[5.1. Requirements for detailed design documentation: 5](#_Toc54860106)

[5.2. Requirements for as-built documentation: 6](#_Toc54860107)

[5.2.1. Formal and legal documents 6](#_Toc54860108)

[5.2.2. Design documentation / architecture 6](#_Toc54860109)

[5.2.3. Foundations - piling 6](#_Toc54860110)

[5.2.4. Reinforced concrete structures / earthworks / general construction works 7](#_Toc54860111)

[5.2.5. Steel structures - made in the workshop 7](#_Toc54860112)

[5.2.6. Steel structures - made on site 8](#_Toc54860113)

[6. ELECTRICAL INDUSTRY (blue color segregator) 8](#_Toc54860114)

[6.1. Requirements for detailed design documentation 8](#_Toc54860115)

[6.2. Requirements for as-built documentation: 9](#_Toc54860116)

[6.2.1. 6kV switchgear of two-section type 9](#_Toc54860117)

[6.2.2. 6kV switchgear, GIPO type: 11](#_Toc54860118)

[6.2.3. LV switchgear and LV powered devices: 12](#_Toc54860119)

[6.2.4. Principles of first voltage application: 13](#_Toc54860120)

[7. POWER INDUSTRY AND MEDIA (GREEN COLOR SEGREGATOR) 13](#_Toc54860121)

[7.1. Requirements for detailed design documentation: 13](#_Toc54860122)

[7.2. Requirements for as-built documentation: 14](#_Toc54860123)

[8. FIRE PROTECTION (RED COLOR SELECTOR) 15](#_Toc54860124)

[8.1. Requirements for detailed design documentation 15](#_Toc54860125)

[8.2. Requirements for as-built documentation 15](#_Toc54860126)

# INTRODUCTION

The purpose of this study is to determine requirements concern the scope of [detailed design documentation](https://www.diki.pl/slownik-angielskiego?q=detailed+design+documentation) and as-built documentation and also transfer rules them to Investor by Contractor.

# 2. ABBREVIATIONS

The following abbreviations are used in this document:

|  |  |
| --- | --- |
| AM | ArcelorMittal |
| AMP | ArcelorMittal Poland S.A |
| DTR | Technical and Movement Documentation |
| UDT | Technical Inspection Authority |
| TOP | Take Over Point |
| WPS | Welding Procedure Specification |
| WPQR | Welding Procedure Qualification Record |
| VAMP | Arc Protection |
| LRW | Breaker Failure Protection |
| SN | Medium Voltage |
| AW | E-Stop - Emergency Stop |
| GIPO | Open air switchgear |
| NN | Low Voltage |
| NDT | Non Destructive Testing |
| VT | Visual Testing |
| MT | Magnetic-particle Testing |
| UT | Ultrasonic Testing |
| PT | Penetrant Testing |
| RT | Radiographic Testing |

# Electronic DOCUMENTATION

## Electronic documentation requirements

* The documentation should be submitted on an electronic medium (CD, DVD-R, USB) in three copies.
* All documents should be submitted in format \*.pdf and also in editable copy:
* Documentation \*.docx, \*.xlsx (Microsoft Office 2007 or new)
* Schedules: \*.mpp (Microsoft Project 2010)
* Drawings: \*.dwg, \*.dwf (AutoCAD 2013 or new)
* Electrical documentation: \*.zw1 (EPlan ver.5.5/P8)
* Photos, pictures: \*.jpg
* Contractor has to provide list of files (drawings, photos, pictures, descriptions) to electronic documentation. List have to contain:
* ordinal number,
* path to the file on the electronic medium,
* file name with the extension (e.g. tif, pdf etc.)
* title of the project (name of the set which includes the relevant documents)
* name of the document
* document number
* document creation date (year-month-day format)
* sheet or page number in the case of multi-page documents
* the total number of sheets or pages of the document
* format - A0, A1, A2, A3, A4 or other, which should be choose with drop-down list
* industry: mechanical, electrical, construction, energy, hydraulics, pneumatics, lubrication, automation and control, list (e.g. of industries), or other, which should be choose with drop-down list
* orientation - only for DWG files - vertical or horizontal
* full name of the supplier
* comments - an optional field that can be used to provide any details
* The arrangement of folders on an electronic medium should be consistent with the arrangement of documents in binders (paper version).
* Please find the appendix (excel file) with the table contains all requirements which have to be fill for: [detailed design documentation](https://www.diki.pl/slownik-angielskiego?q=detailed+design+documentation) and as-built documentation.

Below is an example of filling the table, which is also included in the excel mentioned above.



# DOCUMENTATION IN PAPER VERSION

## Requirements for documentation in the paper version

* Set of documentation for each industry should be contained in a separate binder
* Binders should have the colors corresponding to the industry they relate to:

• black - civil industry  
• blue - electrical industry  
• green - energy and utilities  
• yellow - mechanical industry  
• red - fire protection.



* Each binder should contain a [table of contents](https://www.diki.pl/slownik-angielskiego?q=table+of+contents) on the firs page
* Documentation have to be provide in three copies.
* Chapters in the binders should be separated with distance piece



* Drawings should be permanently attached to the binder by using plastic self-adhesive strips or bracing the edges of the drawings



* Use of folders is forbidden - documentation is to be in binders
* Pages are to be numbered and stamped

# Civil INDUSTRY (black color segregator)

## Requirements for [detailed design documentation](https://www.diki.pl/slownik-angielskiego?q=detailed+design+documentation):

* Describing the safe useful load of floors, covers, roads, footbridges, etc.
* Signatures and Profession of authorized designers who are active members of Okręgowa Izba Inżynierów Budownictwa
* Bills of quantities and investment cost estimate
* Fire protection expert approval of detailed design documentation
* Fire resistance classes of elements.
* Architectural detail design should contain:

• lists of reference materials

• drawings of details

• sections and layout

• a list of doors, windows and gates or steel protected elements like L-shape

* Details and calculations of supporting structures for devices
* Technical specifications for execution and acceptance of construction works
* Layout
* Steel structure:
* • construction performance class,  
  • marking,  
  • cutting and bending,  
  • openings,  
  • merging and trial assembly - defining the scope,  
  • workshop and assembly contacts,  
  • manufacturing tolerances,  
  • transport to the construction site,  
  • screw connections,  
  • welded connections,  
  • workshop welding,  
  • assembly welding,  
  • weld tests,  
  • corrosion protection - its class, type of protection, degree of substrate cleanliness,  
  • drawings, lists,  
  • fire protection.
* Reinforced concrete structures:

• formwork drawings,  
• drawings of reinforcement,  
• lists of reinforcing steel,  
• list of built-in elements (brands, anchors, earthing - hoop).

* Requirements for bearing capacity of native soil and foundations and compaction of backfills
* Others - e.g. grounding resistance of anti-electrostatic floors.
* All other parts and elements which have to be describe or draw more clearly.

## Requirements for as-built documentation:

### Formal and legal documents

* Building permit,
* Notification of the planned date of start work,
* Site manager / construction manager Profession of completion works with:
* photocopy of the membership in the chamber (notification to PINB and declaration of works were performed in accordance with the design, construction practice)
* Protocol for the acceptance of construction and building works
* As-built geodetic inventory + surveyor's statement
* Copy of the construction log

### Design documentation / architecture

* Updated detailed design with marked changes (copy in red)
* Development plan design - descriptive part
* Development plan design - graphic part
* Geotechnical opinion and documentation of subsoil research

### Foundations - piling

* Formal and legal documents:
* construction manager statement with a photocopy of membership in Izba Inżynierów Budownictwa
* technical description (copy in red)
* project documentation (copy in red).
* Quality documentation:
* metric of concreting the piles
* acceptance certificate for reinforcing steel
* conformity declaration of concrete
* test results of concrete samples (compressive strength, and others if needed)
* geodetic inventory
* test load documentation.

### Reinforced concrete structures / earthworks / general construction works

* Formal and legal documents:
* site manager/ construction manager statement with a photocopy of membership in Izba Inżynierów Budownictwa
* plan of inspections and tests
* project documentation (copy in red)
* a list of subcontractors and suppliers
* warranty cards.
* Quality documentation:
* material approval forms with a list (concrete, reinforcement, brand built-in elements, anchors)
* operating manuals, DTR documents.
* Protocols:
* protocols of works acceptance / disappearing works with a list of protocols
* geodetic surveys of elements setting
* earthing system assembly protocol.
* Tests:
* tests and measurements result and other work data
* results of concrete strength tests with the concreting log (appendix no 3).

### Steel structures - made in the workshop

* Introduction:
* accordance certificate with the Order/Contract
* inspections and tests plan
* subcontractors and suppliers list.
* Material approvals:
* certificates of basic materials
* certificates of extra materials to welding.
* Qualifications:
* WPS list
* welding technological instructions (WPS)
* WPQR list
* list of welders and operators
* certificates of welders and operators
* list of NDT operators
* NDT operators' certificates
* Non-destructive testing:
* a report on geometric measurements
* VT test report
* MT / UT test reports
* map of tested welds
* surface protection / painting
* Production documentation:
* welding plans

### Steel structures - made on site

* Formal and legal documents:
* site manager/ construction manager statement with a photocopy of membership in Izba Inżynierów Budownictwa,
* inspections and tests plan
* WPS welding technological instructions
* copy in red design documentation (assembly drawings in paper version, workshop documentation in electronic version)
* Material approvals:
* material acceptance forms
* declaration of performance for the materials used: electrodes, screws, platform gratings, tensioning nuts, trapezoidal sheet, housing, screws, insulation materials, bearings, washers, etc.
* Research / measurements:
* weld test reports
* protocols from the inspection of bolted connections together with a certificate of spanner calibration
* inspection protocol of anti-corrosion coatings
* protocol of the earthing / lightning protection installation
* surveying surveys
* Documentation of the course of work:
* welding log
* assembly log

# ELECTRICAL INDUSTRY (blue color segregator)

## Requirements for detailed design documentation

* Legal part:
* subject and basic of the study
* scope of the study
* arrangements between industries
* designer declaration
* related project
* design basics (regulation, standards, etc.)
* Technical part:
* existing stage description
* intended venture description
* applied security
* local /remote measurements used
* local/remote control
* mechanical/ electrical blockade
* marking apparatus, accessories, cable numbering
* protective grounding
* lighting protection system
* [electrical safety](https://www.diki.pl/slownik-angielskiego?q=electrical+safety) (electric shock protection)
* fire protection method
* Drawings list:
* single line diagram (main devices type)
* network connection topology (marked IP addresses)
* circuit diagram
* cables connection diagram
* erection drawing (terminal block, cables connection diagram, apparatus connection diagram)
* earth and lighting protection system (LPS) diagram
* cables list (length, start, end, type, section, vein amount, cables numbers)
* materials list (type, producer, quantity, designation on the diagram)
* control controller algorithm
* algorytm sterowania sterowników (block AND,OR itp.)
* setting design (calculation with coordination of security DTR)
* cable selection design ([ampacity](https://www.diki.pl/slownik-angielskiego?q=ampacity), voltage drop, short circuit conditions)
* wiring pathway (rack setting, pathway, pipe blocks, size, cables list on given section)
* lamp assembly diagram + illumination simulation
* power balance

## Requirements for as-built documentation:

### 6kV switchgear of two-section type

* Protocols from the entire switchboard:
* protocol of voltage test and resistance of primary circuits + Profession of the correctness of the connections made (bolt tightening torque)
* protocol of VAMP protection and exhaust dampers
* protocol of the attempt to secure LRW, ZS
* protocol of checking the circular circuits
* protocol of checking the electrical safety 230V AC auxiliary voltage
* protocol of checking phase compliance
* report of checking the switchgear earthing
* protocol of checking insulation resistance, correctness of connections, marking of control cables
* report of checking the protection against electric shock (shock voltage)
* Profession of the implementation of fire protection for cable grommet.
* Protocols for SN fields:
* protocol of voltage test and primary circuit resistance
* checking the secondary circuits of the MV field (maps, signalling, markings, synoptic)
* protocol of testing circuit breaker (type, rating data, signalling, mechanical operation of the trolley, control, diversity)
* protocol of checking cable earthing switch (type, rated data, signalling, mechanical operation, control)
* protocol of checking current transformers (type, rated data, correctness of connection, insulation resistance, load, winding resistance) + attach the factory test report;
* protocol of checking the earth fault transformers (type, rated data, correctness of connection, insulation resistance, winding resistance) + attach the factory tests protocol
* protocol of checking the basic MV bay protection (type, rated data, correctness of connection, checking the correctness of logics, checking telecontrol, checking the switch-off function - protections ramps);
* protocol of checking the MV backup bay protection (type, rated data, correctness of connection, verification of logic correctness, checking telecontrol, checking the switch-off function - protections ramps);
* protocol of checking functional MV bay (inter-bay protection, AW, mechanical and electrical interlocks, synoptic, control);
* protocol of post-assembly test of a short-circuit reactor (type, rated data, correct connection, winding resistance, insulation resistance, earthing resistance) + attach the factory test report;
* protocol of MV cable voltage test (type of cable heads, couplings, head tightening torque, type and level of test voltage, marking);
* protocol of checking insulation resistance, correctness of connections, marking of control cables;
* protocol of the post-assembly test of the MV motor (type, rated data, correctness of connection, winding resistance, insulation resistance, earthing resistance, direction of rotation) + attach the protocol of factory tests;
* protocol of the transformer post-assembly test (type, rated data, correctness of connection, winding resistance, insulation resistance, earthing resistance, ratio, voltage level) + attach the factory test report;
* protocol of checking the transformer’s shock protection (shock voltage)
* protocol of checking the reactor shock protection (shock voltage)
* protocol of checking the MV motor electric shock protection (shock voltage)

### 6kV switchgear, GIPO type:

* Protocols from the entire switchboard:
* protocol of voltage test and resistance of primary circuits + Profession of the correctness of the connections made (tightening torque of the screws)
* protocol of VAMP protection and exhaust flaps tests
* protocol of security LRW, ZS
* protocol of checking the circular circuits
* protocol of checking the auxiliary voltage electrical safety (against electric shock) 230V AC
* protocol of checking phase compliance
* protocol of checking the switchgear earthing
* protocol of checking insulation resistance, correctness of connections, marking of control cables
* a report on checking the electrical safety (shock voltage)
* Profession of the implementation of fire protection for cable grommet.
* Protocols for SN fields:
* protocol of voltage test and primary circuit resistance
* checking the secondary circuits of the MV field (maps, signalling, markings, synoptic)
* protocol of checking circuit breaker (type, rating data, signalling, mechanical operation, control, diversity)
* protocol of checking the disconnector of I system (type, rating data, signalling, mechanical operation, control)
* protocol of checking the disconnector of II system (type, rated data, signalling, mechanical operation, control)
* protocol of checking the cable earthing switch (type, rated data, signalling, mechanical operation, control)
* protocol of checking the cable disconnector (type, rating, signalling, mechanical operation, control)
* protocol of test the current transformers (type, rated data, correctness of connection, insulation resistance, load, winding resistance) + attach the factory test report
* protocol of checking the earth fault transformers (type, rated data, correctness of connection, insulation resistance, winding resistance) + attach the protocol of factory tests
* protocol of checking the basic MV bay protection (type, rated data, correctness of connection, checking the correctness of logics, checking telecontrol, checking the switch-off function - protections ramps)
* protocol of checking the MV backup bay protection (type, rated data, correctness of connection, verification of logic correctness, checking telecontrol, checking the switch-off function - protections ramps)
* protocol of checking functional MV bay (inter-field protection, AW, mechanical and electrical interlocks, synoptic, control)
* protocol of post-assembly test of short-circuit reactor (type, rated data, correct connection, winding resistance, insulation resistance, earthing resistance) + attach the factory test report
* protocol of MV motor post-assembly test (type, rated data, correctness of connection, winding resistance, insulation resistance, earthing resistance, direction of rotation) + attach the protocol of factory tests
* protocol of MV cable voltage test (type of cable heads, couplings, head tightening torque, type and level of test voltage, marking)
* protocol of checking insulation resistance, correctness of connections, marking of control cables
* protocol of the transformer post-assembly test (type, rated data, correctness of connection, winding resistance, insulation resistance, earthing resistance, ratio, voltage level) + attach the factory test report
* protocol of checking the transformer’s electric shock protection (electrical safety)
* protocol of checking the reactor’s electric shock protection -shock voltage (electrical safety)
* protocol of checking the MV motor’s electric shock protection - shock voltage (electrical safety).

### LV switchgear and LV powered devices:

* Protocols from LV switchboards / cabinets:
* protocol of checking the insulation resistance of the current circuits and the insulation resistance of the secondary circuits + Profession of the correctness of the connections made (tightening torque) + factory protocol
* protocol of checking the electrical safety (protection against electric shock) of the LV switchgear / cabinet
* protocol of checking phase compliance (for switchboards with two or more supplies)
* protocol of checking the earthing of switchboards/cabinets
* protocol of checking insulation resistance, correctness of connections, marking of control cables;
* protocol of checking insulation resistance, correctness of connections, and marking of power cables
* protocol of checking the electrical safety (electric shock protection) of devices;
* Profession of the implementation of fire protection of cable grommet (certificate for used materials, training for fire passages execution)
* protocol of checking the power supply / drains
* protocol of checking the operation of switching automatics
* protocol of checking the correct operation of the control automatics (emergency buttons, local control, remote control, signalling, etc.).
* LV devices:
* motor – protocol of test of insulation resistance, winding resistance, correctness of connections, checking temperature sensors, earthing, rotation direction, marking + factory report
* transformers – protocol of test of insulation resistance, winding resistance, correctness of connections, checking temperature sensors, earthing, marking + factory report
* local control boxes – protocol of test of insulation resistance, correctness of connections, grounding, marking, functional inspection + factory report.
* Lighting
* electric shock protection report on each lamp (excluding class II);
* protocol of measurements of the basic lighting intensity + map of measurement points
* emergency lighting intensity measurement report + map of measurement points.
* Additional documents:
* SEP qualifications of the persons performing the measurements
* Profession of the site/construction manager of performed works
* current calibration of the meters used for measurements.

### Principles of first voltage application:

* Request for voltage supply to the service
* Submittal of protocols:
* protocol of checking insulation resistance, correctness of connections, marking of power cables;
* protocol of checking the insulation resistance of the current circuits and the insulation resistance of the secondary circuits + Profession of the correctness of the connections made (tightening torque) + factory protocol
* report on checking the earthing of switchboards / cabinets
* design of the selection of securing the powered outflow
* test of electrical safety (electric shock protection test) after applying voltage
* power off
* handing over the report of the electrical safety (electric shock protection) of the switchgear /LV cabinet/receivers.

# POWER INDUSTRY AND MEDIA (GREEN COLOR SEGREGATOR)

## Requirements for detailed design documentation:

Detailed design documentation of technological installations should be prepared separately for each transmitted medium. Designers must have Polish construction license without restrictions, provide an authorized person to check. The documentation have to be prepared in Polish language. Documentation must contain:

* The front page which should contain: name and surname of main designer and designer who checks design, and also their construction license (building license) numbers.
* Table of contents
* Designer's Profession (statement) of executing the design according to the best technical knowledge
* Descriptive part of the installation should content:
* description of the installation
* operating parameters
* location of media takeover points (TOP - take over point)
* hydraulic calculations
* calculations of safety devices
* list of fittings
* list of devices
* a list of measuring points with guidelines for automation
* list of materials and fittings
* guidelines for the test and inspection program together with the referenced standards
* assembly guidelines including welding plan (WPS and WPQR - welding qualifications should be attached), guidelines for tightening screw connections (tightening torques)
* guidelines of documents for the acceptance of UDT (if applicable)
* colouring and painting
* list of referenced regulations and standards
* Drawing part should content:
* the main layout of the installation with the TOP point marked and the installation boundaries marked on the structure – isometry
* detailed design drawings of installation sections at individual stages (building levels)
* details of the installation of devices and fittings
* list and details of the assembly of supports, including welding

## Requirements for as-built documentation:

As-built documentation for technological installations should be prepared separately for each transmitted medium. The documentation should be approved by the designer and signed by the site manager. The documentation have to be prepared in Polish language. Documentation must contain:

* The front page which should contain: name and surname of main designer and designer who checks design, and also their construction license (building license) numbers.
* Table of contents
* Designer's Profession (statement) of executing the design according to the best technical knowledge
* Basic design
* As-built design (red-copy) with changes in the technical description and drawing part marked in red with the signature of the site manager
* Geodetic survey of the supports’ foundation
* Instruction manual of installation
* Manual of devices with warranty cards
* Declarations of performance, certificates and technical approvals for devices and fittings
* Reports of tests and checks
* pressure tests (with an indication of the medium) + attachments:
  + - metrological certificate of a test manometer
    - documentation of the pressure boosting device
    - drawing diagram of connecting the measuring equipment
    - protocol of cleaning and drying the installation
* welding + attachments:
  + - welding log
    - acceptance protocol of weld executed by welder (depending on the type of tests VT, PT, RT, UT etc.)
    - a diagram of welded connections along with the welder's feature marked on individual welds
* bolted connections + attachments (if the screw torque is determined):
  + - identifiable diagram of bolted connections (designation of node numbers, specification of the torque moments for a given node) – the table
    - certificate of calibration of the torque wrench
* Material cards for:
* pipelines, fittings, supports
* welding materials
* paint
* Welders' qualifications

General remark: **each** report should have a section for the inspector confirming test result.

# FIRE PROTECTION (RED COLOR SELECTOR)

## Requirements for detailed design documentation

* Analysis:
* information about used fire, industrial and explosive security measure
* analysis of the effects of possible serious industrial accidents that may occur in the designed installations, taking into account the HAZOP hazard study and operational readiness
* Documents confirming obtaining approval for deviations from the regulations or for the use of alternative solutions in relation to the fire protection requirements,
* Scenario of the development of events during a fire
* Matrix of fire protection devices control
* Designs of fire protection devices

## Requirements for as-built documentation

* Site manager’s statement of performance construction works according with building design, building permit and technical regulations
* Declarations of performance, declarations of conformity, certificates of admittance, certificates of conformity and technical approvals for the construction products and fire-fighting devices used in the facility for fire protection
* Reports of tests and examinations carried out appropriate for a given fire protection device, confirming their correct operation
* Reports of the tests and examinations carried out (appropriate for a given fire protection device) confirming their correct operation
* Protocols of execution the fire protection for passages, installation culverts and building elements
* Reports of tests and checks on utility installations (electrical, lightning protection, gas, ventilation, chimney)
* Instructions for dealing with: controlled substances, new substances and fluorinated greenhouse gases ( within the meaning of the Act of May 15, 2015 on substances that deplete the ozone layer and on certain fluorinated greenhouse gases used in fire protection), as well as fire protection systems, fire extinguishers containing or relying on controlled substances, new substances or fluorinated greenhouse gases, including in particular:
* instructions in Polish language concern the purpose and operation of fire protection systems and extinguishers,
* Fire Protection System Cards developed separately for each fire protection system containing at least 3 kg of controlled substances or fluorinated greenhouse gases,
* personnel certificates authorizing to perform specific activities, including: making an entry in the Fire Protection System Card, installation, leakage control, maintenance, servicing of fire protection systems as well as recovery and disposal of fire protection systems and fire extinguishers,
* entrepreneur's certificates authorizing to installation, maintenance or servicing of fire protection systems.