



Splošne zahteve za načrtovanje, izdelavo in dobavo opreme v TPV Automotive
General requirements for design, manufacture and delivery of equipment to TPV Automotive

Številka zvezka zahtev / List of requirements No.:
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Splošne zahteve za načrtovanje, izdelavo in dobavo opreme v TPV
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1. NAMEN / PURPOSE

Namen tega dokumenta je dobaviteljem opreme predstaviti splošne zahteve po posameznih področjih. Podane so splošne zahteve s področja logistike in transporta, vzdrževanja, varnosti in zdravja pri delu, kakovosti in izobraževanja. Podani so tudi pogoji, katere mora dobavitelj izpolniti pri posameznih fazah prevzema.

The purpose of this document is to introduce to the equipment suppliers the general requirements with regard to a specific area. The requirements are related to logistics and transport, maintenance, occupational safety and health, quality and training. The document also includes terms the suppliers are to comply with at different stages of the acceptance.

Dobavitelj mora upoštevati zahteve zapisane v tem dokumentu in tudi zahteve podane v specifičnih zvezkih zahtev, ki tu niso navedene. V primeru neujemanja zahtev zapisanih v tem dokumentu in zahtev zapisanih v specifičnih zvezkih zahtev veljajo zahteve podane v specifičnih zvezkih zahtev.

The supplier is bound to meet the requirements as laid down in this document as well as the requirements as set out in specific lists of requirements which are not referred to in this document. In the event of discrepancy between the requirements as laid down in this document and the requirements as set out in the specific lists of requirements, the latter shall prevail.

2. LOGISTIKA IN TRANSPORT OPREME / LOGISTICS AND TRANSPORT OF EQUIPMENT

Transport opreme od dobavitelja k naročniku kot tudi postavitve opreme na predpisano mesto v proizvodnji je v odgovornosti dobavitelja.

The supplier shall be responsible for transport of equipment from the supplier to the buyer and for positioning of the equipment according to the specified production layout.

# 1			
A	B	C	D

Oprema mora biti dobavljena naročniku na način, da ne pride do poškodb, uničenja ali sprememb, ki vplivajo na funkcionalnost opreme.

The equipment shall be delivered to the buyer in such a way to avoid any damage, destruction or modification having an impact on the functionality of the equipment.

# 2			
A	B	C	D

Dobavitelj mora predvideti in zagotoviti vso potrebno opremo (avtodvigalo, viličar, jeklene plošče za utrditev podlage,...) za razklad in postavitve opreme na določeno mesto v proizvodnji. Dobaviteljeva odgovornost je tudi postavitve opreme na končno pozicijo. Pred prihodom opreme si mora predstavnik dobavitelja v spremstvu predstavnika naročnika ogledati pot uvoza opreme ter doreči katere morebitne ovire je potrebno predhodno odstraniti.

The supplier shall predict and provide all necessary equipment (autocrane, forklift, steel plates) for unloading and placing of the equipment on final place in the production. The supplier responsibility is also placement of all goods on final position. Before arrival of the goods supplier and buyer shall check way of transportation of the equipment into production and define which obstacles shall be removed.

# 3			
A	B	C	D



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Dobavitelj mora pripraviti tudi navodilo in skico s prijemalnimi mesti za dvigovanje in transport opreme.

In addition, the supplier shall draw up the instructions and make a drawing with handle positions needed for lifting and transporting of the equipment.

# 4			
A	B	C	D

V primeru transporta in razlaganja s strani podizvajalca mora biti ob prevzemu opreme v tovarni prejema in do postavitve prisoten predstavnik dobavitelja.

In the event of transport and unloading by the subcontractor, a buyer's representative shall be present at the acceptance of the equipment in the manufacturing company and until its placing.

# 5			
A	B	C	D

Dobavitelj mora ob zasnovi opreme predvideti takšne naprave (če je možno), ki ne zahtevajo izrednega transporta in so enostavne za sestavo in montažo na lokaciji.

In the stage of design, the supplier shall provide for such devices (if possible) that do not require an exceptional transport operation and are easy to assemble and fit on the site.

# 6			
A	B	C	D

3. VZDRŽEVANJE / MAINTENANCE



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Proizvajalec mora pri zasnovi in izdelavi opreme upoštevati priporočila za vzdrževanje, glede na:

- Pravilnika o varnosti strojev (Ur. l. RS 75/2008),
- Internim zahtevam – Obr. 1000287 – Kriteriji vzdrževanja strojev in opreme,
- EN 13460:2009 - Documents for maintenance,
- EN 13306:2010 – Maintenance terminology.

Kot osnova za oblikovanje vzdrževanja in vzdrževalne pogodbe, je poleg standardov in normativov primerno izpolnjen in s strani proizvajalca/dobavitelja podpisan dokument – Kriteriji vzdrževanja strojev in opreme (obr. 1000287).

In the stage of desing and manufacturing of the equipment, the manufacturer shall take into account the following maintenance recommendations respecting:

- *Rules on Safety of Machinery (Ur. l. RS 75/2008),*
- *Internal requirements – Obr. 1000287 – Criteria for maintenance of Machinery and equipment or tools*
- *EN 13460:2009 - Documents for maintenance,*
- *EN 13306:2010 – Maintenance terminology.*

Maintenance basis for maintenance planning and maintenance contract is adequately filled out and signed Machine and equipment maintenance criteria form (nr. 1000287) by the manufacturer/supplier as well as standards and norms.

# 7			
A	B	C	D

3.1 Tehnična mapa za vzdrževanje / Technical file for maintenance

Proizvajalec opreme je za izdelavo nove ali za spremembe in dodelave obstoječe opreme naročniku dolžan pripraviti **tehnično mapo za vzdrževanje** (1x papir, 1x v ustrezni elektronski obliki), ki jo sestavljajo:

*For manufacture of new or modification and completion of the existing equipment, the manufacturer of equipment shall provide to the Buyer a **technical file for maintenance** (1 copy in paper, 1x in appropriate electronic form), including:*

Načrti in modeli:

Drawings and models:

- sestavne risbe z označenimi pozicijami vseh vgrajenih delov (.dwg ali .dxf format)

- *assembly drawings with marked positions of all component parts (.dwg or .dxf format)*

# 8			
A	B	C	D

- kosovnica vseh vgrajenih delov,

- *bill of material of all component parts,*

# 9			
A	B	C	D

- sheme elektro, hidravličnih in pnevmatskih instalacij

- *schemes of electrical, hydraulic and pneumatic installations*

# 10			
A	B	C	D

- delavniške risbe vseh nestandardnih vgrajenih delov (.dwg ali .dxf format),

- *working drawings of all non-standard component parts (.dwg or .dxf format),*

# 11			
A	B	C	D

- 3D model celotnega orodja ali priprave

- *3D model of the whole tool or device*

# 12			
A	B	C	D



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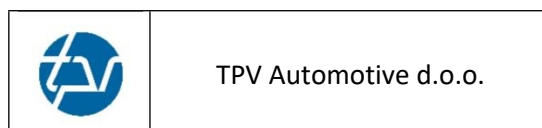
ter dejanske meritve (.stp, .igs format – CATIA V5).

and actual measurements (.stp, .igs format – CATIA V5),

- v glavah risb mora biti vstavljen znak in naziv podjetja TPV.

- the heading of all drawings shall include the logo and the name of TPV as shown below.

# 13			
A	B	C	D



Plani in navodila:

Plans and instructions:

- navodilo za vzdrževanje I. nivo – izvajanje enostavnih vzdrževalnih del s strani operaterja na stroju (mazanje, čiščenje, kontrola delovanja,...),

- instructions for 1st level maintenance – execution of simple machine maintenance works by the operator (lubrication, cleaning, operationa inspection, ...),

# 14			
A	B	C	D

- plan aktivnosti preventivnega vzdrževanja II.nivo (s termini določena potrebna vzdrževalna dela-tedensko, mesečno, letno...),

- action plan for preventive 2nd level maintenance (scheduled maintenance operations on weekly, monthly, yearly basis ...),

# 15			
A	B	C	D

- plan aktivnosti preventivnega vzdrževanja III. nivo s strani proizvajalca opreme ali priporočenega izvajalca. Aktivnosti obsegajo preventivne preglede in vzdrževanja za področja, kjer so potrebna posebna znanja in specialna oprema. Izvedeni preventivni pregledi so jasno dokumentirani v poročilih, ki minimalno vsebujejo:
 - obseg pregleda,
 - ugotovitve - stopnja kritičnosti in potrebni ukrepi: takojšnji in vezani na čas,
 - priporočila.

- action plan for preventive 3rd level maintenance by the equipment manufacturer or a recommended supplier. Action plan shall include preventive inspections and maintenance operations which require special skills and special instruments. The preventive maintenance carried out shall be clearly documented in reports containing at least:
 - the extent of checks,
 - findings - critical points and action required: Immediate and bonded to the time,
 - recommendations.

# 16			
A	B	C	D

- spisec obrabljivih in priporočenih rezervnih delo z dobavnimi roki in okvirno ceno v €,

- list of recommended spare parts and wearing parts, their delivery dates and estimated price in €,

# 17			
A	B	C	D



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- obseg skladiščenja rezervnih delov pri proizvajalcu opreme – spisek s cenikom,
- priporočen obseg rezervnih delov v TPV,
- diagnostika možnih napak,
- ES-izjava o skladnosti za stroje/opremo in proizvajalčeva izjava za orodja,
- posebna oprema in delovna sredstva za potrebe izvajanja vzdrževanja,
- navodilo za uporabo in varno delo.

- *list of spare parts at supplier with pricelist in €,*
- *specification of the equipment and wearing parts with respective drawings and models,*
- *list of all potential failures, description and diagnostics of failures,*
- *ES declaration of machinery conformity and manufacturer's declaration of conformity for tooling,*
- *specific maintenance equipment and instruments,*
- *operating and safety instructions.*

# 18			
A	B	C	D

# 19			
A	B	C	D

# 20			
A	B	C	D

# 21			
A	B	C	D

# 22			
A	B	C	D

# 23			
A	B	C	D

Programska oprema, program, izvirne kode:

Software, programme, entry codes:

Dobavitelj je dolžan dostaviti oz. predati vso programsko opremo, program, vstopne kode, izvirno kodo, ... oz. vse, kar je potrebno za nemoteno samostojno vzdrževanje in nadgradnjo delovanja dobavljene opreme.

The supplier shall deliver and hand over all software, programme, entry codes, source code,... or whatever is necessary for undisturbed independent maintenance and operation upgrading of the delivered software.

# 24			
A	B	C	D

Program (koda) naj vsebuje komentarje (za obrazložitev delovanja)

The programme (code) shall include the comments (or explanations related to the functioning).

# 25			
A	B	C	D

V primeru potrebnih povezav zaradi vzdrževalnega dela na 'daljavo', morajo le te biti jasno predstavljene in usklajene z informatiko TPV. Celotno to področje mora biti skladne z zahtevami ISO 27001

In case of necessary connections due to remote maintenance work, they must be clearly presented and harmonized with TPV informatics. Complete this area must comply with the requirements of ISO 27001

# 26			
A	B	C	D

V primeru posegov na stroju/opremi s strani proizvajalca, ki narekujejo določene spremembe dokumentacije ali funkcionalnosti, mora le ta biti ažurirana in primerno vodena (vodenje sprememb).

In case of manufacturer intervention on the machine/equipment that requires change in documents or functionality, the documents must be updated and properly managed.

# 27			
A	B	C	D



3.2 Konstruktivske zahteve / Engineering requirements

Proizvajalec mora pri konstruiranju stroja ali orodja upoštevati osnovne kriterije, pomembne za vzdrževanje:

In the stage of machine and tool design, the manufacturer shall take into account the basic criteria which are important for maintenance, as follows:

- dostopnost do mest, kjer so potrebni vzdrževalni posegi (eventuelno izdelati potrebne podeste in lestve za dostop),
- enostavnost konstrukcije, ki omogoča hitre in varne vzdrževalne posege (mazanje, nastavitve, zamenjave obrabljenih delov..),
- vgradnja standardnih sestavnih delov dobaviteljev, opredeljenih s strani TPV (mehanika, pnevmatika, hidravlika, elektronika..),
- vzdrževanje je omogočeno z uporabo standardnih orodij in pripomočkov,
- zagotovljena je varnost pri vzdrževalnih posegih (med obratovanjem ali pri mirovanju).

- *access to places where the maintenance operations are required (possibly make necessary platforms and ladders for access)*

# 28			
A	B	C	D

- *simplicity of structure allowing fast and safe maintenance operations (lubrication, adjustments, change of wearing parts, ...),*

# 29			
A	B	C	D

- *assembly of standard component parts made by suppliers who are already specified by TPV (mechanics, pneumatics, hydraulics, electronics...),*

# 30			
A	B	C	D

- *maintenance shall be made possible using standard tools and accessories,*

# 31			
A	B	C	D

- *safety ensurance during maintenance operations (during operation and at standstill).*

# 32			
A	B	C	D

Mesta za nastavljanje, mazanje in vzdrževanje morajo biti dostopna in izven nevarnih območij in naj imajo možnost varnega izvajanja v času mirovanja ali delovanja stroja.

Workplaces for adjustment, lubrication and maintenance shall be accessible and located out of danger zones and shall have the safe mode function at standstill or during operation of the machine.

# 33			
A	B	C	D

Za stroje in naprave, ki so elektronsko krmiljeni, mora proizvajalec zagotoviti opremljenost, ki omogoča spremljanje ključnih parametrov, obveščanje in diagnostiko v primeru pojava napak in/ali zastojev. Zagotovljena je možnost povezave s sistemom MES, kjer se to zahteva. V kolikor je smiselno in primerno, se integrira spremljanje stanja določenih delov na stroju ali opremi (prediktivno vzdrževanje).

When machines and devices are electronically controlled, the manufacturer shall provide for the equipment allowing monitoring of key parametres, information and diagnosis in case of error occurrence and/or stoppage. There shall be a possibility of MES connection where required. If sensible and applicable, monitoring of certain parts of the machine or equipment should be integrated (predictive maintenance).

# 34			
A	B	C	D

# 35			
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Sestavni deli strojev, naprav ali orodij, ki jih je zaradi obrab in drugih vplivov potrebno pogosto menjavati morajo biti standardni in jih je mogoče enostavno ter varno zamenjati po metodah hitre menjave.

Component parts of machines, devices or tools that need to be replaced frequently due to wear and other effects, shall be of standard design and easy and safe to replace using the single-move method.

A	B	C	D

Dostop do sestavnih delov mora biti tak, da lahko delo opravimo s standardnimi tehničnimi sredstvi (orodja, merilni inštrumenti itd.). V primeru, da to ni možno, je proizvajalec dolžan o tem vnaprej obvestiti kupca in ob dobavi opreme dostaviti tudi potrebna specifična orodja ali opremo.

The access to the component parts shall allow the use of standard technical instruments (tools, measuring instruments, etc). In case this is not possible, the manufacturer undertakes to notify the buyer in advance and deliver the necessary specific tools or equipment together with the machine.

# 36			
A	B	C	D

Proizvajalec za specifične vzdrževalne posege z uporabo specifičnih orodij ali opreme izvede potrebna usposabljanja osebja vzdrževanja v TPV.

In case of specific maintenance operations requiring the use of specific tools or equipment, the obvestiti manufacturer shall provide the necessary training for the TPV maintenance personnel.

# 37			
A	B	C	D

Dobavitelj bo dokumentiral kakovost vgrajenih materialov in del z atesti in drugimi dokazili skladno s tehničnimi predpisi in CE normativi ter standardi.

The supplier shall document the quality for all used materials and performed works with certificates in accordance with technical regulations and standards.

# 38			
A	B	C	D

Vsa orodja morajo biti nastavljena na nulto pozicijo. Nulta pozicija mora biti na orodju jasno označena z vidno oznako, ki je izhodišče za nadaljnje nastavitve. Na orodju mora biti tudi standardno pritrdišče za pritrjevanje nulte točke za 3D meritve na DM. Natančnost nastavitve orodja mora biti pod 7% tolerančnega območja izdelka (npr. toleranca pozicije kosa je $\pm 1\text{mm}$ → orodje mora biti nastavljeno na $\pm 0,07\text{ mm}$ natančno). Dokumentaciji mora biti priloženo merilno poročilo z tolerancami in načrt z mernimi točkami ter baznim izhodiščem. Geometrijske reference na orodju morajo biti označene in dodatno pritrjene za primere hitre menjave (vrnitev v osnovni geometrijski položaj ob menjavi z novo referenco).

All tools shall be set to their nominal position. The nominal position of the tool shall be clearly and visibly marked as it shall serve as a starting point for any further settings. The tool shall also have a standard attach point serving for nominal point in case of 3D measurements on the workplace. The tool setting precision shall be under 7% of the product's tolerance area (example: a part's positioning tolerance is $\pm 1\text{mm}$ → the tool shall be set precisely to $\pm 0,07\text{ mm}$). The documentation shall include the measurements report with tolerances and the drawing figuring the measurement points and the basic starting point. Geometrical references on the tool shall be marked and additionally fastened for cases of quick change (return to the basic geometrical position when changed by a new reference).

# 39			
A	B	C	D

Dobavitelj mora zagotoviti vsaj tri ključke za zaklepanje elektro omar, preklopnih/izbirnih stikal, ključavnic varnostnih elementov in drugih področji, ki omejujejo dostop z zaklepom

The Supplier shall provide at least three locking keys for electrical cabinets, toggle / selector switches, security element locks, and other areas that restrict access by locking with locks.

# 40			
A	B	C	D



s ključavicami. Znamka in tip ključavnice se opredeli z dogovorom naročnik /dobavitelj.

The brand and type of the lock shall be determined by agreement of the client / supplier.

3.3 Posegi delavca / Operator interventions

Stroji morajo biti načrtovani, izdelani in opremljeni tako, da je potreba po delavčevi intervenciji omejena. Če se delavčevi intervenciji ni mogoče izogniti, mu mora biti omogočeno, da se posege opravi enostavno in varno. Vse nastavitve morajo biti varovane proti tretji osebi.

The machines shall be designed, manufactured and fitted out so that the need of the operator intervention is limited. In case his intervention can not be avoided, the operator shall be allowed to make the intervention easily and safely. All settings have to be protected against the third person.

# 41			
A	B	C	D

3.3.1 Dostop do delovnega položaja in servisnih mest / Access to workplace and servicing area

Proizvajalec mora zagotoviti primerna sredstva za dostop (stopnice, lestve, delovne podeste itd.), ki omogočajo varen dostop do mest, katera se uporabljajo za proizvodnjo, nastavljanje in vzdrževalna dela.

The manufacturer shall provide the access devices (steps, ladders, platforms, etc) allowing a secure access to all areas used in manufacture, adjustment and maintenance operations.

# 42			
A	B	C	D

3.3.2 Čiščenje notranjih delov strojne opreme / Cleaning of machine's inner parts

Stroji morajo biti načrtovani in izdelani tako, da je mogoče čistiti notranje dele, v katerih se nahajajo nevarne snovi ali preparati, in sicer tako, da vanje ni potrebno vstopati.

Če je vstop nujen, mora proizvajalec že pri konstruiranju poskrbeti, da bo čiščenje stroja varno. Za težavna in specifična čiščenja so potrebna tudi dodatna navodila in izobraževanja za izvajalce v času primopredaje sredstva.

The machines shall be designed and manufactured in a way to allow cleaning of their inner parts containing some dangerous substances without having to enter them. In the case unblocking is necessary, it also has to be enabled from the outside. When the entry into the machine is impossible to be prevented, the manufacturer shall in the stage of design provide for a secure cleaning of the machine. For any difficult and specific cleaning operations additional instructions and trainings shall be provided for the workers at the hand over of the equipment.

# 43			
A	B	C	D

3.4 Ločitev energetskih virov / Separation from power sources

Vsi stroji in/ali oprema morajo biti konstruirani

All the machinery shall be equipped with

# 44			
A	B	C	D



na način, da se jih v primeru potrebnih vzdrževalnih posegov lahko enostavno loči od energetskih virov. Takšni sistemi ločitve morajo biti jasno razpoznavni. Biti morajo takšni, da jih je mogoče zakleniti/ blokirati, kjer preprečimo nekontrolirano vključitev s strani tretje osebe, ki bi lahko ogrozila varnost osebja. Sistem ločitve mora biti takšen, da ostane zaklenjena tudi takrat, ko delavec z mesta, do katerega ima dostop, ne more preskusiti, ali je napajanje še vedno izklopljeno.

devices allowing its separation from sources of power during maintenance performance. These separation systems have to be clearly identified. In case a new switching on might put at risk the exposed persons, these systems have to be equipped with a locking/blocking device. However, with the machines supplied with electric power over a plug to be put into the circuit, it is sufficient to pull out the plug. The separation system shall provide such locking up that the operator cannot check from the accessible workplace whether the power supply is still cut out.

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Ko je napajanje izklopljeno, mora biti zagotovljeno, da se preostala ali v tokokrogu stroja nakopičena energija odvede, ne da bi bilo to nevarno za izpostavljen osebe.

When the power supply is cut out it has to be assured that the remaining power or the power accumulated in the machine's circuit is discharged so that there is no risk for the exposed persons.

# 45			
A	B	C	D

Izjemoma pa lahko ostanejo nekateri tokokrogji zvezani s svojimi energetskimi viri, da npr. držijo dele, varujejo informacije, osvetljujejo notranjost itd. V tem primeru je potrebno operaterju zagotoviti primerno varnost.

Exceptionally, some circuits can remain connected to their sources of power, e.g. to hold components, to secure data, to light up the interior, etc. In such case, the operator needs to be given security.

3.5 Način varčevanja z energijo / Power saving mode

Na stroju se naj po določenem času (ki naj bo nastavljen na HMI-ju ((HMI- Human Machine Interface)) samodejno oziroma z gumbom na HMI-ju vklopi varčevalni način

Welding cell shall go to SAVING mode after a certain time that we set on HMI. SAVING mode can be turn on/off on HMI.

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Način varčevanja z energijo:

SAVING mode:



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- avtomatski izklop dovoda komprimiranega zraka preko elektromagnetnega ventila,
 - avtomatski izklop dovoda varilnega plina,
 - avtomatski izklop napajanja varilnih izvorov, hidravličnih agregatov, ventilatorji,
 - avtomatski izklop servo pogonov in njihovih močnostnih komponent,
 - avtomatski izklop luči,
 - avtomatsko zaprtje loput za odsesavanje.
- automatic shut-off of the compressed air supply using electromagnetic valve.
 - automatic shut-off of the welding gas.
 - automatic power off of welding sources, hydraulic units, fans.
 - automatic shutdown of servo drivers and their power components.
 - automatic light switch-off.
 - automatic closing of suction flaps.

# 47			
A	B	C	D

# 48			
A	B	C	D

# 49			
A	B	C	D

# 50			
A	B	C	D

# 51			
A	B	C	D

# 52			
A	B	C	D

# 53			
A	B	C	D

Sistem se mora povrniti v način delovanja, ko se pritisne kater gumb ali po nastavljeni uri. Sistem lahko začne delovati šele takrat, ko se stabilizirajo vsi energenti. To naj bo čim hitreje.

The system must return to operating mode when a button is pressed after a set hour. The system can only start operating when all energy sources have stabilized. That shall be as fast as possible.

3.6 Zahteve TPV za standardne vgrajene elemente / TPV requirements for standard assembled parts

Pri konstruiranju stroja, opreme ali orodja, mora proizvajalec slediti cilju, da so v enem stroju/orodju vsi vgrajeni elementi standardni in od priznanih proizvajalcev ter upoštevanjem zvezkov zahtev TPV. Vsi vgrajeni deli morajo biti v skladu z ISO in CE standardi in normativi. Nestandardni deli se lahko vgrajujejo le v primeru soglasja TPV. Vsi standardni vgrajeni deli morajo biti dobavljivi od datuma vgradnje še najmanj 7 let.

In the stage of equipment design and manufacturing, the manufacturer shall aim at the principle to build in a machine / tool only standard components supplied by one manufacturer and to build in as few different types as possible. All component parts shall be in compliance with the ISO standard. Non-standard component parts can be built in only upon a previous agreement by TPV d.o.o.. Availability of all standard component parts

# 54			
A	B	C	D



shall be at least 7 years from the date of assembly.

3.7 Označevanje delovnih sredstev / Marking of work assets

Delovna oprema mora biti označena z identifikacijsko tablico, ali gravuro v skladu z navodilom št. 1000744 in v skladu s pravilnikom o varnosti strojev 75/2008 oz. direktivo 2006/42/ES (označevanje strojev).

Equipment must be marked in accordance with Instructions for marking assets – plates (nr. 1000744) and in accordance with machine safety regulations 75/2008 and machinery directive 2006/42/E.

# 55			
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3.8 Barva opreme / Equipment color

Predpisana barva opreme je RAL 9002 razen, če to ni drugače predpisano v posebnih zvezkih zahtev ali če gre za posebnosti, ki so navedene v naslednjih točkah.

The prescribed color is RAL 9002 if not otherwise specified in specific lists of requirements or if it is one of these exceptions

# 56			
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Rdeča barva RAL 3001:

- Opozorilni znaki, oznake ali deli za katere je potrebno posebej opozoriti na veliko nevarnost (za osebe in opremo).

RAL 3001 (signal red):

- Warning signs, markings or parts that should stand out because of the great danger they pose (to workers and equipment).

Opozorilna rumena barva RAL 1003 se uporabi na opremi ali delu, ki je nevaren za zdravje osebja. Označi se opremo oz. del opreme, ki lahko trajno poškoduje osebo ali opremo, ki ščiti nevarne dele pred dostopom osebja. V to spadajo:

RAL 1003 (signal yellow) is used on equipment or parts that present health risks to workers. The color is used on equipment or parts of equipment that might cause irreversible damage to workers or equipment, and which protects workers against access to dangerous parts, namely:

- gibljivi deli opreme, ki predstavljajo potencialno nevarnost za osebe,
- varovalne ograje, ki ščitijo in opozarjajo osebe pred neposredno nevarnostjo (gibljivi deli). Ograja, ki služi ograjevanju delovnega procesa ima RAL 9002 barvo (primer robotske varilne celice kjer je nepooblaščen dostop preprečen že z ključem, kodo,..),

- moving parts of equipment that are potentially dangerous for workers,
- safety rail that protects and alerts workers of immediate danger (moving parts). On rail that encloses the workspace RAL 9002 is used (for example, robotic welding cells which have key and code protection key).

Rumeno (RAL 1003)-črni (RAL 9004) trak za opremo in površine (tla, oprema). Razmerje širin rumenih in črnih pasov je 1:1, barvni pasovi so pod kotom 45°.

Yellow (RAL 1003) – black (RAL 9004) markings for equipment and surfaces (floor, equipment).



- Vsa oprema, ki lahko povzroči, stisk, padec, spotikanje, poškodbo zaradi zaletavanja (npr. poškodbe glave).

The yellow and black width ratio is 1:1 and the color markings have a 45-degree angle.

- *Any equipment that might cause crushing, falling, tripping, crash injury (for example, head injury).*

3.9 Usposabljanje / Training

Dobavitelj zagotovi potrebna usposabljanja za pravilno in učinkovito izvajanje vzdrževalnih posegov na strojih, opremi in/ali orodjih upoštevajoč točko 10. tega dokumenta.

The supplier is obliged to ensure training needed for correct and efficient maintenance on the machines, equipment and/or tools in accordance with section 10 of this document.

# 57			
A	B	C	D

4 VARNOST IN ZDRAVJE PRI DELU / OCCUPATIONAL HEALTH AND SAFETY

Dobavljena delovna oprema (stroj, napravo, varnostne komponente) mora biti izdelana skladno z zahtevami pravilnika o varnosti strojev Ur. l. RS 75/2008, pravilnika o varnosti in zdravju pri uporabi delovne opreme Ur. l. RS 101/2004, standarda SIST EN ISO 12100:2011, in drugih veljavnih aktov s področja varnosti in zdravja pri delu, da zagotavlja varnost uporabniku pri uporabi skozi celotno življenjsko dobo stroja.

The delivered equipment (machine, device, security component) shall be manufactured in accordance with the Machinery Safety Rules (Ur. l. RS 75/2008), Rules on health and safety at work with equipment (Ur. l. RS 101/2004), the standard SIST EN ISO 12100:2011, and other rules in force concerning occupational health and safety so that the equipment shall provide safety for the user throughout its lifetime.

# 58			
A	B	C	D



4.1 Posebne zahteve s področja varnosti in zdravja pri delu / *Special requirements regarding occupational health and safety*

Delovna oprema s svojim delovanjem ne sme negativno vplivati na delovno okolje oziroma s svojimi emisijami škodljivo vplivati na delavca in delovno okolico, predvsem pa mora biti preprečeno:

The work equipment and its operation shall not disturb the working environment nor shall the emissions adversely affect the operator and the working environment. In particular, the following shall be prevented:

- neovirano posegati v nevarna območja obratovanja opreme,

- *unrestricted access in the danger zones of the equipment operation*

# 59			
A	B	C	D

- sevanje-bleščanje v okolje,

- *radiation-gleaming in the environment,*

# 60			
A	B	C	D

- emisija hrupa v okolje, ki ni v skladu z določili Pravilnika o varovanju delavcev pred tveganji zaradi izpostavljenosti hrupu pri delu, zaradi vpliva delovne opreme,

- *noise emissions not in accordance with provisions of Rules on the protection of workers against the risks related to exposure to noise at work due to the work equipment influence,*

# 61			
A	B	C	D

- nedopustno dvigovanje in spreminjanje mikroklimatskih pogojev temperature okolice zaradi vpliva delovne opreme ali delovnega procesa v skladu z določili zakonodaje,

- *intolerable rise and change of microclimatic conditions and environment temperature owing to the impact of the work equipment or work process in accordance with the laws in force,*

# 62			
A	B	C	D

- ustvarjanje nedopustnih emisij prahu, plinov in drugih stranskih produktov.

- *causing of inadmissible dust, gas and by-products emissions.*

# 63			
A	B	C	D

Upoštevana mora biti ergonomija ob standardni predpisani uporabi stroja.

Ergonomic rules shall be taken into account under the prescribed standard conditions of use of the machine.

# 64			
A	B	C	D

V primeru predvidenih ali zaznanih emisij mora proizvajalec delovne opreme izvesti z zakonodajo predpisane meritve (zapršenosti, vsebnosti oljnih hlapov, sevanja (EMS), hrupa...) in o izvedenih meritvah priložiti poročilo z izmerjenimi vrednostmi.

In case of expected and perceived emissions, the manufacturer of equipment shall perform the statutory measurements (dustiness, oil steam content, radiation EMS, noise ...) and submit an official report of the measurements including the measured values.

# 65			
A	B	C	D

Osvetljenost delovnega mesta mora biti

The lighting at the workplace shall be installed

# 66			
A	B	C	D



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izvedena v skladu z določili zahtev zakonodaje in standarda SIST EN 12464.

in accordance with the provisions of law and standards SIST EN 12464.

Delovna oprema, ki proizvaja vibracije mora biti izvedena v skladu z zahtevami zakonodaje in ne sme presegati dovoljenih mej, ki bi vplivale na človeka. Proizvajalec delovne opreme mora oceniti in po potrebi zagotoviti meritve ravni mehanskih vibracij, ki jim bodo uporabniki izpostavljeni, v skladu z zahtevami Pravilnika o varovanju delavcev pred tveganji zaradi izpostavljenosti vibracijam pri delu.

The work equipment causing vibrations shall be produced in compliance with the requirements imposed by the law and shall not exceed the permitted limits that might have an impact on people. The manufacturer of equipment shall make an estimation and carry out, when necessary, measurements of the level of mechanic vibrations the users are exposed to, in compliance with the Rules on the protection of workers against the risks related to exposure to vibrations at work.

# 67			
A	B	C	D

Po končani namestitvi oz. postopku zagona opreme mora proizvajalec zagotoviti, da delovno opremo pregleda pristojna oseba, ki izda potrdilo, iz katerega je razvidno, da je delovna oprema pravilno nameščena in da deluje v skladu s predpisi.

After the the equipment is installed and the launch is completed the manufacturer shall ensure an inspection of the equipment by an authorized person who shall also issue a certificate attesting the equipment has been installed properly and it operates in compliance with the rules.

# 68			
A	B	C	D

4.2 Označevanje in tehnična dokumentacija / Marking and technical documentation

Za delovno opremo mora proizvajalec ali njegov pooblaščen zastopnik, kateri daje stroj na trg zagotoviti tehnično dokumentacijo, pripadajoča navodila in oznake v obsegu zahtevanem s Pravilnikom o varnosti strojev.

For any work equipment its manufacturer or his authorised representative placing the machine on the market, shall provide for a technical documentation with respective instructions and markings in the scope as required by the Rules on Machinery Safety.

# 69			
A	B	C	D

Ob dajanju stroja v obratovanje v Republiki Sloveniji mora proizvajalec ali njegov pooblaščen zastopnik priložiti originalna navodila v slovenskem jeziku ali originalna navodila v enem od uradnih jezikov Evropske unije in njihov prevod v slovenski jezik.

When putting machine into operation in the Republic of Slovenia, the manufacturer or his authorised representative is bound to provide original instructions in Slovenian language or original instructions in one of the official languages of the European Union with their

# 70			
A	B	C	D



translation in Slovenian language.

4.3 zahteve / Other requirements

Vse elektro, razdelilne in komunikacijske omare morajo biti ustrezno protipožarno varovane. Omare, kjer se nahajajo močnostni deli so varovani s primerno izbrano gasilno opremo BONPET ali enakovredno učinkovito opremo drugega proizvajalca.

All electrical, distribution and communication cabinets shall be properly protected against the fire.

Cabinets, which are installed power components are protected with appropriate fire-fighting equipment selected BONPET or equivalent effective equipment from another manufacturer.

# 71			
A	B	C	D

Omare, kjer je nameščena krmilna oprema, se zavaruje s protipožarnimi sistemi, kjer v primeru gašenja ne uničimo še dobro opremo. V uporabi je lahko sistem gašenja s pomočjo CO2 ali sistem z uporabo sredstva NOVEC 1230.

Cabinets where installed control equipment shall be protected with fire protection systems where in case of fire fighting does not damage even good equipment.

A CO2 or a NOVEC 1230 fire protection system may be in use.

# 72			
A	B	C	D

V primeru, ko sta v isti omari močnostni del in krmilna oprema, se uporabi sistem gašenja s pomočjo CO2 ali sistem z uporabo sredstva NOVEC 1230.

In case both power and control equipment is installed in same cabinet a CO2 or a NOVEC 1230 fire protection may be useb.

# 73			
A	B	C	D

Dobavitelj pripravi koncept (tehnični predlog) integracije sistema protipožarnega varovanja s centralnim sistemom.

Supplier prepare integration concept of fire protection system with central system.

# 74			
A	B	C	D

Protipožarni sistem je obvladovan in spremljan preko centralno varovalnega sistema.

The fire system is controlled and monitored by central protection system

# 75			
A	B	C	D

Pri konstruiranju in izdelavi sistemov odsesavanja plinov pri varjenju, mora dobavitelj upoštevati:

In the stage of design and manufacture of welding gas extraction system, the supplier shall take into account the following:

- ustrezen premer, razvod in material cevne sistema upoštevajoč standarde in normative,
- zagotoviti primerno in stabilno hitrost odsesavanja na posameznem odjemnem mestu tekom delovanja,
- če je mogoče, integrirati učinkoviti sistem filtracije trdnih delcev in prahu na izvoru,

- *the right diameter, circuit and material of pipe system in compliance with standards and norms ,*

# 76			
A	B	C	D

- *provide suitable and regular speed of extraction at individual consumer points during operation,*

# 77			
A	B	C	D

- *integrate, if possible, an efficient system of particulate and dust filtration at source,*

# 78			
A	B	C	D



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- na cevni sistemih oceniti rizike mest nalaganja mastnega prahu in zagotoviti ustrezen koncept za možnost hitrega in enostavnega čiščenja notranjosti cevi, kakor tudi namestiti sistem varovanja v primeru vžigov (npr. ampule Bonet).

- *for pipe systems, make a risk assessment at the zones with greasy dust deposit and provide an appropriate concept of quick and simple cleaning of pipe interior, and implement a fire protection system (such as Bonet ampoule).*

# 79			
A	B	C	D

5 DOKUMENTACIJA (tehnična dokumentacija in navodila) / DOCUMENTATION (technical documentation and instructions)

Dobavitelj se zavezuje, da bo pred začetkom izdelave opreme naročniku predstavil celotno tehnično dokumentacijo (layout, risbe, spiske standardnih delov z navedbo proizvajalca,...) potrebno za izdelavo opreme.

Prior to commencing manufacture of the equipment, the supplier shall present to the buyer the complete technical documentation (layout, drawings, lists of standard parts including the name of their manufacturer,...) necessary for the manufacture of the equipment.

Ob predprezemu pri dobavitelju mora proizvajalec predložiti tudi layout (.dwg ali .dxf format) postavitve stroja. Na layoutu morajo biti definiranimi naslednji podatki:

At pre-acceptance at the supplier, the manufacturer shall also submit the machinery layout (.dwg ali .dxf format). The following data shall be given in the layout:

# 80			
A	B	C	D

- celotna površina delovnega mesta (m²),

- *total surface of the workplace (m²),*

# 81			
A	B	C	D



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- zunanje mere stroja/orodja, - external dimensions of the machine/tooling,
- teža stroja/orodja, - machine/tooling weight,
- definicija učinkovite porabe energentov (elektrike, vode, zraka,...) in potrebnih priključkov, ki jih mora kupec pripraviti za priklop stroja. definition of effective fuel consumption (electricity, water, air,...) and the necessary power connections the supplier shall provide for plugging in of the machine.

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# 82			
A	B	C	D

# 83			
A	B	C	D

# 84			
A	B	C	D

Dobavljeni opremi morajo biti priložena naslednja tehnična dokumentacija:

The following technical documentation shall be delivered with the equipment:

- tehnična mapa za vzdrževanje (glej točko 2.1 Tehnična mapa za vzdrževanje), - technical file for maintenance (see item 2.1 Technical file for maintenance)
- sestavne risbe stroja z zadnjimi modifikacijami, skupaj z risbami krmilnih tokokrogov, - assembling drawings of the machine including the latest modifications, along with drawings of control circuits,
- podrobne risbe, opremljene z vsemi izračuni, rezultati preskusov itd., ki so zahtevani za ugotavljanje skladnosti opreme z bistvenimi zdravstvenimi in varnostnimi zahtevami, detailed drawings with all calculations, testings results, etc... which are requested for the purpose of determining the equipment compliance with main health and safety requirements,
- navodila za varen zagon, - instructions for safe launch,
- navodila za varno nastavljanje, instructions for safe adjustments,
- navodila za varno uporabo s predvidljivimi napakami, vzroki zastojev in ukrepi za njihovo odpravljanje, instructions for safe use including the predictable failures, causes of stoppages and actions for their elimination,
- navodila za varno ravnanje z navedbo mase strojev in njihovih različnih delov, kadar jih je potrebno ločeno transportirati, - instructions for safe handling with the indication of the machinery weight and weight of individual parts when they need to be transported separately,
- navodila za varno montažo in - instructions for safe assembly and

# 85			
A	B	C	D

# 86			
A	B	C	D

# 87			
A	B	C	D

# 88			
A	B	C	D

# 89			
A	B	C	D

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A	B	C	D

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A	B	C	D

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demontažo.

disassembly.

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Tehnična dokumentacija mora vsebovati tudi naslednje podatke:

- naziv in naslov proizvajalca opreme,

Technical documentation shall also contain the following data:

- *name and address of the equipment manufacturer,*

# 93			
A	B	C	D

- predvideno uporabo opreme in njene omejitve,

- *intended use and restrictions of the equipment,*

# 94			
A	B	C	D

- ponovitev podatkov, s katerimi je stroj označen, skupaj z ustreznimi dodatnimi podatki, ki olajšajo vzdrževanje (npr. naslov uvoznika, serviserjev itd.),

- *machine marks including all additional information facilitating maintenance (e.g. address of the importer, approved fitter, etc),*

# 95			
A	B	C	D

- opis položaja delavca med delom na opremi, če je potrebno z grafičnimi ponazoritvami,

- *description of the operator's posture during the work at the equipment, with a graphical illustration, if necessary,*

# 96			
A	B	C	D

- izjavo proizvajalca o skladnosti,

- *manufacturer's declaration of conformity,*

# 97			
A	B	C	D

- predvidena uporaba in omejitve opreme,

- *intended use and limitations of the equipment,*

# 98			
A	B	C	D

- podatke o nivoju hrupa, vibracijah, ki jih oprema proizvaja kot stranske učinke v delovno okolje,

- *information on noise level, vibrations produced by the equipment as side effects in the environment;*

# 99			
A	B	C	D

- tveganja, ki so prisotna pri delu z opremo in opozorilne nasvete,

- *risks presented at work with the equipment and warning advice,*

# 100			
A	B	C	D

- nazoren opis delovanja opreme,

- *clear description of the equipment operation,*

# 101			
A	B	C	D

- Navodila za varno delo in uporabo,

- *instructions for safe work and use,*

# 102			
A	B	C	D

- opis delovanja opreme v vseh možnih režimih delovanja,

- *description of the equipment operation in any possible mode of operation,*

# 103			
A	B	C	D

- priključitvene sheme,

- *connection diagrams,*

# 104			
A	B	C	D

# 105			
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- električne, hidravlične, pnevmatske sheme,
 - seznam nadomestnih delov z načrti,
 - garancijski list.
- *electrical, hydraulic and pneumatic diagrams,*
 - *list of spare parts with drawings,*
 - *warranty certificate.*

A	B	C	D

# 106			
A	B	C	D

# 107			
A	B	C	D

Kadar je potrebno, morajo navodila opozarjati tudi na načine na kakršne se strojev ne sme uporabljati. Navodila morajo biti pisana jasno, da jih delavci lahko razumejo, v skladu s splošno izobrazbo, ki jo je razumno pričakovati od upravljalcev.

When necessary, the instructions have to warn about the manners the machinery must not be used in. The instructions have to be understandable for workers considering their general education reasonably expected from them.

# 108			
A	B	C	D

Proizvajalec ali njegov pooblaščen zastopnik mora priložiti originalna navodila v slovenskem jeziku ali originalna navodila v enem od uradnih jezikov Evropske unije in njihov prevod v slovenski jezik.

The manufacturer or his authorized representative shall enclose the original instructions in Slovenian language or in one of the official languages of the European Union and their translation in Slovenian language.

# 109			
A	B	C	D

6 ZAHTEVE ZA PODROČJE IKT (Informacijsko Komunikacijska Tehnologija) / ICT REQUIREMENTS (Information Communication Technology)

Dobavitelj se zavezuje, da bo konfiguracija krmilnikov, procesnih in kontrolnih računalnikov ustrezala zahtevam Informatike in da bo zagotovljeno vzdrževanje in rezervni deli.

The supplier undertakes that the configuration of controllers, process and control computers shall comply with the IT requirements and that maintenance and spare parts shall be provided.

# 110			
A	B	C	D

Računalniki morajo biti ustrezno zaščiteni in primerni za delo v industrijskem okolju:

The computers shall be adequately protected and made suitable for use in industrial environment:

- industrijska izvedba računalnikov (s pasivnim hlajenjem ali ustrezno protiprašno zaščito),
 - uporaba standardnih in sodobnih komponent,
 - vgrajeni v ohišje stroja ali kontrolne priprave ali nameščeni v svoji omarici, ki nudi ustrezno zaščito proti prahu in hlapom in omogoča zadostno hlajenje.
- *industrial computers (passively cooled system or appropriate anti-dust protection),*
 - *use of standard and advanced component parts,*
 - *either integrated into the machine or control device housing or placed in their own computer box providing appropriate protection against dust or*

# 111			
A	B	C	D

# 112			
A	B	C	D

# 113			
A	B	C	D



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vapour and enabling adequate cooling,

- če volumen omarice in tesnjenje le te ne zagotavlja ustreznih delovnih pogojev za računalnik, mora biti omarica klimatizirana.

- *if the volume of the cabinet and its sealing does not provide adequate working conditions for the computer, the cabinet must be air-conditioned.*

# 114			
A	B	C	D

Računalniki morajo imeti ustrezno programsko opremo in urejene uporabniške dostope:

The computers shall have appropriate software and users access:

- aktualen in licenciran operacijski sistem v slovenskem ali angleškem jeziku,

- *updated and licensed operating system in Slovene or English language,*

# 115			
A	B	C	D

- urejene uporabniške dostope (za redno delo uporabnika z omejenimi pravicami, za servisne posege uporabnika z administracijskimi pravicami),

- *users access (for regular user account with limited rights, for user servicing interface with administrator rights),*

# 116			
A	B	C	D

- dokumentacijo in navodila za uporabljeno programsko opremo,

- *documentation and instructions for the software in use,*

# 117			
A	B	C	D

- izveden sistem varnostnega kopiranja na zunanji medij,

- *backup system to an external media,*

# 118			
A	B	C	D

- ustrezno protivirusno zaščito v primeru, ko se računalniki povezujejo v TPV omrežje.

- *appropriate antivirus protection when computers are connected to TPV network,*

# 119			
A	B	C	D

- *free network connection or wireless interface when computers are connected to TPV network.*

# 119			
A	B	C	D

Procesni in kontrolni računalniki, krmilniki ter ostala omrežna procesna oprema morajo biti v lokalni (LAN) mreži stroja in / oz. linije. V ta namen morajo imeti prost omrežni priključek. Naslovni prostor lokalne mreže stroja in/oz linije mora biti predhodno dogovorjen in odobren s strani TPV (služba IKT in služba vzdrževanja). Če se računalnik ali krmilnik povezuje v procesno omrežje TPV, se vmes doda L3 stikalo ali usmerjevalnik, ki ga določi TPV. Tako ločimo LAN omrežje stroja (linije) od procesnega omrežja TPV. To stikalo mora

Process and control computers, controllers, and other network processing equipment shall be on the machine's (line's) local (LAN) network. For this purpose, they shall have a free network connection. The local area network address of the machine (line) shall be pre-agreed and approved by the TPV (IT and Maintenance service). If a computer or controller connects to a TPV process network, an L3 switch or router specified by the TPV is added in between. This separates the machine's (line's) LAN from the TPV process network. This switch shall also

# 120			
A	B	C	D



omogočati tudi varen in kontroliran oddaljen dostop do procesnih računalnikov in krmilnikov. Ustrezno L3 stikalo/usmerjevalnik dobavi in konfigurira dobavitelj (po priporočilih TPV – služba IKT).

Na ta način lahko omogočimo dobavitelju ali serviserju kontroliran oddaljen dostop do procesnega računalnika ali krmilnika s pomočjo RDP, VNC ali druge primerljive povezave in ustrezno priključevanje v procesno omrežje TPV.

Če je potrebno se za VPN povezavo uporabi VPN klient, ki ga določi IKT ekipa.

Predhodno mora dobavitelj in/ali serviser s TPV skleniti pogodbo o vzdrževanju.

Vzdrževanje IKT opreme s strani dobavitelja mora biti urejeno z vzdrževalno pogodbo, dobavitelj mora v življenjski dobi opreme zagotavljati rezervne dele. V vzdrževalni pogodbi mora biti nujno definiran odzivni čas za odpravo napake in dobavo rezervne IKT opreme.

6.1 Zahteve za MES / MES requirements

MES (angl. Manufacturing Execution System) je proizvodni informacijski sistem, ki povezuje transakcijski sistem (npr. SAP) ter sisteme za krmiljenje in nadzor fizičnih procesov v proizvodnji, ki tečejo v realnem času. Glavna naloga MES sistema je, da zagotovi uporabnikom dostop do informacij o proizvodnih operacijah in strojih v realnem času. Osnova za vzpostavitev MES sistema je zajem podatkov (realne meritve iz proizvodnega procesa), ki pa mora biti izveden na način, ki je definiran v dokumentu št. 1000705

allow secure and controlled remote access to process computers and controllers. The corresponding L3 switch / router is supplied and configured by the supplier (as recommended by TPV - IT Service).

In this way, we can enable the supplier or repairer controlled remote access to a computer or process controller via RDP, VNC or other comparable connection and the appropriate connection in the TPV process network.

If VPN connection is needed, VPN client is determined by TPV ICT team.

The supplier and / or repairer must conclude a maintenance contract with TPV.

The supplier's maintenance shall be regulated by a maintenance agreement and the supplier undertakes to provide spare parts for lifetime of the equipment. The maintenance contract should be strictly defined response time to eliminate errors and the supply of spare IT equipment.

# 121			
A	B	C	D

# 122			
A	B	C	D

# 123			
A	B	C	D

# 124			
A	B	C	D

The Manufacturing Execution System (MES) is manufacturing information system that connect transaction system (e.g. SAP) and systems for controlling and monitoring of processes in production that run in real time. The main goal of these system is to provide users with real-time access to accurate data on manufacturing operations and equipment. The basis for implementation of MES system is data capture (real measurements in the production process) which has to be made in a way defined in document no. 1000704



SIEMENS PLC Specifikacija konfiguracije.

SIEMENS PLC configuration specification.

7 VARSTVO OKOLJA / ENVIRONMENT PROTECTION

Proizvajalec mora pri načrtovanju in izdelavi upoštevati predpise glede varstva okolja države uporabnika.

At the stage of design and manufacturing, the manufacturer shall comply with the rules related to environmental protection in force in the user's country.

# 125			
A	B	C	D

8 KAKOVOST / QUALITY

8.1 FMEA

8.1.1 FMEA sredstev / Equipment FMEA

Dobavitelj je ob predstavitvi konstrukcijske dokumentacije za orodje ali stroj dolžan predložiti tudi FMEA sredstev.

When presenting the engineering documentation relating to a tool or a machine, the supplier undertakes to submit the Equipment FMEA.

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8.1.2 FMEA procesa / Process FMEA

Dobavitelj se mora, v primeru povabila naročnika, udeležiti študije FMEA procesa. Namen je priti do zaključkov katere aktivnosti bodo pri izdelavi orodja ali stroja potrebne, da bomo preprečili nastanek možnih napak in njihovih posledic. Zaključki analize FMEA morajo biti v vsakem primeru upoštevani pri mehanski in avtomatski zasnovi orodja ali stroja, kar bo preprečilo izdelavo neustreznih oziroma pomanjkljivih delov.

The supplier shall upon the buyer's invitation attend the FMEA process study, the purpose of which is to come to resolutions whose actions relating to the manufacture of a tool or machinery are necessary to prevent occurrence of possible failures and their effects. The FMEA resolutions shall in any case be taken into account at the stage of mechanical and automatic design of a tool or machinery so that production of defective or non-compliant parts is prevented.

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Dobavitelj mora zasledovati cilj, da konstrukcijsko prepreči vlaganja nepravilnih delov (uporaba poka yoke). Če to ni možno, mora dobavitelj izdelati napravo, ki bo omogočila prepoznavanje neustreznosti pred odpremo izdelka. V vsakem primeru mora dobavitelj uvesti rešitev, ki bo delavcu omogočila prepoznavanje nepravilno narejenih delov.

The supplier shall follow the objective to prevent, in the terms of engineering, insertion of defective parts (use of poka yoke). If this is not possible, the supplier shall manufacture a device intended to detect any non-conformity of the product before shipping. In any case, the supplier shall implement a solution allowing the operator to detect defective parts.

# 128			
A	B	C	D

8.2 Sposobnosti in centriranost delovnega sredstva in procesa / Equipment and process Capability (CP and Cpk)

Kote, ki so na načrtu izdelka tolerirane, so predmet statističnega izračuna.

The dimensions which are tolerated in terms of the product drawing are subject to statistic calculation.

# 129			
A	B	C	D

Dobavitelj delovnega sredstva mora zagotoviti izdelavo izdelkov na delovnem sredstvu, namenjenemu za serijsko proizvodnjo, v skladu z zvezkom zahtev. Izdelki morajo biti v skladu z zahtevami na načrtih. Sposobnost delovnega sredstva in sposobnost procesa morata biti v skladu z zahtevami v tem in v skladu z zahtevami v specifičnem zvezku zahtev. Za izračun študije sposobnosti je potrebno vzeti ustrezno število zaporedno izdelanih kosov, brez kakršne koli vmesne intervencije. Izračuni študije sposobnosti so osnova za pred-prevzem delovnega sredstva v TPV-ju in končni prevzem. Po doseženi sposobnosti delovnega sredstva in procesa je potrebno izpolniti tudi zahtevo o centriranosti delovnega sredstva in procesa. Zahteve sposobnosti in centriranosti procesa so zapisane v poglavju o prevzemih.

The supplier of the equipment shall ensure the products manufacturing by the equipment intended for series production in accordance with the list of requirements. The products shall be following the requirements specified in the drawings. Equipment and process capability shall comply with the requirements referred to in this list of requirements and in the specific list of requirements. For calculation of capability, an appropriate number of products made successively and without any intermediate intervention shall be taken. Capability calculations shall represent the basis for pre-acceptance of equipment by TPV and for the final acceptance. The requirements as to the process capability (Cp) and capability index (Cpk) are given in the acceptance section.

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9 PREVZEMI / ACCEPTANCES

Vsi prevzemi se izvajajo v skladu s terminskim planom, ki je določen ob naročilu. O vseh predvidenih odstopanjih od terminskih planov je dobavitelj dolžan obvestiti naročnika in se z njim dogovoriti in uskladiti glede nadaljnjega poteka izdelave.

Prevzemi se beležijo na Zapisnik prevzema delovnega sredstva 103324.

All acceptances are made in accordance with the planning specified at the time of ordering. The supplier shall notify the buyer about any anticipated deviation from the time schedules and come to agreement with him on further conduct of manufacture.

Acceptances are registered in the Equipment Acceptance Minutes 103324.



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Metode dela: diagram prikazuje posamezne korake pri razvoju, izdelavi in prevzemu opreme.

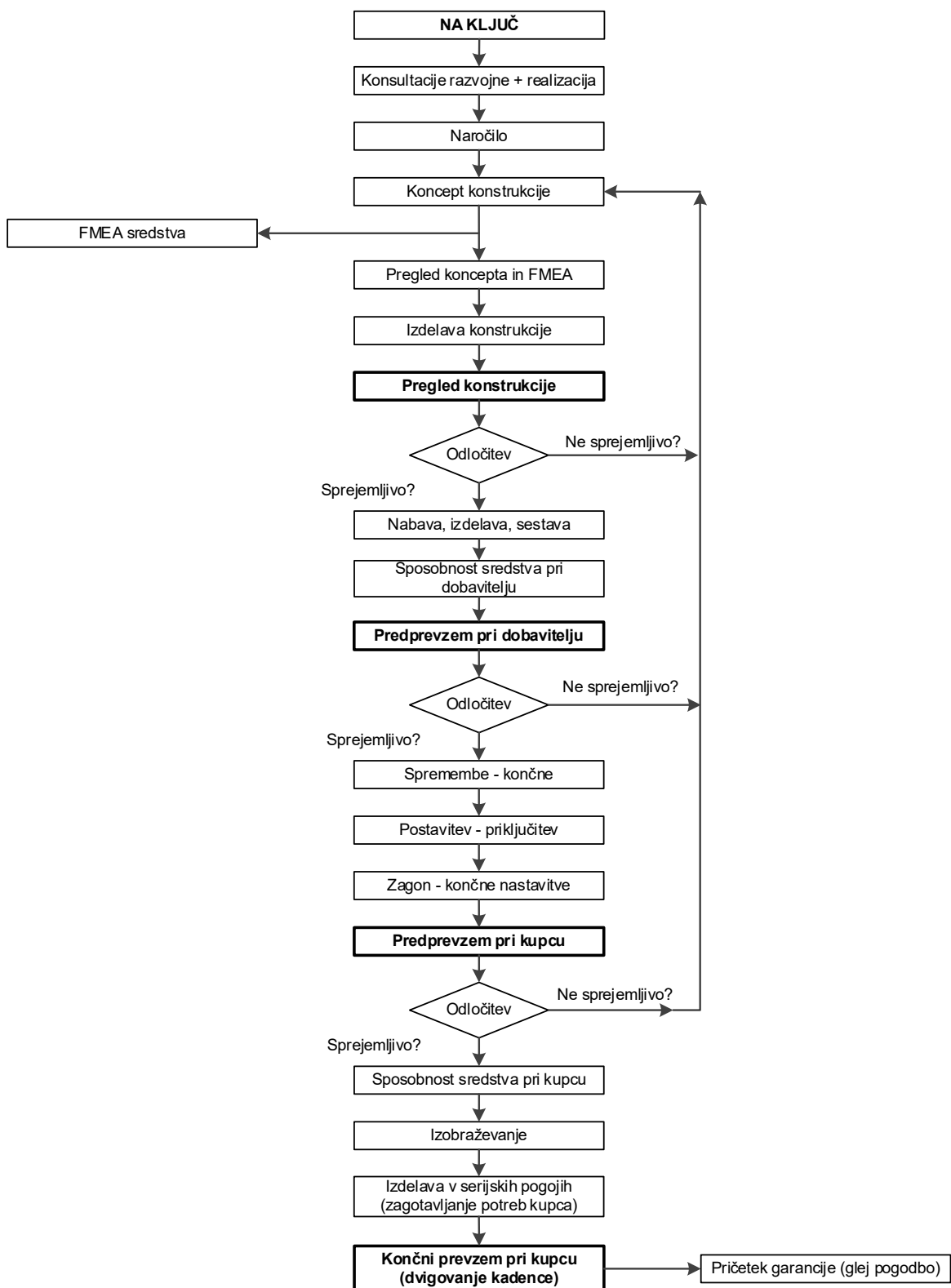


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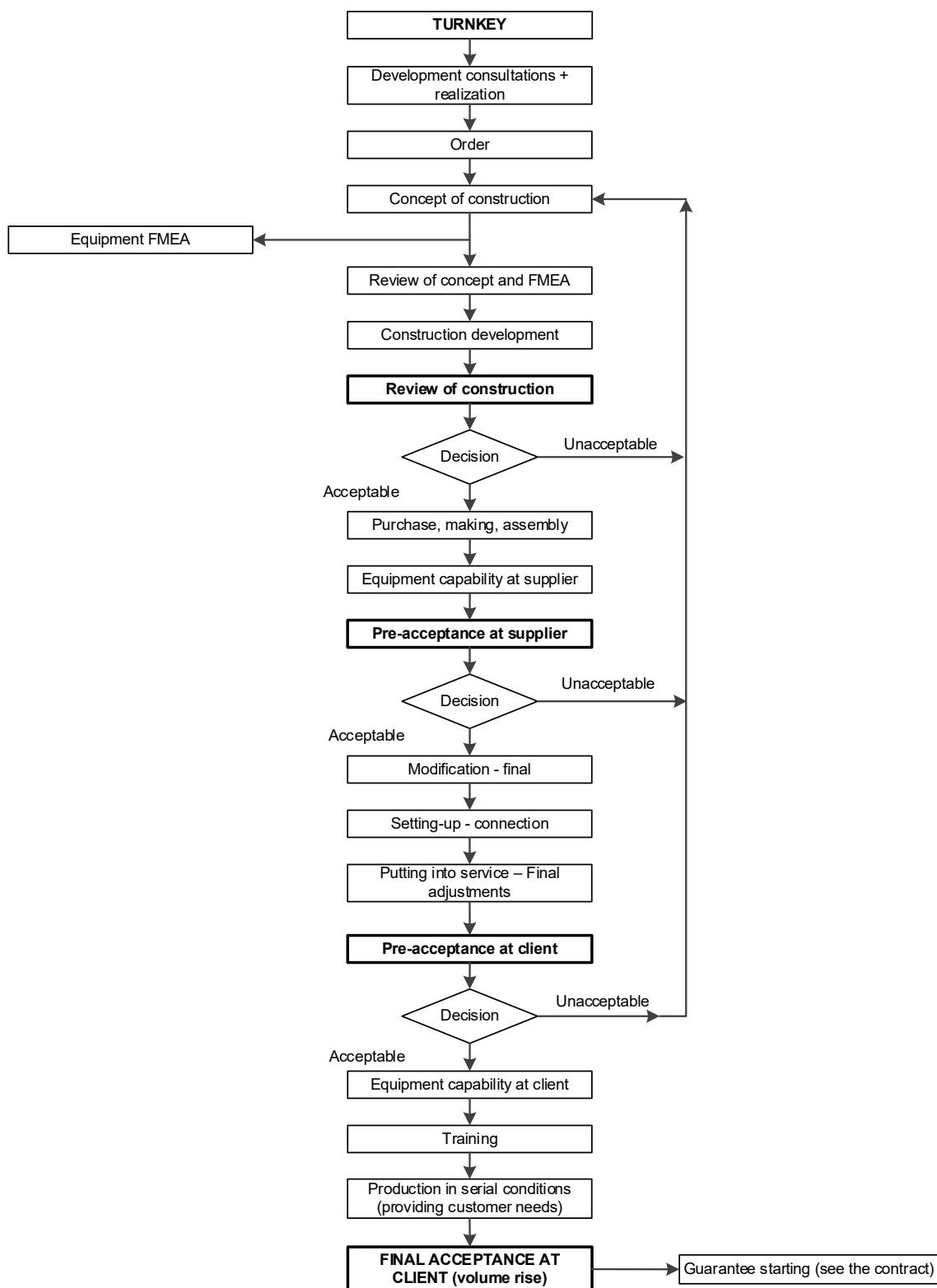
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Methods of working: diagram shows steps at development, posamezne korake pri razvoju, production and equipment acceptance.



9.1 Pred-prevzem pri dobavitelju / Pre-acceptance at the supplier



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Pred-prevzem delovnega sredstva pri dobavitelju se izvede, ko delovno sredstvo deluje v serijskih pogojih (če je take pogoje možno zagotoviti). Pri tem se zaporedno izdelata minimalno 30 (razen, če je v specifičnem zvezku zahtev določeno drugače) izdelkov brez kakršne koli vmesne intervencije. Opraviti se morajo meritve vseh dimenzij, ki so definirane na načrtu izdelka. Pomeriti je potrebno minimalno 5 prvih in 5 zadnjih izdelanih kosov in priložiti poročilo meritev. V primeru nezmožnosti merjenja kosov pri dobavitelju, se je dobavitelj dolžan glede meritev kosov dogovoriti z naročnikom.

Pre-acceptance of the equipment at the supplier shall be made when the equipment runs in series conditions (if such conditions can be established). For this proceeding, at least 30 parts (unless otherwise specified in the specific list of requirements) shall be manufactured successively without any intermediate intervention. All measurements of all dimensions specified in the product drawing shall be performed. At least the first 5 and the last 5 manufactured parts shall be measured and the measurement report shall be delivered. Should the supplier not be in position to provide the measurement of the parts, he shall arrange with the buyer for such measurements.

# 131			
A	B	C	D

Na pred-prevzemu pri dobavitelju se zahteva, da so vse na načrtu definirane dimenzije izmerjene in znotraj predpisanih toleranc.

At the pre-acceptance at the supplier, all dimensions specified in the drawing shall be measured and shall be within the prescribed tolerances.

# 132			
A	B	C	D

Beleži se doseganje zahtev, zapišejo se napake in neskladnosti dejanskega stanja v primerjavi z zahtevami zvezkov zahtev in načrtov izdelkov, določen pa je tudi terminski plan z odgovornimi in roki za odpravo napak in pomanjkljivosti.

The Acceptance Minutes shall contain requirements completion, failures and non-compliances of the actual situation in comparison with the lists of requirements and a time schedule including the responsible persons and time limits for elimination of failures and defects.

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9.2 Pred-prevzem v TPV-ju / Pre-acceptance at TPV

V serijskih pogojih se zaporedoma izdelata minimalno 100 (razen, če je v specifičnem zvezku zahtev določeno drugače) izdelkov brez kakršne koli vmesne intervencije. Opraviti se morajo meritve vseh dimenzij, ki so definirane na načrtu za minimalno 30 izdelkov. Izvede se statistična študija sposobnosti in centriranosti delovnega sredstva in procesa. Zahtevana sposobnost in centriranost za tolerirane dimenzije na načrtu je $Pp / Ppk \geq 1,33$.

In series conditions 100 parts (unless otherwise specified in the specific list of requirements) shall be manufactured successively without any intermediate intervention. All dimensions specified in the drawing shall be measured on at least 30 parts. A statistical study of equipment and process capability (Cp) and capability index (Cpk) shall be conducted. The required capability (Cp) and capability index (Cpk) for tolerated dimensions according to the drawing are $Pp / Ppk \geq 1,33$.

# 134			
A	B	C	D

Ob preizkusni seriji se preveri tudi produktivnost delovnega sredstva, ki mora biti min. 90%, razen, če je drugače definirano v ZZ

At the stage of trial production the equipment efficiency is subject to verification and it shall be at least 90% unless otherwise specified in the

# 135			
A	B	C	D



in/ali pogodbi pri naročilu delovnega sredstev.

specific List of requirements and/or in the agreement signed at placing the order for the equipment.

V času preizkusa se izvede tudi R&R, ki mora biti v zelenem področju in časi cikla morajo biti na predpisanem nivoju, ter v mejah ponovljivosti kakovosti.

At the stage of trial production the R&R calculation shall be performed: it has to be ranked in the green area and cycle times have to be on the prescribed level and within the limits of quality repeatability.

# 136			
A	B	C	D

Doseganje zahtev se beleži v Zapisnik prevzema delovnega sredstva 103324, preveri se odpravljanje napak in neskladnosti, ki so bile ugotovljene pri pred-prevzemu pri dobavitelju. Tudi tukaj se zapišejo morebitne napake in neskladnosti ter določi terminski plan z odgovornimi in roki za odpravo morebitnih napak in pomanjkljivosti.

The Equipment Acceptance Minutes 103324 shall contain requirements completion and inspection of failures and non-compliances elimination as identified at the pre-acceptance at the supplier. Any failures or non-compliances shall be recorded and a time schedule including the responsible persons and time limits for elimination of failures and defects shall be determined.

# 137			
A	B	C	D

9.3 Končni prevzem / Final acceptance

Končni prevzem delovnega sredstva se opravi po postavitvi delovnega sredstva in zagonu preizkusne proizvodnje **v serijskih pogojih**. Preveri se skladnost delovnega sredstva in izdelka z zahtevami v ZZ in zahtevami na načrtu izdelka. V treh serijah se izdelata min po 200 izdelkov (skupaj min 600 izdelkov). Izračunata se sposobnost in centriranost procesa na osnovi 30 vzorcev iz vsake serije (skupaj 90 vzorcev), razen, če je v specifičnem zvezku zahtev določeno drugače.

*Final acceptance of the equipment is made after the equipment has been placed and the trial production has started up **in series conditions**. Compliance of the equipment and product with the List of requirements and drawing requirements shall be checked. At least 200 parts shall be made in each of three batches (in total at least 600 parts). The process capability (Cp) and capability index (Cpk) shall be calculated on the basis of 30 samples of each individual batch (90 samples in total) unless otherwise specified in the specific list of requirements.*

# 138			
A	B	C	D

Zahtevana sposobnost in centriranost za vse tolerirane dimenzije na načrtu (varnostne, regulativne, statistične, funkcionalne) je $C_p / C_{pk} \geq 1,67$ (razen, če je v specifičnem zvezku zahtev določeno drugače).

Capability and capability index required for all toleranced dimensions on the drawing (security, regulation, statistics, functionality) are $C_p / C_{pk} \geq 1,67$ unless otherwise specified in the specific list of requirements.

# 139			
A	B	C	D

Dolžina trajanja preizkusne proizvodnje je min. eno izmeno, razen, če je drugače definirano v specifičnem ZZ in/ali pogodbi pri naročilu delovnega sredstev. V času preizkusne

Duration of the trial production shall be at least 1 shift unless otherwise specified in the specific List of requirements and/or in the agreement signed at placing the order for the equipment.

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proizvodnje je potrebno zapisati vse pomanjkljivosti na delavnem sredstvu, katere mora dobavitelj v skladu z zadolžitvami v zapisniku odpraviti. Preizkusna proizvodnja poteka s proizvodnimi delavci, ki so bili predhodno izšolani za predvidena dela.

During the trial production, all failures detected on the equipment shall be recorded and the supplier shall eliminate them in accordance with responsibilities laid down in the minutes. The trial production is conducted by operators previously trained for the operations in question.

Ob preizkusni seriji se preveri tudi produktivnost delovnega sredstva, ki mora biti min. 96%, razen, če je drugače definirano v ZZ in/ali pogodbi pri naročilu delovnega sredstev.

At the stage of trial production the equipment efficiency is subject to verification and it shall be at least 96% unless otherwise specified in the specific List of requirements and/or in the agreement signed at placing the order for the equipment.

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A	B	C	D

V času preizkusa se izvede tudi R&R, ki mora biti v zelenem področju in časi cikla morajo biti na predpisanem nivoju, ter v mejah ponovljivosti kakovosti.

At the stage of trial production the R&R calculation shall be performed: it has to be ranked in the green area and cycle times have to be on the prescribed level and within the limits of quality repeatability.

# 142			
A	B	C	D

Končni prevzem v TPV-ju se opravi po končani preizkusni seriji. Delovno sredstvo se sprejme na osnovi pogojev iz pogodbe kupca in zapisniku o končnem prevzemu pri kupcu. Projektna skupina nadzira odpravo morebitnih napak, ki so bile ugotovljene pri montaži delovnega sredstva.

The final acceptance at TPV shall be made after the trial production has ended. The equipment shall be accepted based on the conditions stipulated in the buyer's agreement and the Minutes on the final acceptance at the buyer. The project team shall inspect elimination of any defects detected at the equipment assembly.

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9.4 Zapisnik končnega prevzema / Final acceptance minutes

Po montaži delovnega sredstva, preizkusnem zagonu delovnega sredstva, odpravi napak na delovnem sredstvu, potrditvi izdelka po ustrezni proceduri, izdelavi potrebnih meritev in izračunov sposobnosti in centriranosti delovnega sredstva in procesa v okviru predvidenih ciljev, se izdelava zapisnik o končnem prevzemu.

After the equipment assembly, trial start-up of the equipment, elimination of equipment defects, product validation according to a defined procedure, execution of necessary measurements and calculations of equipment and process capability and capability index with respect to the expected objectives, the final Acceptance Minutes are recorded.

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A	B	C	D

10 IZOBRAŽEVANJE / TRAINING

Dobavitelj mora v sodelovanju z TPV določiti vse potrebno za izvedbo izobraževanj. In sicer:

The supplier shall in collaboration with TPV define all issues necessary for training, as follows:



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- koga je potrebno izobraziti (operaterje, tehnično osebje, vzdrževanje, vodstveno osebje),

- *people needed to attend the training (operators, technical and maintenance staff, management),*

# 145			
A	B	C	D

- čas izobraževanja,

- *duration of training,*

# 146			
A	B	C	D

- terminski plan izobraževanja,

- *planning of training,*

# 147			
A	B	C	D

- datum izobraževanja,

- *date of training,*

# 148			
A	B	C	D

- definirati etape izobraževanja,

- *definition of different steps of training,*

# 149			
A	B	C	D

- definirati sredstva za izobraževanje,

- *definition of training material,*

# 150			
A	B	C	D

- definirati vsebino vzdrževanja in njihove tipe,

- *definition of contents of training and its type,*

# 151			
A	B	C	D

- definirati izobraževanje generalno (tehnik, električarji, nastavljavci) in specifično,

- *definition of training in general aspect (technicians, electricians, adjusters) and in specific aspect,*

# 152			
A	B	C	D

- definirati kraj izobraževanja.

- *definition of place of training.*

# 153			
A	B	C	D

Dobavitelj bo zagotovil teoretično in praktično usposabljanje osebja naročnika, ki bo upravljalo z dobavljeno opremo, in sicer do te mere, da bo opremo mogoče nemoteno uporabljati in jo pravilno vzdrževati.

For the buyer's personnel handling with the equipment, the supplier shall provide a theoretical and practical training to the extent to use the equipment smoothly and to maintain it properly.

# 154			
A	B	C	D

Število ur, predvidenih za vsa izobraževanja, mora dobavitelj določiti in upoštevati v cenovni ponudbi.

The number of hours expected for the entire training shall be determined by the supplier and included in his quotation.

# 155			
A	B	C	D

Dobavitelj mora glede na tveganja, ki jih naprava predstavlja za varnost in zdravje pri delu, varstvo okolja in varstvo pred požarom, pripraviti izobraževalno gradivo in navodila za varno delo.

With respect to risks the equipment represents for occupational health and safety, environmental protection and fire protection, the supplier shall prepare the training material and instructions for safe use.

# 156			
A	B	C	D

Po končanem usposabljanju bo dobavitelj izdelal poročilo o vsebini usposabljanja in spisek

After the training, the supplier shall make a report on the training content delivered, list of

# 157			
A	B	C	D



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usposobljenih oseb ter izdal potrdilo o usposobljenosti osebja, ki dokazuje, da je z usposabljanjem osebje ustrezno izučil. Spisek in zapis o usposabljanju dobavitelj preda odgovorni osebi v TPV.

qualified staff and shall also issue a training certificate proving the appropriate qualification of the staff involved. List of qualified staff, report and training certificate shall be delivered to TPV Automotive.

Del dokumentacije, ki služi kot izobraževanje delavcev in vzdrževalcev mora biti predan 15 dni pred izvedbo izobraževanj v TPV. Vsa izobraževanja se vodijo v dogovoru s kadrovske službo TPV-ja.

A part of documentation intended for training of operators and maintenance staff shall be delivered to TPV 15 days before the training takes place. All training sessions shall be conducted in accordance with TPV HR Service.

# 158			
A	B	C	D

11 NAVODILO ZA IZPOLNJEVANJE TABELE / CHECKLIST INSTRUCTION

Desna stran dokumenta s tabelo 1 se uporabi med posameznimi fazami prevzema [in se izpolni s strani TPV Automotive v sodelovanju z dobaviteljem](#).

Right side of document with Table 1 is used during takeover stages only as a checklist [and is fulfilled by TPV Automotive in cooperation with supplier](#).

#			
A	B	C	D



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Table 1

- številka zahteve

Faza prevzema:

A – pregled konstrukcije,

B – preprevzem pri dobavitelju,

C – predprevzem v TPV,

D – končni prevzem.

Dovoljeni so naslednji znaki v katerikoli fazi prevzema:

✓ - zahteva izpolnjena,

✗ - zahteva ni izpolnjena,

N – zahteva ne more biti ocenjena v tej fazi prevzema

- number of requirements

Stages of takeover:

A – design review,

B – pre-acceptance at supplier,

C – pre-acceptance at TPV,

D – final acceptance.

During any takeover stage use of following signs are allowed:

✓ - Requirement OK,

✗ - Requirement NOK,

N – not applicable, not assessed.