ΣΗΜΕΙΩΜΑ

ΠΡΟΣ: Πρόεδρο και Μέλη Επιτροπής Προσφορών

ΜΕΣΩ.: Προέδρου Τμήματος ΕΤΠ Δρ. Κώστα Κώστα

ΑΠΟ: Αλέξανδρα Χαραλαμπίδη, Συντονιστή Επιτροπής Αξιολόγησης

ΗΜΕΡ.: 22/11/2016

ΘΕΜΑ: Έκθεση Αξιολόγησης Διαγωνισμού αρ. ΕΤΠ(2)/015/2016 για Προμήθεια εργαστηριακού εξοπλισμού για τα Διδακτικά Εργαστήρια του Τμήματος Επιστήμης και Τεχνολογίας Περιβάλλοντος (ΕΤΕΠ)

Παρακαλώ όπως συμπεριληφθεί στην ημερήσια διάταξη της επόμενης συνεδρίας της Επιτροπής Προσφορών η επισυναπτόμενη έκθεση αξιολόγησης του αναφερόμενου διαγωνισμού.

ΕΚΘΕΣΗ ΑΞΙΟΛΟΓΗΣΗΣ

(ΑΝΟΙΚΤΗ ΔΙΑΔΙΚΑΣΙΑ – ΕΝΑΣ ΦΑΚΕΛΟΣ)

Διαγωνισμός αρ. ΕΤΠ(2)/015/2016 για Προμήθεια εργαστηριακού εξοπλισμού για τα Διδακτικά Εργαστήρια Χημικής Τεχνολογίας του Τμήματος Επιστήμης και Τεχνολογίας Περιβάλλοντος (ΕΤΕΠ)

* Να συμπληρωθεί ο αριθμός και ο τίτλος του διαγωνισμού

ΠΕΡΙΕΧΟΜΕΝΑ

ΕΚΘΕΣΗ ΑΞΙΟΛΟΓΗΣΗΣ

1. ΓΕΝΙΚΑ ΣΤΟΙΧΕΙΑ

1.1 Στοιχεία διαγωνισμού

Αριθμός διαγωνισμού:	ΕΤΠ(2)/015/2016

Τίτλος διαγωνισμού:	Προμήθεια εργαστηριακού εξοπλισμού για τα Διδακτικά Εργαστήρια Χημικής Τεχνολογίας του Τμήματος Επιστήμης και Τεχνολογίας Περιβάλλοντος (ΕΤΕΠ)

Προϋπολογισμός:	€168.000,00, μη συμπεριλαμβανομένου του ΦΠΑ. ~~Το αναφερόμενο ποσό συμπεριλαμβάνει ~~*~~ποσό προνοίας / ~~*~~δικαίωμα προαίρεσης / ανανέωσης / ~~*~~κόστος εγκατάστασης / ~~*~~ εκπαίδευσης / ~~*~~συντήρησης ποσού ίσου με €.....~~ (να διαγραφεί αναλόγως) ~~*Η σύμβαση χρηματοδοτείται από τα Διαρθρωτικά Ταμεία / ΙΠΕ.~~ *Η σύμβαση χρηματοδοτείται από τον προϋπολογισμό του Τεχνολογικού Πανεπιστημίου Κύπρου (να διαγραφεί αναλόγως)	Αναθέτουσα Αρχή:	Τεχνολογικό Πανεπιστήμιο Κύπρου
Είδος Σύμβασης:	~~Υπηρεσίες /~~ Προμήθεια ~~/ Έργο~~ (να διαγραφεί ότι δεν ισχύει)		
Διαδικασία:	Ανοικτή Διαδικασία	Κριτήριο Ανάθεσης	Η πλέον συμφέρουσα από οικονομική άποψη προσφορά βάσει τιμής ανά αντικείμενο

Ημερομηνία προκήρυξης:	25/10/2016	Ημερομηνία και ώρα λήξης προθεσμίας υποβολής προσφορών:	09/11/2016 και ώρα 12:30 μ.μ	Ημερομηνία λήξης ισχύος προσφορών:	08/02/2017

1.2 Αρμόδιο Όργανο Αξιολόγησης

Συντονιστής Αρμοδίου Οργάνου:	*Αλέξανδρος Χαραλαμπίδης*
Μέλος Αρμοδίου Οργάνου:	*Θεόδωρος Ζαχαριάδης*
Μέλος Αρμοδίου Οργάνου:	*Κώστας Ν. Κώστα*
Μέλος Αρμοδίου Οργάνου:	
Μέλος Αρμοδίου Οργάνου:	

1.3 Υποβληθείσες προσφορές

Α/Α	ΕΠΩΝΥΜΙΑ ΟΙΚΟΝΟΜΙΚΟΥ ΦΟΡΕΑ *(να αναγράφεται ολοκληρωμένη η επωνυμία, όπως παρουσιάζεται στο έντυπο υποβολής προσφοράς και με την αρίθμηση που έχει δοθεί από το Γραφείο Προσφορών κατά τη διαδικασία αποσφράγισης των προσφορών)*
1.	***C&V Kritticos Suppliers Ltd***

2. ΕΚΘΕΣΗ ΠΟΙΟΤΙΚΗΣ ΕΠΙΛΟΓΗΣ

2.1 Συναντήσεις

Βάσει των κανονισμών περί Δημοσίων Συμβάσεων (Κ.Δ.Π.242/2012) ζητήθηκε όπως τα πιο κάτω άτομα παραστούν ως παρατηρητές στη/στις πιο κάτω συνεδρία/ες της Επιτροπής Αξιολόγησης:

- Γενική Λογίστρια της Κυπριακής Δημοκρατίας
- Γενικό Ελεγκτή της Κυπριακής Δημοκρατίας και
- Εσωτερικό Ελεγκτή του Τεχνολογικού Πανεπιστημίου Κύπρου.

*(Δες **Παράρτημα Α**: Επιστολή πρόσκλησης και **Παράρτημα Β**: Πρακτικό/ά συνάντησης Επιτροπής Αξιολόγησης)*

Α/Α	ΗΜΕΡΟΜΗΝΙΑ	ΩΡΑ	ΤΟΠΟΣ	ΗΜΕΡΗΣΙΑ ΔΙΑΤΑΞΗ
1.	21/11/2016	12:00	Γραφεία του Τμήματος ΕΤΠ	1. Προκαταρκτικός έλεγχος υποβαλλόμενων προσφορών 2. Έλεγχος τυπικών προϋποθέσεων συμμετοχής 3. Έλεγχος πλήρωσης κριτηρίων ποιοτικής επιλογής* 4. Έλεγχος οικονομικής και χρηματοοικονομικής επάρκειας* 5. Έλεγχος τεχνικών και επαγγελματικών ικανοτήτων* 6. Έλεγχος υποβαλλόμενων εγγράφων τεχνικής προσφοράς 7. Έλεγχος υποβαλλόμενων εγγράφων οικονομικής προσφοράς 8. Αξιολόγηση τεχνικών προδιαγραφών* 9. Αξιολόγηση οικονομικής προσφοράς* * να διαγραφεί ότι δεν ισχύει ~~10. Ορισμός ημερομηνίας, ώρας, αίθουσας και Ημερήσιας Διάταξης επόμενης Συνεδρίας (σε περίπτωση που πραγματοποιηθεί επιπρόσθετη συνεδρία)~~

2.2 Προκαταρκτική εξέταση πληρότητας προσφορών

Κατά το στάδιο αυτό της Αξιολόγησης, εξετάστηκαν οι υποβληθείσες προσφορές, με βάση τον πιο κάτω πίνακα και δεν διαπιστώθηκε οποιαδήποτε απόκλιση:

ΠΡΟΚΑΤΑΡΚΤΙΚΗ ΕΞΕΤΑΣΗ ΠΛΗΡΟΤΗΤΑΣ ΠΡΟΣΦΟΡΩΝ					
ΑΠΑΙΤΗΣΕΙΣ ΕΓΓΡΑΦΩΝ ΔΙΑΓΩΝΙΣΜΟΥ	*ΠΛΗΡΩΣΗ ΑΠΑΙΤΗΣΕΩΝ*				
	C&V Kriticos Suppliers Ltd				
1 ΠΡΩΤΟΤΥΠΟ ΚΑΙ1 ΑΝΤΙΓΡΑΦΟ	ΝΑΙ				
ΜΟΝΟΓΡΑΦΗ ΤΗΣ ΚΑΘΕ ΣΕΛΙΔΑΣ, ΣΥΜΠΕΡΙΛΑΜΒΑΝΟΜΕΝΩΝ ΚΑΙ ΤΩΝ ΕΝΤΥΠΩΝ, ΑΠΟ ΤΟΝ ΠΡΟΣΦΕΡΟΝΤΑ Ή ΕΚΠΡΟΣΩΠΟ ΤΟΥ (*Σε περιπτώσεις βιβλιοδετημένων στοιχείων μπορεί να μονογραφηθεί μόνο η πρώτη και η τελευταία σελίδα)*	ΝΑΙ				
ΣΥΜΠΛΗΡΩΣΗ ΚΑΙ ΥΠΟΓΡΑΦΗ ΕΝΤΥΠΟΥ ΤΕΧΝΙΚΗΣ ΠΡΟΣΦΟΡΑΣ	ΝΑΙ				
ΣΥΜΠΛΗΡΩΣΗ ΠΙΝΑΚΑ ΠΡΟΣΦΟΡΑΣ ΚΑΙ ΣΥΜΜΟΡΦΩΣΗΣ ΜΕ ΤΙΣ ΤΕΧΝΙΚΕΣ ΠΡΟΔΙΑΓΡΑΦΕΣ (εάν εφαρμόζεται)	ΝΑΙ				
ΣΥΜΠΛΗΡΩΣΗ ΚΑΙ ΥΠΟΓΡΑΦΗ ΕΝΤΥΠΟΥ ΟΙΚΟΝΟΜΙΚΗΣ ΠΡΟΣΦΟΡΑΣ	ΝΑΙ				
ΣΥΜΠΛΗΡΩΣΗ ΠΙΝΑΚΑ ΑΝΑΛΥΣΗΣ ΠΟΣΟΥ ΠΡΟΣΦΟΡΑΣ*/ΤΙΜΩΝ ΜΟΝΑΔΟΣ*/ΔΕΛΤΙΟΥ ΠΟΣΟΤΗΤΩΝ* (να διαγραφεί αναλόγως)	ΝΑΙ				
ΚΑΤΑΛΟΓΟΙ / ΦΥΛΛΑΔΙΑ ΚΑΤΑΣΚΕΥΑΣΤΩΝ (εάν εφαρμόζεται, ισχύει μόνο για προμήθειες)	ΝΑΙ				
ΥΠΟΒΟΛΗ ΔΕΙΓΜΑΤΟΣ (εάν εφαρμόζεται, ισχύει μόνο για προμήθειες)	Δ/Ε				
ΨΗΦΙΑΚΟ ΜΕΣΟ (CD) για την τεχνική προσφορά (εάν εφαρμόζεται)	ΝΑΙ				
ΨΗΦΙΑΚΟ ΜΕΣΟ (CD) για την οικονομική προσφορά (εάν εφαρμόζεται)	ΝΑΙ				

2.3 Έλεγχος τυπικών προϋποθέσεων συμμετοχής

Κατά το στάδιο αυτό έγινε έλεγχος των τυπικών προϋποθέσεων συμμετοχής, όπως αυτές φαίνονται στον πιο κάτω Πίνακα και περιγράφονται στα Έγγραφα του Διαγωνισμού. Δεν διαπιστώθηκαν οποιεσδήποτε αποκλίσεις από τις προϋποθέσεις που ζητούνταν στα έγγραφα του διαγωνισμού.

ΕΛΕΓΧΟΣ ΤΥΠΙΚΩΝ ΠΡΟΫΠΟΘΕΣΕΩΝ ΣΥΜΜΕΤΟΧΗΣ					
ΑΠΑΙΤΗΣΕΙΣ ΕΓΓΡΑΦΩΝ ΔΙΑΓΩΝΙΣΜΟΥ	ΠΛΗΡΩΣΗ ΑΠΑΙΤΗΣΕΩΝ				
	C&V Kritikos Suppliers Ltd				
ΕΓΓΥΗΣΗ ΣΥΜΜΕΤΟΧΗΣ / ΕΝΤΥΠΟ «ΔΕΣΜΕΥΣΗ ΜΗ ΑΠΟΣΥΡΣΗΣ ΠΡΟΣΦΟΡΑΣ (να διαγραφεί αναλόγως) ~~Σε περίπτωση υποβολής εγγύησης συμμετοχής:~~ ~~α) ΠΟΣΟ: €.....~~ ~~β) ΗΜΕΡΟΜΗΝΙΑ ΛΗΞΗΣ~~ ~~Σε περίπτωση κοινοπραξίας, η εγγυητική πρέπει να καλύπτει όλες τις εταιρίες~~	ΝΑΙ				
ΧΩΡΑ ΕΓΚΑΤΑΣΤΑΣΗΣ	ΚΥΠΡΟΣ				
ΑΠΟΔΕΙΚΤΙΚΑ ΣΤΟΙΧΕΙΑ ΣΥΣΤΑΣΗΣ ΕΤΑΙΡΕΙΑΣ *Σε περίπτωση Κοινοπραξίας, τα στοιχεία σύστασης πρέπει να υπάρχουν για όλες τις εταιρίες*	ΝΑΙ				
ΕΝΤΥΠΟ «ΣΤΟΙΧΕΙΑ ΚΑΤΑΣΚΕΥΑΣΤΗ» (ισχύει για προμήθειες)	ΝΑΙ				
ΕΓΓΡΑΦΗ ΣΕ ΕΠΑΓΓΕΛΜΑΤΙΚΟ ΜΗΤΡΩΟ (ισχύει μόνο για έργα)	Δ/Ε				
ΚΑΤΑΛΛΗΛΟΤΗΤΑ ΣΕ ΣΧΕΣΗ ΜΕ ΤΗΝ ΚΑΤΗΓΟΡΙΑ ΚΑΙ ΤΑΞΗ ΕΡΓΟΛΗΠΤΗ (ισχύει μόνο για έργα)	Δ/Ε				
ΣΥΜΦΩΝΗΤΙΚΟ ΣΥΝΕΡΓΑΣΙΑΣ *(σε περίπτωση κοινοπραξίας)*	Δ/Ε				
ΠΛΗΡΕΞΟΥΣΙΟ ΕΚΠΡΟΣΩΠΟΥ *(σε περίπτωση κοινοπραξίας)*	Δ/Ε				
ΔΙΚΑΙΩΜΑ ΥΠΟΓΡΑΦΗΣ	ΝΑΙ				

2.4 Έλεγχος προσωπικής κατάστασης

Στο στάδιο αυτό η Επιτροπή Αξιολόγησης προχώρησε στον Έλεγχο της προσωπικής κατάστασης των προσφερόντων σύμφωνα με τα στοιχεία του πιο κάτω Πίνακα:

ΕΛΕΓΧΟΣ ΠΡΟΣΩΠΙΚΗΣ ΚΑΤΑΣΤΑΣΗΣ					
ΑΠΑΙΤΗΣΕΙΣ ΕΓΓΡΑΦΩΝ ΔΙΑΓΩΝΙΣΜΟΥ	ΠΛΗΡΩΣΗ ΑΠΑΙΤΗΣΕΩΝ				
	C&V Kritikos Suppliers Ltd				
ΔΗΛΩΣΗ ΠΙΣΤΟΠΟΙΗΣΗΣ ΠΡΟΣΩΠΙΚΗΣ ΚΑΤΑΣΤΑΣΗΣ ΠΡΟΣΦΕΡΟΝΤΑ (ΕΝΤΥΠΟ 3)	*ΝΑΙ*				
ΔΗΛΩΣΗ ΠΙΣΤΟΠΟΙΗΣΗΣ ΠΡΟΣΩΠΙΚΗΣ ΚΑΤΑΣΤΑΣΗΣ ΑΛΛΩΝ ΦΟΡΕΩΝ (σε περίπτωση που εφαρμόζεται η στήριξη από άλλους φορείς)	*Δ/Ε*				
ΒΕΒΑΙΩΣΗ ΣΧΕΤΙΚΑ ΜΕ ΤΗΝ ΠΡΟΣΤΑΣΙΑ ΤΩΝ ΕΡΓΑΖΟΜΕΝΩΝ (ΕΝΤΥΠΟ 7)	*ΝΑΙ*				

Κατά τον έλεγχο αυτό δεν διαπιστώθηκαν οποιεσδήποτε αποκλίσεις από τις προϋποθέσεις που ζητούνταν στα έγγραφα του διαγωνισμού.

2.5 ~~Έλεγχος Οικονομικής και Χρηματοοικονομικής Επάρκειας~~ - Δεν εφαρμόζεται

~~Στο στάδιο αυτό η Επιτροπή Αξιολόγησης προχώρησε στον Έλεγχο της Οικονομικής και Χρηματοοικονομικής Επάρκειας των προσφερόντων σύμφωνα με τα στοιχεία του πιο κάτω Πίνακα:~~

~~*Σημείωση:~~

- ~~Σε περίπτωση κοινοπραξίας οι ανωτέρω προϋποθέσεις αρκεί να πληρούνται αθροιστικά από τα μέλη της κοινοπραξίας~~
- ~~Σε περίπτωση που ο ενδιαφερόμενος οικονομικός φορέας δύναται να στηρίζεται στις δυνατότητες άλλου/ων φορέα/ων ασχέτως της νομικής φύσης των δεσμών με αυτόν/ους, θα πρέπει να υποβάλει τα αναγκαία έντυπα έτσι ώστε να είναι σε θέση να αποδείξει ότι θα έχει στη διάθεση του τους αναγκαίους πόρους.~~

Κατά τον έλεγχο της Οικονομικής και Χρηματοοικονομικής Επάρκειας δεν διαπιστώθηκαν οποιεσδήποτε αποκλίσεις από τις προϋποθέσεις που ζητούνταν στα έγγραφα του διαγωνισμού από τους Οικονομικούς Φορείς.

2.6 Έλεγχος τεχνικών και επαγγελματικών ικανοτήτων-Δεν εφαρμόζεται

Στο στάδιο αυτό η Επιτροπή Αξιολόγησης προχώρησε στον έλεγχο των τεχνικών και επαγγελματικών ικανοτήτων των προσφερόντων σύμφωνα με τα στοιχεία του πιο κάτω Πίνακα:

*Σημείωση:

- Σε περίπτωση κοινοπραξίας οι ανωτέρω προϋποθέσεις αρκεί να πληρούνται αθροιστικά από τα μέλη της κοινοπραξίας
- Σε περίπτωση που ο ενδιαφερόμενος οικονομικός φορέας δύναται να στηρίζεται στις δυνατότητες άλλου/ων φορέα/ων ασχέτως της νομικής φύσης των δεσμών με αυτόν/ους, θα πρέπει να υποβάλει τα αναγκαία έντυπα έτσι ώστε να είναι σε θέση να αποδείξει ότι θα έχει στη διάθεση του τους αναγκαίους πόρους.

2.7 Κατάσταση οικονομικών φορέων που προχωρούν / δεν προχωρούν στο στάδιο της τεχνικής αξιολόγησης

Η Επιτροπή Αξιολόγησης μετά τους πιο πάνω ελέγχους αποφάσισε όπως:

- **προχωρήσει** στην αξιολόγηση της Τεχνικής Προσφοράς των πιο κάτω οικονομικών φορέων:

Αριθμός Οικονομικού Φορέα	Επωνυμία Οικονομικού Φορέα
1.	***C&V Kriticos Suppliers Ltd***

3. ΕΚΘΕΣΗ ΑΞΙΟΛΟΓΗΣΗΣ

3.1 Συναντήσεις

Α/Α	ΗΜΕΡΟΜΗΝΙΑ	ΩΡΑ	ΤΟΠΟΣ	ΗΜΕΡΗΣΙΑ ΔΙΑΤΑΞΗ
1	21/11/2016	12:00	Γραφεία του Τμήματος ΕΤΠ	1. Έγκριση Πρακτικών 1ης Συνεδρίας 2. Αξιολόγηση Τεχνικής Προσφοράς 3. Αξιολόγηση οικονομικής προσφοράς 4. Σύνταξη έκθεσης αξιολόγησης

Συνημμένα υποβάλλονται τα Πρακτικά της παραπάνω συνάντησης στο Παράρτημα Α.

3.2 Αξιολόγηση τεχνικής προσφοράς

Μετά από ενδελεχή μελέτη και αξιολόγηση των τεχνικών προσφορών έχουν προκύψει τα ακόλουθα:

Η προσφορά του οικονομικού φορέα δεν **παρουσιάζει** ουσιώδης **αποκλίσεις** από τις τεχνικές προδιαγραφές του διαγωνισμού.

Επισυνάπτεται ως **Παράρτημα Γ** πίνακας τεχνικών προδιαγραφών της έγκυρης υποβληθείσας προσφοράς. Επισημαίνεται ότι με βάση τον Πίνακα στο Παράρτημα Γ δεν παρατηρείται οποιαδήποτε απόκλιση από τη ζητούμενη προμήθεια. Επιπλέον, τα ζητούμενα όργανα τηρούν όλες τις απαραίτητες προδιαγραφές.

3.3 Αξιολόγηση οικονομικής προσφοράς

Η Επιτροπή Αξιολόγησης έχει προχωρήσει στη συνέχεια σε έλεγχο των ακόλουθων οικονομικών φορέων με σκοπό να εντοπιστούν τυχόν αριθμητικά λάθη ή/και λάθη από μεταφορά. Στο πιο κάτω πίνακα αναφέρονται αναλυτικά οι τιμές που προσφέρθηκαν. Η μοναδική εταιρία που πρόσφερε τιμές για τα συγκεκριμένα όργανα ήταν η εταιρία C&V Kriticos Suppliers Ltd.

	Προσφερόμενη Τιμή (σε ευρώ, μη συμπεριλαμβανομένου ΦΠΑ)						
Ζητούμενη υπηρεσία	*1*	*2*	*3*	*4*	*5*	*6*	*7*
	Computer Controlled Liquid mass transfer and diffusion coefficient unit ***QDTGC & SCADA & PID CONTROL & PC***	*Computer Controlled Fixed Bed Adsorption Unit* ***QALFC & SCADA & PID CONTRO L & PC***	*Base Unit (computer controlled), with the following Chemical Reactors: Continuous stirred tank reactor, Batch Reactor, Stirred tank reactors in series, Plug flow reactors* ***QUSC & QRCAC & QRDC & QRSC & QRPC & SCADA & PID CONTROL & PC***	*Computer controlled catalytic reactors with Flow injection analysis (FIA) unit* ***QRCC & FIA & SCADA & PID CONTROL & PC***	*Corrosion Study unit* ***EEC***	*Computer controlled Sedimentation tank* ***PDSC & SCADA & PC***	*Computer Controlled Continuous Distillation unit, automatic feeder* ***UDCC & SCADA & PID CONTROL & PC***
Ποσότητα	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Αναμενόμενη τιμή (Ευρώ) (Ανά τεμάχιο)	**15.126**	**14.286**	**33.613**	**32.773**	**10.084**	**27.731**	**34.454**
Επωνυμία Οικονομικού Φορέα							
C&V Kriticos Suppliers Ltd	***15.094,00***	***14.194,00***	***33.488,00***	***32.684,00***	***9.084,00***	***28.970,00***	***34.274,00***

Στο πιο κάτω πίνακα δίνονται οι αποκλίσεις των τιμών των αντικειμένων που επιλέχθηκαν σε σύγκριση με την αναμενόμενη τιμή. Σε καμία περίπτωση η απόκλιση δεν ήταν μεγαλύτερη του ±10%.

		Αναμενόμενη τιμή (Ευρώ)	Επωνυμία Οικονομικού Φορέα (Μοντέλο)	Τιμή (Ευρώ)	Απόκλιση από αναμενόμενη τιμή	Αιτιολόγηση απόκλισης
Ζητούμενη υπηρεσία	1. *Computer Controlled Liquid mass transfer and diffusion coefficient unit* ***QDTGC & SCADA & PID CONTROL & PC***	**15.126**	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	15.094,00	**-0,2%**	**Απόκλιση μικρότερη του 10%**
	2. *Computer Controlled Fixed Bed Adsorption Unit* ***QALFC & SCADA & PID CONTROL & PC***	**14.286**	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	14.194,00	**-0,7%**	**Απόκλιση μικρότερη του 10%**
	3. *Base Unit (computer controlled), with the following Chemical Reactors: Continuous stirred tank reactor, Batch Reactor, Stirred tank reactors in series, Plug flow reactors* ***QUSC & QRCAC & QRDC & QRSC & QRPC & SCADA & PID CONTROL & PC***	**33.613**	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	33.488,00	**-0,5%**	**Απόκλιση μικρότερη του 10%**
	4. *Computer controlled catalytic reactors with Flow injection analysis (FIA) unit* ***QRCC & FIA & SCADA & PID CONTROL & PC***	**32.684**	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	32.773,00	**+0,3%**	**Απόκλιση μικρότερη του 10%**
	5. *Corrosion Study unit* ***EEC***	**10,084**	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	9.084,00	**-9,9%**	**Απόκλιση μικρότερη του 10%**
	6. *Computer controlled Sedimentation tank* ***PDSC & SCADA & PC***	**27.731**	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	28.970,00	**+4,5%**	**Απόκλιση μικρότερη του 10%**
	7. *Computer Controlled Continuous Distillation unit, automatic feeder* ***UDCC & SCADA & PID CONTROL & PC***	**34,454**	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	34.274,00	**-0,5%**	**Απόκλιση μικρότερη του 10%**

Σημείωση:

- *Σε περίπτωση ασυνήθιστα χαμηλής προσφοράς, θα πρέπει να ζητηθεί γραπτώς από την εταιρεία διευκρίνιση και επιβεβαίωση ότι μπορεί να ανταπεξέλθει*
- *θα πρέπει να γίνει αναφορά σε προσφερόμενες τιμές που κρίνονται εξωπραγματικές ή σε τυχόν αναθεωρημένες τιμές προσφορών που θα προκύψουν από διάρθωση αριθμητικών λαθών*

Επισυνάπτεται ως **Παράρτημα Δ** πίνακας με τις *τιμές ~~/ *ανάλυση τιμών προσφοράς / *δελτίο ποσοτήτων όλων των έγκυρων~~ της υποβληθείσας προσφοράς.

Γ.2.1

4. ΑΝΑΘΕΣΗ ΣΥΜΒΑΣΗΣ

Η Επιτροπή Αξιολόγησης εισηγείται την κατακύρωση του αναφερόμενου διαγωνισμού στον Οικονομικό Φορέα με την πιο κάτω επωνυμία, ο οποίος υπέβαλε προσφορά η οποία πληροί τους όρους και προδιαγραφές του διαγωνισμού. Το συνολικό ποσό κατακύρωσης για όλα τα αντικείμενα ανέρχεται σε €167.788,00, μη συμπεριλαμβανομένου του ΦΠΑ και συμπεριλαμβανομένου εγγύησης καλής λειτουργίας για 2 χρόνια.

Πίνακας ανάθεσης σύμβασης ανά αντικείμενο

		Αναμενόμενη τιμή (Ευρώ)	Επωνυμία Οικονομικού Φορέα (Μοντέλο)	Τιμή (Ευρώ)	Αιτιολογία
Ζητούμενη υπηρεσία	1. Computer Controlled Liquid mass transfer and diffusion coefficient unit (QDTGC & SCADA & PID CONTROL & PC)	15.126	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	15.094,00	*Μοναδική προσφορά Ικανοποίηση Προδιαγραφών*
	2. Computer Controlled Fixed Bed Adsorption Unit (QALFC & SCADA & PID CONTROL & PC)	14.286	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	14.194,00	*Μοναδική προσφορά Ικανοποίηση Προδιαγραφών*
	3. Base Unit (computer controlled), with the following Chemical Reactors: Continuous stirred tank reactor, Batch Reactor, Stirred tank reactors in series, Plug flow reactors (QUSC & QRCAC & QRDC & QRSC & QRPC & SCADA & PID CONTROL & PC)	33.613	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	33.488,00	*Μοναδική προσφορά Ικανοποίηση Προδιαγραφών*
	4. Computer controlled catalytic reactors with Flow injection analysis (FIA) unit (QRCC & FIA & SCADA & PID CONTROL & PC)	32.773	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	32.684,00	*Μοναδική προσφορά Ικανοποίηση Προδιαγραφών*
	5. Corrosion Study unit (EEC)	10.084	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	9.084,00	*Μοναδική προσφορά Ικανοποίηση Προδιαγραφών*
	6. Computer controlled Sedimentation tank (PDSC & SCADA & PC)	27.731	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	28.970,00	*Μοναδική προσφορά Ικανοποίηση Προδιαγραφών*
	7. Computer Controlled Continuous Distillation unit, automatic feeder (UDCC & SCADA & PID CONTROL & PC)	34.454	C&V Kriticos Suppliers Ltd (EDIBON INTERNATIONAL)	34.274,00	*Μοναδική προσφορά Ικανοποίηση Προδιαγραφών*
		ΣΥΝΟΛΟ		***167.788,00***	

Πίνακας ανάθεσης σύμβασης ανά προσφέροντα

Αριθμός Οικονομικού Φορέα	*Επωνυμία Οικονομικού Φορέα*	*Τιμή*
1.	*C&V Kriticos Suppliers Ltd*	*167.788,00*
	ΣΥΝΟΛΟ	*167.788,00*

Υπογραφές μελών Αρμοδίου Οργάνου Αξιολόγησης

ΟΝΟΜΑΤΕΠΩΝΥΜΟ	ΥΠΟΓΡΑΦΗ	ΗΜΕΡΟΜΗΝΙΑ
Αλέξανδρος Χαραλαμπίδης		21/11/2016
Θεόδωρος Ζαχαριάδης		21/11/16
Κώστας Κώστα		21/11/2016

Σημείωση:
Όλες οι σελίδες της έκθεσης αξιολόγησης, συμπεριλαμβανομένου των Παραρτημάτων, θα πρέπει να μονογραφηθούν από όλα τα μέλη της Επιτροπής Αξιολόγησης

Γ.2.1

ΚΑΤΑΛΟΓΟΣ ΠΑΡΑΡΤΗΜΑΤΩΝ

ΠΑΡΑΡΤΗΜΑ Α – Πρόσκληση σε συνάντηση Επιτροπής Αξιολόγησης

(να επισυναφθεί συμπληρωμένη η ακόλουθη επιστολή και το σχετικό αποδεικτικό αποστολής της στους εμπλεκόμενους φορείς)

Γ.2.1

18/11/2016.

Αρ. Τηλεομοιοτύπου: 22302433

Γενική Λογίστρια

Γενικό Λογιστήριο της Δημοκρατίας

Υπόψη: Ανδρία Γιαβρή

Λευκωσία

<u>Αξιολόγηση Διαγωνισμού αρ. ΕΤΠ(2)/015/2016-ΔΔ για Προμήθεια εργαστηριακού εξοπλισμού για τα Διδακτικά Εργαστήρια Χημικής Τεχνολογίας του Τμήματος Επιστήμης και Τεχνολογίας Περιβάλλοντος (ΕΤΕΠ)</u>

Επιθυμώ να σας πληροφορήσω ότι η Επιτροπή Αξιολόγησης του πιο πάνω διαγωνισμού θα πραγματοποιήσει συνάντηση στις 21/11/2016 μεταξύ των ωρών 12:00 - 13:00, για την αξιολόγηση της μιας προσφοράς που έχει υποβληθεί.

Σημειώνεται ότι ο προϋπολογισμός του αναφερόμενου διαγωνισμού ανέρχεται σε €168.000, μη συμπεριλαμβανομένου του ΦΠΑ.

Σε περίπτωση που επιθυμείτε να παρευρεθείτε στη συνάντηση του πιο πάνω θέματος, παρακαλώ όπως επικοινωνήσετε με τον Αλέξανδρο Χαραλαμπίδη, στο τηλέφωνο αρ. 25 002306 και αφού συμπληρώσετε το κάτω μέρος της παρούσας επιστολής να την αποστείλετε στο τηλεομοιότυπο αρ. 25002656.

Αλέξανδρος Χαραλαμπίδης

Συνιστώντης Επιτροπής Αξιολόγησης

Έχουμε λάβει γνώση του περιεχομένου της επιστολής και σας πληροφορούμε ότι ο/η ....

θα παρευρεθεί, εκ μέρους του ...., στις ../../20.. και ώρα ....:...

Κοιν.: Γενικό Ελεγκτή της Δημοκρατίας (αρ. τηλεομοιοτύπου: 22302071)

Εσωτερικό Ελεγκτή Τεχνολογικού Πανεπιστημίου Κύπρου (ηλεκτρονική διεύθυνση: akis.kleanthous@cut.ac.cy)

ΓΑ/ΑΜ

ΠΑΡΑΡΤΗΜΑ Β – Πρακτικά Συνάντησης Επιτροπής Αξιολόγησης

ΠΡΑΚΤΙΚΟ ΣΥΝΑΝΤΗΣΗΣ

Διαγωνισμός αρ. ΕΤΠ(2)/015/2016 για Προμήθεια εργαστηριακού εξοπλισμού για τα Διδακτικά Εργαστήρια του Τμήματος Επιστήμης και Τεχνολογίας Περιβάλλοντος (ΕΤΕΠ)

Στα πλαίσια αξιολόγησης του αναφερόμενου διαγωνισμού εγκρίθηκε από την Επιτροπή Προσφορών ad-hoc Επιτροπή Αξιολόγησης αποτελούμενης από τους:

1. Αλέξανδρος Χαραλαμπίδης, Δρ., Συντονιστής
2. Θεόδωρος Ζαχαριάδης, Δρ., Μέλος
3. Κώστας Κώστα, Δρ. Μέλος

Συνάντηση επιτροπής αξιολόγησης

Η Επιτροπή Αξιολόγησης καθόρισε την 21/11/2016 ως ημερομηνία συνεδρίας για την αξιολόγηση της υποβληθείσας προσφοράς. Στη συνεδρία εκτός από τα μέλη της Επιτροπής Αξιολόγησης προσκλήθηκαν και εκπρόσωποι του Γενικού Λογιστηρίου και της Ελεγκτικής Υπηρεσίας της Κυπριακής Δημοκρατίας καθώς και ο Εσωτερικός Ελεγκτής του ΤΕΠΑΚ.

Έλεγχος πληρότητας υποβληθείσας προσφοράς

Κατά τη συνάντηση καταγράφηκε η παραλαβή 1 προσφοράς από τον ακόλουθο οικονομικό φορέα:

Αριθμός Οικονομικού Φορέα	Επωνυμία Οικονομικού Φορέα	Ποσό σε Ευρώ (χωρίς ΦΠΑ). Συνολική τιμή
1.	C&V Kriticos Suppliers Ltd	*167.788,00*
	ΣΥΝΟΛΟ	*167.788,00*

Γ.2.1

Η Επιτροπή έλεγξε κατά πόσο η εταιρεία υπέβαλε τα απαιτούμενα έγγραφα πλήρως συμπληρωμένα και υπογραμμένα. Στη συνέχεια η επιτροπή αποφάσισε όπως προχωρήσει με την τεχνική και οικονομική αξιολόγηση της έγκυρης προσφοράς, συμπληρώνοντας παράλληλα τον πίνακα τεχνικών προδιαγραφών και τιμών.

Συμπεράσματα και εισήγηση

Η Επιτροπή Αξιολόγησης ομόφωνα εισηγείται προς την Επιτροπή Προσφορών την κατακύρωση του αναφερόμενου διαγωνισμού (ανά αντικείμενο) στην εταιρεία όπως φαίνεται στον πιο κάτω πίνακα για το αντίστοιχο ποσό, μη συμπεριλαμβανομένου του ΦΠΑ. Η εν λόγω εταιρεία υπέβαλε την προσφορά και πληροί τους όρους και προδιαγραφές του διαγωνισμού.

Τα παρόντα πρακτικά εγκρίθηκαν με λήξη της συνεδρίας και η Επιτροπή Αξιολόγησης προχώρησε με τη σύνταξη της σχετικής έκθεσης αξιολόγησης.

ΠΑΡΑΡΤΗΜΑ Γ – ΠΙΝΑΚΑΣ ΠΡΟΣΦΟΡΑΣ ΚΑΙ ΣΥΜΜΟΡΦΩΣΗΣ ΜΕ ΤΙΣ ΤΕΧΝΙΚΕΣ ΠΡΟΔΙΑΓΡΑΦΕΣ

1.1.1 1. Ζητούμενη υπηρεσία (1): Computer controlled gaseous mass transfer and diffusion coefficient unit

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
1.	**GENERAL SPECIFICATIONS**			
1.1.	Supply of a teaching computer controlled gaseous mass transfer and diffusion coefficient unit	YES	Supply of a teaching computer controlled gaseous mass transfer and diffusion coefficient unit (**QDTGC Unit**), with **SCADA** and **PID control.**	See Brochure Page: 1, Point: 1
1.2	Unit should allow students familiarize with the concepts of mass transfer theory – especially for the diffusion of a volatile liquid into an inert gas – enabling them to obtain experimental data and results which lead them to a proper practice understanding of the process.	YES	The QDTGC is a teaching unit that allows students to familiarise with the notions of mass transfer theory, specifically about the diffusion of a volatile liquid into an inert gas, obtaining experimental data and results which are very useful for a correct practice understanding of the process and, consequently, for the technical teaching of the students.	See Brochure Page: 2, Point: 2

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
1.3	*Experiments & Practical exercises using the system:* 1. *Fick's law application to calculate the diffusivity* 2. *Direct measurement of mass transfer rates* 3. *Determination of molar density transfer rate* 4 *Study of the effect of temperature on diffusion coefficients* 5. *Use of gas laws to calculate concentration differences in terms of partial pressures* 6. *Graphic representation of concentration profiles* 7. *Sensors calibration exercises*	YES	*Exercises and Practical possibilities to be done with the main items:* 1. Fick's law application to calculate the diffusivity 2. Direct measurement of mass transfer rates 3. Determination of molar density transfer rate 4. Study of the effect of temperature on diffusion coefficients 5. Use of gas laws to calculate concentration differences in terms of partial pressures 6. Graphic representation of concentration profiles *Additional practical possibilities:* 7. Sensors calibration	*See Brochure* *Page: 5, Point: 3*
1.4	*The unit should include the following as part of the configuration of the complete system:* • *Gaseous mass transfer and diffusion coefficient unit* • *Advanced Real-time SCADA and PID control*	YES	*The main items provided in our offer that enable normal and full operation of the complete system are the following:* 1. QDTGC Unit – Gaseous Mass Transfer and Diffusion Coefficient Unit 2. QDTGC/CIB – Control Interface Box 3. DAB – Data Acquisition Box 4. QDTGC/CCSOF – PID Computer Control & Data Acquisition & Data Management Software 5. Cables and Accessories (for normal operation) 6. Manuals (complete description of manuals provided is outlined in Point 1.12)	*See Brochure* *Page: 4, Point: 4*
1.5	*Projector and/or electronic whiteboard compatibility which would allow the unit to be explained and demonstrated (simultaneous visual demonstration of results and*	YES	*Projector and/or electronic whiteboard compatibility that allows the unit to be explained and demonstrated to an entire class at one time.* *The unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit,*	*See Brochure* *Page: 3, Point: 5* *See Brochure*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	manipulation of the unit) to an entire class at one time during the process.		curing the process, by using a projector or an electronic whiteboard.	Page: 4, Point: 6
1.6	The system should be capable of doing applied research, real industrial simulation, training courses, etc.	YES	The unit is capable of doing applied research, real industrial simulation, training courses, etc.	See Brochure Page: 3, Point: 7
1.7	Remote operation and control by the user and remote control for technical support by the manufacturer.	YES	Remote operation and control by the user and remote control for EDIBON technical support, are always included.	See Brochure Page: 3, Point: 8
1.8	Unit should be totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic& Software).	YES	Totally safe utilizing four (4) safety systems i.e. Mechanical, Electrical, Electronic and Software	See Brochure Page: 3, Point: 9
1.9	Unit should be designed and manufactured under several quality standards; certificates should be provided with the submission of the tender	YES	Unit is designed and manufactured under several quality standards. Please see the literature attached for the certificates of each unit.	See Brochure & Certificates Pages: 3 & 105-116, Point: 10
1.10	Unit should be designed for future expansion and integration. The available options should also be stated.	YES	This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.	See Brochure Page: 3 Point: 11
1.11	Cables and accessories for the operation of the full set-up should also be supplied	YES	Cables and accessories for the normal and full operation of the full set-up unit i.e. for the parts outlined in Point 1.4	See Brochure Page: 4 Points: 4 & 12
1.12	Manuals that should be submitted along with	YES	The unit is supplied with eight (8) manuals: 1. Required Services	See Brochure

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	the system: • *Required services* • *Assembly and installation* • *Interface and control software* • *Starting-up* • *Safety* • *Maintenance* • *Calibration* • *Exercises and Practical Possibilities*		2. Assembly and Installation 3. Interface and Control Software 4. Starting-up 5. Safety 6. Maintenance 7. Calibration 8. Practices	*Page: 4* *Point: 13*
1.13	*Installation and Training of the system should be performed by Scientific personnel from the manufacturer to a team of ... people and the following should be covered in the training:* • *Theory/Scientific background – Technology used* • *Training on proper operation and capabilities of the system* • *Applications of the system* • *Everyday maintenance of the system*	*YES*	*Installation and Training of the system will be performed by Scientific personnel from EDIBON and C & V Kriticos Suppliers Ltd (Chemist/Sales & Engineer) to a team of ... people and the following aspects will be covered in the training:* 1. Theory/Scientific background – Technology used 2. Training on proper operation and capabilities of the system 3. Applications of the system 4. Everyday maintenance of the system	
1.14	*Warranty Period*	*5 Years*	*Warranty Period: 5 Years*	*See Warranty Certificate* *Page: 104*
	UNIT PARTS & SPECIFICATIONS			
2.1	*The unit should be bench-top*	*YES*	*QDTGC Unit is bench-top*	*See Brochure* *Page: 3* *Point: 14*
2.2	*Anodized aluminium structure and panels in painted steel; main metallic elements in*	*YES*	*Anodized aluminium structure and panels in painted steel.* *Main metallic elements in stainless steel.*	*See Brochure* *Page: 3*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	stainless steel			Point: 15
2.3	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit is shown.	See Brochure Page: 3 Point: 16
2.4	A narrow vertical glass capillary tube with a known inside diameter should be included in the unit	YES	A precision glass capillary tube (a narrow vertical tube with a known inside diameter).	See Brochure Page: 3 Point: 17
2.5	Air pump with computer controlled air regulation	Range: 1-7 L/min	Air pump with air regulation, computer controlled. Range: 1-7 L/min	See Brochure Page: 3 Point: 18
2.6	Travelling optic system with accurate focus adjustment and mounted for vertical axis movement. Distance measurement by displacement sensor	YES	Travelling optic system with accurate focus adjustment and mounted for vertical axis movement. Distance measurement by displacement sensor.	See Brochure Page: 3 Point: 19
2.7	Thermostatically controlled water transparent-sided bath with a capacity of around 35 L	35 L	Thermostatically controlled water transparent-sided bath. Capacity: 36 L	See Brochure Page: 3 Point: 20
2.8	Computer controlled heating resistance i.e. 500 W	YES	Heating resistance (500 W), computer controlled.	See Brochure Page: 3 Point: 21
2.9	Two (2) temperature sensors; level switch	YES	Two (2) temperature sensors; level switch.	See Brochure Page: 3 Point: 22

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	COMPUTER CONTROL & SOFTWARE			
3.1	*Advanced Real-Time SCADA and PID Control: This should include Control Interface Box, Data Acquisition Board and Software*	YES	*Advanced Real-Time SCADA and PID control; this includes:* 1. Control Interface Box 2. Data Acquisition Board 3. Software for: a. Computer control b. Data acquisition c. Data management	*See Brochure* *Pages: 1 & 3* *Points: 23 & 24*
3.2	*Control Interface Box Specifications:* • *Process diagram should be shown in the front panel* • *Unit control elements should be permanently computer controlled* • *Modes of control: open-, multi- and real-time control* • *Capability of simultaneous visualisation of all parameters involved in the process in the computer* • *Ability to calibrate all sensors involved in the process* • *Real-time curves representation about system responses* • *Shield and filtered signals to avoid external interferences* • *All the actuators' values should have the ability to be changed at any time from the keyboard, allowing this way the analysis about curves and responses of the whole process* • *Real-time PID control for parameters involved in the process simultaneously and flexibility of modifications of the PID parameters from the computer keyboard at any moment during the process*	YES	*Control Interface Box Specifications:* 1. Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student. 2. All sensors, with their respective signals, are properly manipulated from -10 V to +10 V computer output. 3. Sensors connectors in the interface have different pines numbers (from 2 to 16) to avoid connection errors. 4. Single cable between the control interface box and computer. 5. The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure. 6. Open Control & Multicontrol & Real-Time control. 7. Simultaneous visualization in the computer of all parameters involved in the process. 8. Calibration o all sensors involved in the process. 9. Real time curves representation about system responses. 10. Shield and filtered signals to avoid external interferences. 11. All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process. 12. Real time PID control for parameters involved in the process simultaneously. 13. Real time PID control and flexibility of modifications from the	*See Brochure* *Page: 3* *Points: 25-40*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• *Control: proportional, integral and derivative, by changing the values of the three control constants; based on the real PID mathematical formula* • *Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously*		computer keyboard of the PID parameters, at any moment during the process. 14. Real time PID and on/off control for pumps, compressors, resistances, control valves, etc. 15. Proportional control, integral control and derivative control, based on the real PID mathematical formula, by changing the values, at any time, of the three control constants (proportional, integral and derivative constants). 16. Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously. 17. All the actuators and sensors values and their responses are displayed on only one screen in the computer; possibility of automatization of the actuators involved in the process.	
3.3	*PCI Data Acquisition Board (National Instruments) Specifications:* • *To be placed in a computer slot* • *Analog Input: 16 single-ended or 8 differential channels; 16 bits resolution, 1 in 65536; sampling rate up to 250 KS/s (Kilo samples per second)* • *Analog Output: 2 channels; 16 bits resolution, 1 in 65536* • *Digital Input/Output: 24 inputs/outputs channels*	*YES*	*PCI Data Acquisition Board (National Instruments) specifications:* 1. To be placed in a computer slot. 2. Analog Input: a. Number of channels = 16 single-ended or 8 differential. b. Resolution = 16 bits, 1 in 65536 c. Sampling rate up to: 250 KS/s (kilo samples per second) d. Input range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O. DMA channels = 6 3. Analog Output: a. Number of channels = 2 b. Resolution = 16 bits, 1 in 65536 c. Maximum output rate up to: 833 KS/s d. Output range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O 4. Digital Input/Output:	*See Brochure* *Page: 4* *Point: 41*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
			a. Number of channels = 24 inputs/outputs b. DO or DI Sample Clock frequency: 0 to 1 MHz 5. Timing: a. Number of Counter/timers = 2 b. Resolution: Counter/timers: 32 bits	
3.4	PC	YES	*The minimum characteristics for the desktop computer that Edibon recommends for their systems are:* *- Intel Core i5 processor.* *- 4 GB RAM.* *- 500 GB HD.* *- DVD±RW* *- Ethernet Card* *- Minimum 17" Screen.* *- O.S. Windows (min. Windows 7 32bits).* *- Slot PCIe express available.* ***HP280 G2 Microtower PC & 200V4LAB Philips LCD screen***	*See Brochures* *Pages: 97-103*
3.5	*Software(s) Specifications:* • *Software(s) delivered with the system should be able to provide computer control, data acquisition and data management of the system (based on Labview)* • *Should be compatible with the industry standards* • *Software should be flexible and multicontrol, developed with actual windows graphic systems, acting simultaneously on all process parameters* • *Software should be open, allowing the teacher to modify texts and instructions*	YES	*The three (3) softwares outlined in Point 3.1 have the following specifications:* 1. Specialized EDIBON control software based on Labview 2. Software derived with the system can provide PID computer control, data acquisition and data management. 3. Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible	*See Brochure* *Page: 3* *Point: 42* *See Brochure* *Page: 4* *Point: 43* *See Brochure*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• *Passwords for teachers and students in order to ease teachers' control on the students and allow the access to different work levels* • *Analog and digital PID control; PID menu and set point selection required in the whole work range* • *Should be able to perform management, processing, comparison and storage of data* • *Sampling velocity up to 250 KS/s (Kilo samples per second)* • *Should allow the registration of the alarms state and the graphic representation in real time* • *The software should have the ability to perform Calibration exercises in order to teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.*		with the industry standards. 4. Registration and visualization of all process variables in an automatic and simultaneous way. 5. Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters. 6. Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels. 7. Analog and digital PID control. 8. PID menu and set point selection required in the whole work range. 9. Management, processing, comparison and storage of data. 10. Sampling velocity up to 250 KS/s 11. It allows the registration of the alarms state and the graphic representation in real time. 12. Comparative analysis of the obtained data, after the process and modification of the conditions during the process. 13. Calibration system for the sensors involved in the process. Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.	*Page: 4* *Point: 44* *See Brochure* *Page: 1* *Point: 45*

2. Ζητούμενη υπηρεσία (2): Computer controlled fixed bed absorption unit

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	GENERAL SPECIFICATIONS			
1.15	Supply of a teaching computer controlled fixed bed adsorption unit	YES	Supply of a teaching computer controlled Fixed Bed Adsorption unit (**QALFC unit**), with **SCADA** and **PID control.**	See Brochure Page: 15 Point: 1
1.16	Unit should allow students familiarize with the concepts of the gas adsorption phenomenon using a fixed adsorption column. The overall objective of the unit should be the analysis of the behaviour of the adsorption breakthrough and desorption elution curves associated with the separation of CO_2 from Helium using activated carbon.	YES	The Computer Controlled Fixed Bed Adsorption Unit "QALFC" is designed to demonstrate the gas adsorption phenomenon using a fixed adsorption column. The overall objective of this unit is to analyse the behaviour of the adsorption breakthrough and desorption elution curves associated with the separation of CO_2 from Helium using activated carbon. The equilibrium adsorption capacity of this activated carbon will be determined from this analysis and used to model the experimental breakthrough and elution curves.	See Brochure Page: 16 Point: 2
1.17	Experiments & Practical exercises using the system: 8. Study of the Solute Movement Theory model described by the adsorption-desorption process 9. Study of adsorption/desorption processes under different operational conditions such as temperature, pressure, flow rate and molar fraction 10. Study of the breakthrough curves of CO_2	YES	Exercises and Practical Possibilities to be done with main items: 1. Study of the Solute Movement Theory model described by the adsorption-desorption process. 2. Study of adsorption/desorption processes under different operational conditions such as temperature, pressure, flow rate and molar fraction. 3. Study of the breakthrough curves of CO_2 and the temperature profiles during the adsorption/desorption processes.	See Brochure Page: 19 Point: 3

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	and the temperature profiles during the adsorption/desorption processes 11. Study of the quasi-isothermal regime at low concentrations and pressures; study the effect of these variables 12. Familiarization with the formation of the compressive and dispersive fronts in adsorption processes 13. Sensors calibration exercises 14. Obtaining of the adsorption equilibrium isotherm of CO_2 from them desorption curve		4. Study of the quasi-isothermal regime at low concentrations and pressures. Study of the effect of these variables. 5. Familiarization with the formation of the compressive and dispersive fronts in adsorption processes. *Additional practical possibilities:* 6. Sensors calibration. 7. Obtaining of the adsorption equilibrium isotherm of CO_2 from the desorption curve.	
1.18	*The unit should include the following as part of the configuration of the complete system:* • *Fix bed adsorption unit* • *Advanced Real-time SCADA and PID control*	YES	*The main items provided in our offer that enable normal and full operation of the complete system are the following:* 1. QALFC Unit – Fixed Bed Adsorption Unit 2. QALFC/CIB – Control Interface Box 3. DAB – Data Acquisition Box 4. QALFC/CCSOF – PID Computer Control & Data Acquisition & Data Management Software 5. Cables and Accessories (for normal operation) 6. Manuals (complete description of manuals provided is outlined in Point 1.26)	*See Brochure* *Page: 18* *Point: 4*
1.19	*Projector and/or electronic whiteboard compatibility which would allow the unit to be explained and demonstrated (simultaneous visual demonstration of results and manipulation of the unit) to an entire class at one time during the process.*	YES	*Projector and/or electronic whiteboard compatibility that allows the unit to be explained and demonstrated to an entire class at one time.* *The unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.*	*See Brochure* *Page: 17* *Point: 5* *See Brochure* *Page: 18* *Point: 6*
1.20	*The system should be capable of doing*	YES	*The unit is capable of doing applied research, real industrial simulation, training courses, etc.*	*See Brochure* *Page: 17*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	applied research, real industrial simulation, training courses, etc.			Point: 7
1.21	Remote operation and control by the user and remote control for technical support by the manufacturer.	YES	Remote operation and control by the user and remote control for EDIBON technical support, are always included.	See Brochure Page: 17 Point: 8
1.22	Unit should be totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic& Software).	YES	Totally safe utilizing four (4) safety systems i.e. Mechanical, Electrical, Electronic and Software	See Brochure Page: 17 Point: 9
1.23	Unit should be designed and manufactured under several quality standards; certificates should be provided with the submission of the tender	YES	Unit is designed and manufactured under several quality standards. Please see the literature attached for the certificates of each unit.	See Brochure & Certificates Pages: 17 & 105-116, Point: 10
1.24	The unit should be designed for future expansion and integration. The available options should also be stated.	YES	This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.	See Brochure Page: 17 Point: 11
1.25	Cables and accessories for the operation of the full set-up should also be supplied	YES	Cables and accessories for the normal and full operation of the full set-up unit i.e. for the parts outlined in Point 1.18	See Brochure Page: 18 Points: 4 & 12
1.26	Manuals that should be submitted along with the system: • Required services • Assembly and installation • Interface and control software • Starting-up	YES	The unit is supplied with eight (8) manuals: 1. Required Services 2. Assembly and Installation 3. Interface and Control Software 4. Starting-up 5. Safety	See Brochure Page: 18 Point: 13

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	• Safety • Maintenance • Calibration • Exercises and Practical Possibilities		6. Maintenance 7. Calibration 8. Practices	
1.27	Installation and Training of the system should be performed by Scientific personnel from the manufacturer to a team of … people and the following should be covered in the training: • Theory/Scientific background – Technology used • Training on proper operation and capabilities of the system • Applications of the system • Everyday maintenance of the system	YES	Installation and Training of the system will be performed by Scientific personnel from EDIBON and C & V Kritikos Suppliers Ltd (Chemist/Sales & Engineer) to a team of … people and the following aspects will be covered in the training: 1. Theory/Scientific background – Technology used 2. Training on proper operation and capabilities of the system 3. Applications of the system 4. Everyday maintenance of the system	
1.28	Warranty Period	5 Years	Warranty Period: 5 Years	See Warranty Certificate Page: 104
	UNIT PARTS & SPECIFICATIONS			
2.10	The unit should be bench-top	YES	QALFC Unit is bench-top	See Brochure Page: 17 Point: 14
2.11	Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel	YES	Anodized aluminium structure and panels in painted steel. Main metallic elements in stainless steel.	See Brochure Page: 17. Pt: 15
2.12	A diagram of the key elements of the unit should be shown in the front panel of the	YES	Diagram in the front panel with similar distribution to the elements in the real unit is shown.	See Brochure Page: 17. Pt: 16

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	system			
2.13	The unit should have two pressure regulators – one for Helium and another for CO_2 inlet – and the two (2) gases are fed from compressed gas cylinders (gas cylinders are not in the configuration of the system)	YES	The unit consists of two (2) pressure regulators, one for the Helium inlet and the other for the CO_2 inlet. The two gases (CO_2 and Helium) are fed from compressed gas cylinders (gas cylinders are not supplied with the unit).	See Brochure Page: 17 Point: 17
2.14	The fixed bed adsorption column should be made out of stainless steel and must have the following dimensions. Height: 300-350 mm Diameter: 70-100 mm	YES	Fixed bed adsorption column specifications: ✓ Height: 310 mm ✓ Diameter: 80 mm ✓ Material: Stainless Steel	See Brochure Page: 17 Point: 18
2.15	The fixed bed adsorption column includes the following: 1. Bed of glass beads for gas distribution 2. Gas distribution plate at the column inlet 3. Activated carbon – for adsorption/desorption process 4. Jacket – to maintain a certain temperature in the column (with the hot water circulation system) 5. Six (6) temperature sensors "J" type located along the inner side of the column	YES	The fixed bed adsorption column includes: 1. A bed of glass beads for gas distribution 2. A gas distribution plate at the column inlet 3. Activated carbon to study the adsorption/desorption process 4. Jacket to maintain a certain temperature in the column (with the hot water circulation system) 5. Six (6) temperature sensors, "J" type located along the inner side of the column. Length of temperature sensors: 280, 240, 190, 150, 100 and 60 mm.	See Brochure Page: 17 Point: 19
2.16	Calibration using a column bypass or any other method should be included in the features of the system. If a column bypass	YES	A column bypass is included for system calibration purposes. It includes two 3-way directional valves which divert the gas stream between the fixed bed adsorption column and the	See Brochure Page: 17 Point: 20

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	method is used, then two 3-way directional valves which divert the gas stream between the fixed bed adsorption column and the bypass should be used, otherwise if another method is used, then the technology should be stated		*bypass.*	
2.17	*The hot water circulation system should include the following:* *1. Computer controlled water pump* *2. Thermostatic bath with computer controlled heating element and "J" type temperature sensor located in the bath; the sensor works with the PID controller on heating element to maintain the desired temperature inside the column* *3. Flexible tubing to connect pump to column's jacket to the thermostatic bath* *4 Maximum working temperature 45 ° C*	*YES*	*A hot water circulation system including:* 1. Computer controlled water pump 2. Thermostatic bath with computer controlled heating element – Maximum working temperature: 45 °C 3. "J" type temperature sensor located in the thermostatic bath. This temperature sensor works with the PID controller on heating element to maintain the desired temperature inside the column. 4. Flexible tubing to connect the pump to the column's jacket and the column's jacket to the thermostatic bath.	*See Brochure* *Page: 17* *Point: 21*
2.18	*System should have at least three (3) flow sensors:* *1. First flow sensor located at the CO_2 line inlet* *Range: 0-1 L/min* *2. Second flow sensor located at the He line inlet* *Range: 0-5 L/min* *3. Third flow sensor located at the CO_2 infrared sensor inlet – Measures the CO_2 concentration at the column outlet and the column bypass*	*YES*	*Three (3) flow sensors:* 1. A flow sensor (located at the CO_2 line inlet) Range: 0-1 L/min 2. A flow sensor (located at the Helium line inlet) Range: 0-5 L/min 3. A flow sensor (located at the CO_2 infrared sensor inlet) Range: 0-1 L/min *The CO_2 infrared sensor measures the CO_2 concentration at the column outlet and the column bypass, range 0-10 %*	*See Brochure* *Page: 17* *Point: 22*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάτηση	Απάντηση - Προσφορά	Παραπομπή
	Range: 0-1 L/min			
2.19	System should have a pressure sensor that shows the circuit pressure and a range from 0-2 bar	YES	Pressure sensor showing the circuit pressure Range: 0-2 bar	See Brochure Page: 17 Point: 23
2.20	System should have at least four (4) regulation valves: 1. Two (2) valves for regulating the CO_2 and He inlet flow 2. One (1) valve at the column and bypass outlet for controlling the pressure in the circuit 3. One (1) valve regulating the gas flow in the CO_2 sensor and discharging part of the gas stream to the atmosphere before entering the CO_2 sensor	YES	Four (4) regulation valves: Two (2) valves regulate the CO_2 and Helium inlet flow. A valve at the column and bypass outlet is used to control the pressure in the circuit. A valve to regulate the gas flow in the CO_2 sensor and to discharge part of the gas stream to the atmosphere before entering the CO_2 sensor.	See Brochure Page: 17 Point: 24
2.21	System should have at least three (3) fixed flow control valves: 1. Two (2) valves limiting the CO_2 and He inlet flow 2. One (1) valve limiting the gas stream at the inlet of the CO_2 sensor	YES	Three (3) fixed flow control valves: Two valves limit the CO_2 and Helium inlet flow. One valve limits the gas stream at the inlet of the CO_2 sensor.	See Brochure Page: 17 Point: 25
2.22	Unit should be protected against overpressure (> 1.3 bars) with a safety valve. All electrical circuits should be protected by the appropriate safety elements	YES	The QALFC unit is protected against overpressure (pressure higher than 1.3 bars) with a safety valve. All electrical circuits are protected by the appropriate safety elements.	See Brochure Page: 17 Point: 26
	COMPUTER CONTROL & SOFTWARE			
3.6	PC supply	YES	The minimum characteristics for the desktop computer that	See Brochures

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
			Edibon recommends for their systems are: *- Intel Core i5 processor.* *- 4 GB RAM.* *- 500 GB HD.* *- DVD±RW* *- Ethernet Card* *- Minimum 17" Screen.* *- O.S. Windows (min. Windows 7 32bits).* *- Slot PCIe express available.* ***HP280 G2 Microtower PC & 200V4LAB Philips LCD screen***	*Pages: 97-103*
3.7	*Advanced Real-Time SCADA and PID Control: This should include Control Interface Box, Data Acquisition Board and Software*	*YES*	*Advanced Real-Time SCADA and PID control, this includes:* 1. Control Interface Box 2. Data Acquisition Board 3. Software for: a. Computer control b. Data acquisition c. Data management	*See Brochure* *Pages: 15 & 17* *Points: 27 & 28*
3.8	*Control Interface Box Specifications:* • *Process diagram should be shown in the front panel* • *Unit control elements should be permanently computer controlled* • *Modes of control: open-, multi- and real-time control* • *Capability of simultaneous visualisation of all parameters involved in the process in the computer* • *Ability to calibrate all sensors involved in the process*	*YES*	*Control Interface Box Specifications:* 1. Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student. 2. All sensors, with their respective signals, are properly manipulated from -10 V to +10 V computer output. 3. Sensors connectors in the interface have different pines numbers (from 2 to 16) to avoid connection errors. Single cable between the control interface box and computer. 4. The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure. Simultaneous visualization	*See Brochure* *Page: 18* *Point: 29-37*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	• *Real-time curves representation about system responses* • *Shield and filtered signals to avoid external interferences* • *All the actuators' values should have the ability to be changed at any time from the keyboard, allowing this way the analysis about curves and responses of the whole process* • *Real-time PID control for parameters involved in the process simultaneously and flexibility of modifications of the PID parameters from the computer keyboard at any moment during the process* • *Control: proportional, integral and derivative, by changing the values of the three control constants, based on the real PID mathematical formula* • *Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously*		in the computer of all parameters involved in the process. Calibration o all sensors involved in the process. 5. Open Control & Multicontrol & Real-Time control. 6. Real time curves representation about system responses. Storage of all the process data and results in a file. Graphic representation, in real time, of all the process/system responses. 7. All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process. All the actuators and sensors values and their responses are displayed on only one screen in the computer. 8. Shield and filtered signals to avoid external interferences. 9. Real time PID control and flexibility of modifications from the computer keyboard of the PID parameters, at any moment during the process. Real time PID and on/off control for pumps, compressors, resistances, control valves, etc. Real time PID control for parameters involved in the process simultaneously. Proportional control, integral control and derivative control, based on the real PID mathematical formula, by changing the values, at any time, of the three control constants (proportional, integral and derivative constants). 10. Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously. 11. Possibility of automatization of the actuators involved in the process.	
3.9	*PCI Data Acquisition Board (National Instruments) Specifications:* • *To be placed in a computer slot* • *Analog Input: 16 single-ended or 8 differential channels; 16 bits resolution, 1 in 65536; sampling rate up to 250 KS/s*	*YES*	*PCI Data Acquisition Board (National Instruments) specifications:* 1. To be placed in a computer slot. 2. Analog Input: a. Number of channels = 16 single-ended or 8	*See Brochure* *Page: 18* *Point: 38*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	(Kilo samples per second) • *Analog Output: 2 channels; 16 bits resolution, 1 in 65536* • *Digital Input/Output: 24 inputs/outputs channels*		differential. b. Resolution = 16 bits, 1 in 65536 c. Sampling rate up to: 250 KS/s (kilo samples per second) d. Input range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O. DMA channels = 6 3. Analog Output: a. Number of channels = 2 b. Resolution = 16 bits, 1 in 65536 c. Maximum output rate up to: 900 KS/s d. Output range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O 4. Digital Input/Output: a. Number of channels = 24 inputs/outputs b. DO or DI Sample Clock frequency: 0 to 100 MHz 5. Timing: a. Number of Counter/timers = 4 b. Resolution: Counter/timers: 32 bits	
3.10	*Software(s) Specifications:* • *Software(s) delivered with the system should be able to provide computer control, data acquisition and data management of the system (based on Labview)* • *Should be compatible with the industry standards* • *Software should be flexible and multicontrol, developed with actual windows graphic systems, acting simultaneously on all process parameters* • *Software should be open, allowing the teacher to modify texts and instructions.*	*YES*	*The three (3) softwares outlined in Point 3.7 have the following specifications:* 1. Specialized EDIBON control software based on Labview 2. Software derived with the system can provide PID computer control, data acquisition and data management. 3. Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards.	*See Brochure* *Page: 15* *Point: 39* *See Brochure* *Page: 18, Pt: 40* *See Brochure* *Page: 18* *Point: 41*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	• *Passwords for teachers and students in order to ease teachers' control on the students and allow the access to different work levels* • *Analog and digital PID control: PID menu and set point selection required in the whole work range* • *Should be able to perform management, processing, comparison and storage of data* • *Sampling velocity up to 250 KS/s (Kilo samples per second)* • *Should allow the registration of the alarms state and the graphic representation in real time* • *The software should have the ability to perform Calibration exercises in order to teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.*		4. Registration and visualization of all process variables in an automatic and simultaneous way. 5. Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters. 6. Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels. 7. Analog and digital PID control. PID menu and set point selection required in the whole work range. 8. Management, processing, comparison and storage of data. 9. Sampling velocity up to 250 KS/s 10. It allows the registration of the alarms state and the graphic representation in real time. 11. Comparative analysis of the obtained data, after the process and modification of the conditions during the process. 12. Calibration system for the sensors involved in the process. Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements. .	*See Brochure* *Page: 18* *Point: 42* *See Brochure* *Page: 15* *Point: 43*

3. Ζητούμενη υπηρεσία (3): Computer controlled chemical reactors

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
1.	**GENERAL SPECIFICATIONS**			
1.28	Supply of a teaching computer controlled unit that can work with one or several reactors	YES	Supply of a teaching computer controlled service unit (**QUSC**) that can work with one or several reactors.	See Brochure Page: 28, Pt: 1
1.29	The unit should supply all the services for the operation of each reactor	YES	The unit supplies all the services for the operation of each reactor.	See Brochure Page: 28, Pt: 2
1.30	Accommodation and exchange system of the reactors should be quick and easy to handle	YES	Accommodation and exchange system of the reactors is quick and easy to handle.	See Brochure Page: 28, Pt: 3
1.31	Quick connectors with shutoff valve that enable an easy coupling of the basic unit to the chosen reactor	YES	Quick connectors with shutoff valve that enable an easy coupling of the Service Unit to the chosen reactor.	See Brochure Page: 28, Pt: 4
1.32	Cables and accessories for the operation of the full set-up should also be supplied	YES	Cables and accessories for normal operation are supplied along with the unit. Depending on the choice of the reactor you want to install to the basic unit different connections are used and are supplied with each reactor separately.	See Brochure Page: 45, Pt: 5
1.33	All the elements of the basic unit and each reactor should be chemically resistant	YES	All elements of this unit are chemically resistant.	See Brochure Page: 28, Pt: 6
1.34	Manuals that should be submitted along with the basic unit and each reactor: • Required services • Assembly and installation	YES	The service unit and each reactor is supplied with eight (8) manuals: 1. Required Services 2. Assembly and Installation 3. Interface and Control Software	See Brochure Pages: 29, 31, 32, 34 Points: 7-10

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• Interface and control software • Starting-up • Safety • Maintenance • Calibration • Exercises and Practical Possibilities		4. Starting-up 5. Safety 6. Maintenance 7. Calibration 8. Practices	
1.35	Unit should be designed and manufactured under several quality standards; certificates should be provided with the submission of the tender	YES	Unit is designed and manufactured under several quality standards. Please see the literature attached for the certificates of each unit.	See Certificates Pages: 26 & 105-116, Point: 11
1.36	Installation and Training of the system should be performed by Scientific personnel from the manufacturer to a team of … people and the following should be covered in the training: • Theory/Scientific background – Technology used • Training on proper operation and capabilities of the system • Applications of the system • Everyday maintenance of the system	YES	Installation and Training of the system will be performed by Scientific personnel from EDIBON and C & V Kritikos Suppliers Ltd (Chemist/Sales & Engineer) to a team of … people and the following aspects will be covered in the training: 1. Theory/Scientific background – Technology used 2. Training on proper operation and capabilities of the system 3. Applications of the system 4. Everyday maintenance of the system	
1.37	Warranty Period	5 Years	Warranty Period: 5 Years	See Warranty Certificate Page: 104
2.	**PARTS OF BASIC UNIT & SPECIFICATIONS**			
2.23	Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel	YES	Anodized aluminium structure and panels in painted steel. Main metallic elements in stainless steel.	See Brochure Page: 28, Pt: 12

Γ.2.1

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
2.24	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit is shown.	See Brochure Page: 28, Pt: 13
2.25	The unit should accommodate two (2) computer controlled peristaltic dosing pumps, with variable speed and flow rate up to at least 3 l/h	YES	The unit accommodates two (2) peristaltic dosing pumps with variable speed, computer controlled. Flow rate up to 3 l/h (unit standard disposition).	See Brochure Page: 28, Pt: 14
2.26	Computer controlled and temperature PID control of thermostatic bath	Minimum capacity 6 L	Thermostatic bath of 6 L capacity, computer controlled. Temperature PID control of the thermostatic bath.	See Brochure Page: 28, Pt: 15
2.27	Pump to impel the thermostatization water from the bath to the reactor. Specifications: • 3 L/min pump • Flow sensor range: 0.25-6.5 l/min	YES	Pump of 3 l/min to impel the thermostatization water from the bath to the reactor. Flow sensor range: 0.25-6.5 l/min	See Brochure Page: 28, Pt: 16
2.28	Two (2) tanks for the reagents of 1 L capacity each made of Pyrex glass	YES	Two (2) tanks for the reagents of 1 L capacity each one, made of Pyrex glass	See Brochure Page: 28, Pt: 17
2.29	The control of the reaction should be carried out by a conductivity sensor which would allow the reaction evolution parameterization in real time.	YES	The control of the reaction is carried out by a conductivity sensor, which allows the reaction evolution parameterization in real time.	See Brochure Page: 28, Pt: 18
2.30	Three (3) "J" type temperature sensors: One (Sensor 1) to know the thermostatic bath temperature in a continuous way Two (Sensors 2 & 3) to know the water	YES	Three (3) "J" type temperature sensors: One to know the thermostatic bath temperature in a continuous way and two sensors to know the water temperature of the thermostatic bath water inlet and outlet.	See Brochure Page: 28, Pt: 19

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	temperature of the thermostatic bath water inlet and outlet			
3.	***PARTS, SPECIFICATIONS & POSSIBLE EXERCISES OF CONTINUOUS STIRRED TANK REACTOR***			
3.11	*Small scale computer controlled continuous stirred tank reactor designed to demonstrate to students the behaviour of a reactor used for homogeneous reactions liquid-liquid*	*YES*	*Small scale continuous stirred tank reactor (**QRCAC**), computer controlled, designed to demonstrate the behavior of a reactor used for homogeneous reactions liquid-liquid.*	*See Brochure Page: 29, Pt: 20*
3.12	*Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel*	*YES*	*Anodized aluminum structure and panel of painted steel. Main metallic elements in stainless steel.*	*See Brochure Page: 29, Pt: 21*
3.13	*A diagram of the key elements of the unit should be shown in the front panel of the system*	*YES*	*Diagram in the front panel with similar distribution to the elements in the real unit.*	*See Brochure Page: 29, Pt: 22*
3.14	*Reactor's body made of borosilicate glass with maximum capacity of 2 L, specially designed to work in continuous.*	*YES*	*Reactor body made of borosilicate glass, with a maximum capacity of 2 l, specially designed to work in continuous. It also allows batch operation.*	*See Brochure Page: 29, Pt: 23*
3.15	*Adjustable volume from 0.4-1.5 L*	*YES*	*Adjustable volume from 0.4 to 1.5 l*	*See Brochure Page: 29, Pt: 24*
3.16	*Stainless steel heat transfer coil (5 loops of 60 mm diameter) and a (removable) baffle*	*YES*	*Stainless steel heat transfer coil (5 loops of 60 mm of diameter) and a baffle (removable).*	*See Brochure Page: 29, Pt: 25*
3.17	*Computer controlled stirring system with speed control and indication; Stirring range: 0-220 rpm*	*YES*	*Stirring system with speed control and indication, computer controlled. Stirrer range: 0-220 rpm*	*See Brochure Page: 29, Pt: 26*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
3.18	Reactor lip with connectors for the appropriate sensors	YES	Reactor lip with connectors for the appropriate sensors.	See Brochure Page: 29, Pt: 27
3.19	Temperature sensor "J" type to control the temperature into the reactor	YES	Temperature sensor "J" type to control the temperature into the reactor.	See Brochure Page: 29, Pt: 28
3.20	Conductivity cell to control the reaction; Measurement range up to 20 mS	YES	Conductivity cell to control the reaction. Measurement range up to 20 mS.	See Brochure Page: 29, Pt: 29

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
3.21	*Experiments & Practical exercises using the Continuous stirred tank reactor:* *1. Determination of ionic conductivities* *2. Batch operations* *a. Obtaining of the reaction order respect to ethyl-acetate; initial velocity method* *b. Obtaining of the reaction order respect to sodium hydroxide; initial velocity method* *c. Velocity constant computation; constant sodium hydroxide initial concentration* *d. Velocity constant computation; constant ethyl-acetate initial concentration* *e. Variation of the kinetic constant with temperature; Arrhenius equation* *f. Theoretical and experimental conversion comparative; deviation from ideality* *g. Mixture effects* *3. Velocity equation formulation* *4. Continuous operation* *5. Continuous operation with mixture effects* *6. Conductivity measurement system: conductimeter* *7. Variation of conversion with residence time* *8. Residence time distribution* *9. Determination of the reaction rate constant* *10. Sensors calibration exercises*	*YES*	*Exercises and Practical Possibilities with the Continuous Stirred Tank Reactor (QRCAC):* 1. Determination of ionic conductivities 2. Batch operations: a. Obtaining of the reaction order respect to ethyl-acetate; initial velocity method b. Obtaining of the reaction order respect to sodium hydroxide; initial velocity method c. Velocity constant computation; constant sodium hydroxide initial concentration d. Velocity constant computation; constant ethyl-acetate initial concentration e. Variation of the kinetic constant with temperature; Arrhenius equation f. Theoretical and experimental conversion comparative; deviation from ideality g. Mixture effects 3. Velocity equation formulation 4. Continuous operation 5. Continuous operation with mixture effects 6. Conductivity measurement system: conductimeter 7. Variation of conversion with residence time 8. Residence time distribution 9. Determination of the reaction rate constant *Additional practical possibilities:* 10. Sensors calibration	*See Brochure* *Page: 35* *Point: 30*
4.	***PARTS, SPECIFICATIONS & POSSIBLE EXERCISES OF BATCH REACTOR***			

Γ.2.1

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
4.1	Small scale computer controlled batch reactor designed for the kinetic study of homogeneous reactions liquid-liquid, both in adiabatic conditions and in isothermal conditions.	YES	Small scale batch reactor (**QRDC**), computer controlled, designed for the kinetic study of homogeneous reactions liquid-liquid, both in adiabatic and isothermal conditions.	See Brochure Page: 31, Pt: 31
4.2	Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel	YES	Anodized aluminum structure and panel of painted steel. Main metallic elements in stainless steel.	See Brochure Page: 31, Pt: 32
4.3	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit.	See Brochure Page: 31, Pt: 33
4.4	Reactor's body should be an isolated vessel with a stainless steel external casing and working volume of 1 L	YES	The reactor body is an isolated vessel with a stainless steel external casing. The working volume is 1 L.	See Brochure Page: 31, Pt: 34
4.5	Stainless steel heat transfer coil (5 loops of 60 mm diameter) and a baffle	YES	Heat transfer coil made of stainless steel and reactor baffle, of 5 loops of 60 mm of diameter. The tube internal diameter is of 6 mm and the external one if of 8 mm.	See Brochure Page: 31, Pt: 35
4.6	Computer controlled stirring system with speed control and indication; Stirring range: 0-220 rpm	YES	Stirring system with speed control and indication, computer controlled. Stirrer range: 0-220 rpm	See Brochure Page: 31, Pt: 36
4.7	Temperature sensor "J" type to control the temperature into the reactor	YES	Temperature sensor "J" type to control the temperature into the reactor.	See Brochure Page: 31, Pt: 37
4.8	Conductivity cell to control the reaction; Measurement range up to 20 mS	YES	Conductivity cell to control the reaction. Measurement range up to 20 mS.	See Brochure Page: 31, Pt: 38

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
4.9	Reactor lip with connectors for the appropriate sensors	YES	Reactor lip with connectors for the appropriate sensors.	See Brochure Page: 31, Pt: 39
4.10	Experiments & Practical exercises using the Batch reactor: 1. Determination of ionic conductivities 2. Batch operations a. Calculation of the reaction order referred to ethyl-acetate; initial velocity method b. Determination of the reaction order referred to sodium hydroxide; initial velocity method c. Determination of the speed constant; constant sodium hydroxide initial concentration d. Determination of the speed constant; constant ethyl-acetate initial concentration e. Variation of the kinetic constant with temperature; Arrhenius equation f. Comparison of the theoretical and experimental conversion; deviation from ideality g. Mixture effects 3. Formulation of speed equation 4. Calculation of the heat transference coefficient of the coil 5. Calculation of the hydrolysis reaction enthalpy 6. Conductivity measurement system: conductimeter 7. Sensors calibration exercises	YES	Exercises and Practical possibilities using the Batch reactor: 1. Determination of ionic conductivities 2. Batch operations a. Calculation of the reaction order referred to ethyl-acetate; initial velocity method b. Determination of the reaction order referred to sodium hydroxide; initial velocity method c. Determination of the speed constant; constant sodium hydroxide initial concentration d. Determination of the speed constant; constant ethyl-acetate initial concentration e. Variation of the kinetic constant with temperature; Arrhenius equation f. Comparison of the theoretical and experimental conversion; deviation from ideality g. Mixture effects 3. Formulation of speed equation 4. Calculation of the heat transference coefficient of the coil 5. Calculation of the hydrolysis reaction enthalpy 6. Conductivity measurement system: conductimeter Additional practical possibilities 7. Sensors calibration exercises	See Brochure Page: 35 Point: 40
5.	**PARTS, SPECIFICATIONS & POSSIBLE EXERCISES OF STIRRED TANK REACTORS IN SERIES**			

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
5.1	The three (3) continuous stirred tank reactors connected in series, are used to increase the reagents conversion referred to an only reactor and so obtain product with higher purity, must have different height to let product from the first reactor got to the second one and so on.	YES	The stirred tank reactors in series (QRSC) are used to increase the reagents conversion referred to an only reactor and so obtain product with higher purity. Three (3) continuous stirred tank reactors connected in series, computer controlled. The three reactors have different height to let product from the first reactor go to the second one and so on.	See Brochure Page: 32, Pt: 41 See Brochure Page: 32, Pt: 42
5.2	Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel	YES	Anodized aluminum structures and panels of painted steel. Main metallic elements in stainless steel.	See Brochure Page: 32, Pt: 43
5.3	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit.	See Brochure Page: 32, Pt: 44
5.4	Reactor's body made of Pyrex glass with maximum capacity of 2 L. Adjustable volume from 0.4-1.5 L	YES	Reactor's body made of pyrex glass with maximum glass with a volume of 2 l. Adjustable volume from 0.4-1.5 L.	See Brochure Page: 32, Pt: 45
5.5	Conductivity cell to control the reaction; Measurement range up to 20 mS	YES	Each reactor is fitted with a conductivity cell. Measurement range up to 20 mS.	See Brochure Page: 32, Pt: 46
5.6	Computer controlled stirring system with speed control	YES	Each reactor has a stirrer with variable speed, computer controlled.	See Brochure Page: 32, Pt: 47
5.7	The two (2) reagent vessels and the two (2) variable speed dosing pumps (found in the	YES	The two (2) reagent vessels and the two (2) variable speed dosing pumps (At the QUSC Service Unit) feed reagents into	See Brochure Page: 32, Pt: 48

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	basic unit) should feed reagents into the first reactor in line		the first reactor line.	
5.8	Three (3) temperature sensors "J" type to control the temperature into the reactors, one in each reactor	YES	Three (3) temperature sensors "J" type, one in each reactor. Quick connectors with shutoff valve that enable an easy coupling of the reactors to the Service Unit.	See Brochure Page: 32, Pt: 49
5.9	Experiments & Practical exercises using the Batch reactor: 1. Investigation of dynamic behaviour of stirred tank reactors in series 2. Determination of ionic conductivities 3. Influence of flow rate 4. Work in continuous: a. With just one (1) reactor b. With just one (1) reactor with mixture effects c. Will all three (3) reactors 5. Effect of step input change 6. Response to an impulse change 7. Sensors calibration exercises	YES	Exercises & Practical possibilities using the Stirred Tank Reactors is series: 1. Investigation of dynamic behaviour of stirred tank reactors in series 2. Determination of ionic conductivities 3. Influence of flow rate 4. Work in continuous: a. With just one (1) reactor b. With just one (1) reactor with mixture effects c. Will all three (3) reactors 5. Effect of step input change 6. Response to an impulse change Additional practical possibilities: 7. Sensors calibration exercises	See Brochure Page: 35 Point: 50
6.	**PARTS, SPECIFICATIONS & POSSIBLE EXERCISES OF PLUG FLOW REACTOR**			
6.1	Small scale computer controlled plug flow reactor designed to demonstrate the flow pattern characterisation and the steady state conversion in a tubular reactor with axial dispersion	YES	Small scale Plug Flow Reactor (**QRPC**), computer controlled, designed to demonstrate the flow pattern characterization and the steady state conversion in a tubular reactor with axial dispersion.	See Brochure Page: 34, Pt: 51

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
6.2	Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel	YES	Anodized aluminium structure and panels of painted steel. Main metallic elements in stainless steel.	See Brochure Page: 34, Pt: 52
6.3	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit.	See Brochure Page: 34, Pt: 53
6.4	Plug reactor constituted by a glass column of 1 L (i.e. 1 L working volume); packed with 3 mm diameter glass balls Length: 1000-1200 mm	YES	Plug reactor constituted by a glass column of 1 L and 1100 mm long, packed with 3 mm diameter glass balls.	See Brochure Page: 34, Pt: 54
6.5	Premixer should be included at the bottom of the column in order to provide a complete mixing of the reagents entering the reactor and improve the flow distribution	YES	At the bottom of the column a premixer provides a complete mixing of the reagents entering the reactor and improves the flow distribution.	See Brochure Page: 34, Pt: 55
6.6	The unit should be able to either feed the reagents in a continuous way or carry out pulse and step changes to the flow pattern for characterization by using a 6 ways injection valve or with any other way that should be stated	YES	This unit (QRPC Plug Flow Reactor) uses a 6-way injection valve, which allows either the feeding of reagents in a continuous way or the possibility to carry out pulse and step changes to characterization of the flow patern.	See Brochure Page: 34, Pt: 56
6.7	One (1) temperature sensor "J" type to control the temperature into the reactor	YES	One (1) Temperature sensor "J" type	See Brochure Page: 34, Pt: 57

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
6.8	Conductivity cell to control the reaction; Measurement range up to 20 mS	YES	Conductivity cell to control the reaction. Measurement range up to 20 mS.	See Brochure Page: 34, Pt: 58
6.9	Experiments & Practical exercises using the Batch reactor: 1. Determination of the residence time distribution of the reactor 2. Effect of flow rate and feed concentration on the determination of flow pattern and on the steady state conversion 3. Study of the reactor response to different perturbations: step and pulse change 4. Demonstration of the flow pattern in the reactor and comparison with the theoretical model 5. Determination of the steady state conversion of a second order reaction 6. Understanding the principles of tracer techniques in flow pattern characterisation 7. Conductivity measurement system: conductimeter 8. Sensors calibration exercises	YES	Experiments & Practical exercises using the Plug Flow reactor: 1. Determination of the residence time distribution of the reactor 2. Effect of flow rate and feed concentration on the determination of flow pattern and on the steady state conversion 3. Study of the reactor response to different perturbations: step and pulse change 4. Demonstration of the flow pattern in the reactor and comparison with the theoretical model 5. Determination of the steady state conversion of a second order reaction 6. Understanding the principles of tracer techniques in flow pattern characterisation 7. Conductivity measurement system: conductimeter Additional practical possibilities: 8. Sensors calibration	See Brochure Page: 35 Point: 59
7.	**COMPUTER CONTROL & SOFTWARE**			
7.1	PC Supply	YES	The minimum characteristics for the desktop computer that Edibon recommends for their systems are: - Intel Core i5 processor. - 4 GB RAM. - 500 GB HD. - DVD±RW - Ethernet Card - Minimum 17" Screen.	See Brochures Pages: 97-103

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
			- O.S. Windows (min. Windows 7 32bits). - Slot PCIe express available. **HP280 G2 Microtower PC & 200V4LAB Philips LCD screen**	
7.2	Advanced Real-Time SCADA and PID Control. This should include Control Interface Box, Data Acquisition Board and Software	YES	Advanced Real-Time SCADA and PID control; this includes: 1. Control Interface Box 2. Data Acquisition Board 3. Software for: a. Computer control b. Data acquisition c. Data management	See Brochure Page: 26 Points: 60 & 61
7.3	Control Interface Box Specifications: • Can work with one or several reactors • Process diagram should be shown in the front panel • Unit control elements should be permanently computer controlled • All sensors with their respective signals should be properly manipulated from -10V to +10V and the output should be shown in the computer. • Sensor connectors in the interface should have different pines numbers in order to avoid connection errors • Single cable between the control interface box and the computer • Capability of simultaneous visualisation of all parameters involved in the process in the computer; calibration of all sensors involved in the process also included • Real-time curves representation about system responses and storage of all the process data and results in a file • All the actuators' values should have the	YES	Control Interface Box Specifications: 1. This control interface is common for the chemical reactors and can work with one or several reactors. 2. Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student. 3. All sensors, with their respective signals, are properly manipulated from -10 V to +10 V computer output. Sensors connectors in the interface have different pines numbers (from 2 to 16) to avoid connection errors. Single cable between the control interface box and computer. 4. The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure. 5. Simultaneous visualization in the computer of all parameters involved in the process. 6. Calibration of all sensors involved in the process. 7. Real time curves representation about system responses. Storage of all the process data and results in a file. Graphic representation, in real time, of all the process/system responses. 8. All the actuators' values can be changed at any time from the	See Brochure Page: 28 Point: 62

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	ability to be changed at any time from the keyboard, allowing this way the analysis about curves and responses of the whole process; actuators and sensors values and responses should be displayed on only one (1) screen in the computer • *Shield and filtered signals to avoid external interferences* • *Real-time PID control for parameters involved in the process simultaneously and flexibility of modifications of the PID parameters from the computer keyboard at any moment during the process* *e.g. on/off control for pumps, compressors, resistances, control valves etc* • *Control: proportional, integral and derivative, by changing the values of the three control constants; based on the real PID mathematical formula* • *Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously* • *Three (3) safety levels: Mechanical (basic unit), electronic (control interface) and control software*		keyboard allowing the analysis about curves and responses of the whole process. All the actuators and sensors values and their responses are displayed on only one screen in the computer. 9. Shield and filtered signals to avoid external interferences. 10. Real time PID control and flexibility of modifications from the computer keyboard of the PID parameters, at any moment during the process. Real time PID and on/off control for pumps, compressors, resistances, control valves, etc. Real time PID control for parameters involved in the process simultaneously. 11. Proportional control, integral control and derivative control, based on the real PID mathematical formula, by changing the values, at any time, of the three control constants (proportional, integral and derivative constants). 12. Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously. 13. Possibility of automatization of the actuators involved in the process. 14. Open Control & Multicontrol & Real-Time control. 15. Three (3) safety levels, one mechanical in the unit, another electronic in the control interface and the third one in the control software.	
7.4	*PCI Data Acquisition Board (National Instruments) Specifications:* • *To be placed in a computer slot* • *Analog Input: 16 single-ended or 8 differential channels; 16 bits resolution, 1 in 65536; sampling rate up to 250 KS/s (Kilo samples per second)*	*YES*	*PCI Data Acquisition Board (National Instruments) specifications:* 1. To be placed in a computer slot. 2. Analog Input: a. Number of channels = 16 single-ended or 8 differential. b. Resolution = 16 bits, 1 in 65536	*See Brochure* *Page: 28* *Point: 63*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	Input range (V) = ± 10 V; Data transfers=DMA, interrupts, programmed I/0. DMA channels=6 • *Analog Output: 2 channels; 16 bits resolution, 1 in 65536; Max output rate up to: 900 KS/s* *Output range (V) = ± 10 V; Data transfers=DMA, interrupts, programmed I/0* • *Digital Input/Output: 24 inputs/outputs channels; D0 or DI Sample Clock frequency: 0 to 100 MHz*		c. Sampling rate up to: 250 KS/s d. Input range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O. DMA channels = 6 3. Analog Output: a. Number of channels = 2 b. Resolution = 16 bits, 1 in 65536 c. Maximum output rate up to: 900 KS/s d. Output range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O 4. Digital Input/Output: a. Number of channels = 24 inputs/outputs b. D0 or DI Sample Clock frequency: 0 to 100 MHz 5. Timing: a. Number of Counter/timers = 4 b. Resolution: Counter/timers: 32 bits	
7.5	*Software(s) Specifications:* • *Software(s) delivered with the system should be able to provide computer control, data acquisition and data management of each reactor* • *Compatible with actual Windows operating systems* • *Graphic and intuitive simulation of the process on the computer screen* • *Registration and visualization of all process variables in an automatic and simultaneous way* • *Should be compatible with the industry standards* • *Software should be flexible and multicontrol, developed with actual windows graphic systems, acting simultaneously on all process parameters*	*YES*	*Softwares' Specifications* 1. Specialized EDIBON control software based on Labview 2. Software derived with the system can provide PID computer control, data acquisition and data management. 3. Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards. 4. Registration and visualization of all process variables in an automatic and simultaneous way. 5. Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.	*See Brochure* *Page: 26, Pt: 64* *See Brochure* *Page: 29, Pt: 65* *See Brochure* *Page: 29* *Point: 66* *See Brochure* *Page: 29* *Point: 67*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• *Software should be open, allowing the teacher to modify texts and instructions.* • *Passwords for teachers and students in order to ease teachers' control on the students and allow the access to different work levels* • *Analog and digital PID control; PID menu and set point selection required in the whole work range* • *Should be able to perform management, processing, comparison and storage of data* • *Comparative analysis of the obtained data, after the process and modification of the conditions during the process* • *Sampling velocity up to 250 KS/s (Kilo samples per second)* • *Should allow the registration of the alarms state and the graphic representation in real time* • *The software should have the ability to perform Calibration exercises in order to teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.*		6. Analog and digital PID control. PID menu and set point selection required in the whole work range. 7. Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels. 8. Management, processing, comparison and storage of data. 9. Sampling velocity up to 250 KS/s 10. It allows the registration of the alarms state and the graphic representation in real time. 11. Comparative analysis of the obtained data, after the process and modification of the conditions during the process. 12. Calibration system for the sensors involved in the process. Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.	*See Brochure* *Page: 26* *Point: 68*

4. Ζητούμενη υπηρεσία (4): Computer controlled catalytic reactor

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
1.	**GENERAL SPECIFICATIONS**			
1.38	Supply of a teaching computer controlled catalytic reactor and Flow Injection Analysis (FIA) unit.	YES	Supply of a teaching computer controlled catalytic reactor (**QRCC**) and the Flow Injection Analysis (**FIA**) unit with **SCADA** and **PID control.**	See Brochure Page: 46 Points: 1 & 2
1.39	Unit should allow students familiarize with the concepts of the saccharose hydrolysis reaction in a continuous way by using catalytic fixed-bed reactors. The overall objective of the unit should be the analysis of the behaviour and main characteristics of a catalyst in a chemical reaction and the immobilization of catalysts in the reactors which prevents them from being dragged by the final product. Furthermore, using a FIA analysis system will enable the students measure the conversion degree of the reaction and the concentration of the final product in a continuous way without the need of doing it manually.	YES	Research and development of catalysts are extremely important in the chemical industry and therefore the analysis of the behaviour and main characteristics of a catalysis in a chemical reaction is vital. Furthermore, the student must understand the immobilization of catalysts in the reactors, a fact that prevents them from being dragged by the final product. The QRCC is a teaching unit designed to perform the saccharose hydrolysis reaction in a continuous way by using catalytic fixed-bed reactors. The QRCC unit is composed of three (3) fixed-bed reactors. Two of them are fixed-bed reactors for chemical catalysis with the same chemical catalyst, called ionic exchange resin but with different grain size. The third reactor is a fixed-bed reactor for biological (enzymic) catalysis with an immobilized enzyme. By using the additional accessory i.e. QRCC-IF Flow	See Brochure Page: 47 Point: 3 See Brochure Page: 47 Point: 4

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
			Injection Analysis (FIA) unit, the conversion degree of the reaction of the saccharose hydrolysis can be measured in a continuous way.	*See Brochure* *Page: 47* *Point: 5*
1.40	*Experiments & Practical exercises using the system:* *15. Study of the principles of catalytic fixed-bed reactors* *16. Effect of the variation in the particle's size in the effectiveness of a fixed-bed reactor* *17. Comparison of chemical and biological (enzymic) catalysis* *18. Checking the influence on different variables on the obtained final product* *e.g. feed flow, temperature of reaction, reagents concentration* *19. Spectrophotometer calibration* *20. Using the spectrophotometer and product analysis* *21. Study of the Flow Injection Analysis (FIA) technique and principles* *22. Examination of the reproducibility and sensitivity of the FIA analysis method as a function of the flow rate and sample concentration* *23. Sensors calibration exercises* *24. Studies of steady and unsteady state catalysis* *25. Flow charactersation in a fixed-bed* *26. Determination of steady state and unsteady state kinetics of a catalytic fixed-bed reactor*	*YES*	***Exercises and Practical possibilities to be done with the main items:*** *1. Study of the principles of catalytic fixed-bed reactors* *2. Effect of the variation in the particle's size in the effectiveness of a fixed-bed reactor* *3. Comparison of chemical and biological (enzymic) catalysis* *4. Checking the influence on different variables (feed flow, temperature of reaction, reagents concentration) on the obtained final product* *5. Spectrophotometer calibration using the spectrophotometer and product analysis* *6. Study of the Flow Injection Analysis (FIA) technique and principles using the QRCC-IF accessory* *7. Examination of the reproducibility and sensitivity of the FIA analysis method as a function of the flow rate and sample concentration using the QRCC-IF accessory* *Additional practical possibilities:* *8. Sensors calibration exercises* *9. Studies of steady and unsteady state catalysis* *10. Flow characterisation in a fixed-bed* 11. Determination of steady state and unsteady state kinetics of a catalytic fixed-bed reactor	*See Brochure* *Page: 50* *Point: 6*
1.41	*The unit should include the following as part of*	*YES*	*The main items provided in our offer that enable normal and*	*See Brochure*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	the configuration of the complete system: • *Catalytic reactor* • *Flow Injection Analysis (FIA) unit* • *Advanced Real-time SCADA and PID control*		*full operation of the complete system are the following:* 1. QRCC Unit – Catalytic Reactor Unit 2. QRCC/CIB – Control Interface Box 3. DAB – Data Acquisition Box 4. QRCC/CCSOF – PID Computer Control & Data Acquisition & Data Management Software 5. Cables and Accessories (for normal operation) 6. Manuals (complete description of manuals provided is outlined in Point 1.49)	*Page: 49* *Point: 7*
1.42	*Projector and/or electronic whiteboard compatibility which would allow the unit to be explained and demonstrated (simultaneous visual demonstration of results and manipulation of the unit) to an entire class at one time during the process.*	*YES*	*Projector and/or electronic whiteboard compatibility that allows the unit to be explained and demonstrated to an entire class at one time.* *The unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.*	*See Brochure* *Page: 48, Pt: 8* *See Brochure* *Page: 49* *Point: 9*
1.43	*The system should be capable of doing applied research, real industrial simulation, training courses, etc.*	*YES*	*The unit is capable of doing applied research, real industrial simulation, training courses, etc.*	*See Brochure* *Page: 48, Pt: 10*
1.44	*Remote operation and control by the user and remote control for technical support by the manufacturer.*	*YES*	*Remote operation and control by the user and remote control for EDIBON technical support, are always included.*	*See Brochure* *Page: 48, Pt: 11*
1.45	*Unit should be totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic& Software).*	*YES*	*Totally safe utilizing four (4) safety systems i.e. Mechanical, Electrical, Electronic and Software*	*See Brochure* *Page: 48, Pt: 12*
1.46	*Unit should be designed and manufactured*	*YES*	*Unit is designed and manufactured under several quality*	*See Brochure &*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάτηση	Απάντηση - Προσφορά	Παραπομπή
	under several quality standards; certificates should be provided with the submission of the tender		*standards.* *Please see the literature attached for the certificates of each unit.*	*Certificates* *Pages: 48 & 105-116, Point: 13*
1.47	*The unit should be designed for future expansion and integration. The available options should also be stated.*	*YES*	*This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.*	*See Brochure* *Page: 48, Pt: 14*
1.48	*Cables and accessories for the operation of the full set-up should also be supplied*	*YES*	*Cables and accessories for the normal and full operation of the full set-up unit i.e. for the parts outlined in Point 1.41*	*See Brochure* *Page: 49* *Points: 7 & 15*
1.49	*Manuals that should be submitted along with the system:* • *Required services* • *Assembly and installation* • *Interface and control software* • *Starting-up* • *Safety* • *Maintenance* • *Calibration* • *Exercises and Practical Possibilities*	*YES*	*The unit is supplied with eight (8) manuals:* 1. Required Services 2. Assembly and Installation 3. Interface and Control Software 4. Starting-up 5. Safety 6. Maintenance 7. Calibration 8. Practices	*See Brochure* *Page: 49* *Point: 16*
1.50	*Installation and Training of the system should be performed by Scientific personnel from the manufacturer to a team of ... people and the following should be covered in the training:* • *Theory/Scientific background – Technology used* • *Training on proper operation and*	*YES*	*Installation and Training of the system will be performed by Scientific personnel from EDIBON and C & V Kniticos Suppliers Ltd (Chemist/Sales & Engineer) to a team of ... people and the following aspects will be covered in the training:* 5. Theory/Scientific background – Technology used 6. Training on proper operation and capabilities of the system 7. Applications of the system	

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	capabilities of the system • Applications of the system • Everyday maintenance of the system		8. Everyday maintenance of the system	
1.51	Warranty Period	5 Years	Warranty Period: 5 Years	See Warranty Certificate Page: 104
2.	**UNIT PARTS & SPECIFICATIONS**			
2.31	The unit should be bench-top		Bench-top unit	See Brochure Page: 48, Pt: 17
2.32	Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel	YES	Anodized aluminium structure and panels in stainless steel.	See Brochure Page: 48, Pt: 18
2.33	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit.	See Brochure Page: 48, Pt: 19
2.34	Two (2) glass flasks of two (2) litres of capacity should be supplied with the unit for the initial solution and the final product.	YES	Two (2) glass flasks of 2 litres of capacity, for the initial solution and the final product.	See Brochure Page: 48, Pt: 20
2.35	The unit should be composed of three (3) Reactors: 1. Two (2) fixed-bed reactors for chemical catalysis, composed by acid ion exchange resins 2. One (1) fixed-bed reactor for biological (enzymic) catalysis	YES	Reactors of the QRCC Unit: Two (2) fixed-bed reactors for chemical catalysis, composed by acid ion exchange resins. A fixed-bed reactor for biological (enzymic) catalysis; recommended use with an immobilized enzyme.	See Brochure Page: 48, Pt: 21

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
2.36	Reactors Specifications 1. Diameter: 50 mm 2. Height: 160 mm 3. Material: Glass with a methacrylate cover for protection	YES	Reactors diameter: 50 mm Reactors height: 160 mm Material: Glass with a methacrylate cover for protection	See Brochure Page: 48 Point: 22
2.37	A thermostatic bath with heating resistance of 600 W, controlled by a PID from the computer (PC) should also be provided with the unit Note: PC is not a part of the configuration of the system	YES	Thermostatic bath with heating resistance of 600 W, controlled by a PID from the computer (PC).	See Brochure Page: 48, Pt: 23
2.38	The heated water supply to the reactors jackets should allow the automatic control of reaction temperature to a set point value.	YES	A heated water supply to the reactors jackets allows the automatic control of reaction temperature to a set point value.	See Brochure Page: 48, Pt: 24
2.39	The peristaltic pump that is included in the unit should allow feed flow and speed regulation from 0 to 32 ml/min, where everything is computer controlled (PC)	YES	Peristaltic pump, with speed regulation, computer controlled (PC), that allows to regulate the feed flow from 0-32 ml/min.	See Brochure Page: 48, Pt: 25
2.40	In order to monitor the temperature of the key points of the system, five (5) temperature sensors, "J" type should be also included.	YES	Five (5) temperature sensors "J" type, placed at key points of the system.	See Brochure Page: 48, Pt: 26
2.41	Final product analysis and absorbance measurements should be performed using a computer controlled (PC) spectrophotometer that must be included in the configuration of	YES	Spectrophotometer, computer controlled (PC), for the final product analysis and absorbance measures: Wavelength range: 325-1000 nm Bandwidth: 5 nm	See Brochure Page: 48, Pt: 27

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	the system with the following characteristics: 1. Wavelength range: 320-1000 nm 2. Bandwidth: 5 nm			
2.42	For safety purposes, all electrical circuits are protected by adequate protection devices.	YES	All electrical circuits are protected by adequate protection devices.	See Brochure Page: 48, Pt: 28
2.43	The Flow Injection Analysis (FIA) unit should consist of a four (4) channels penstaltic pump that will be responsible for the following actions: 1. Impulse the right quantities of the final product together with reagents that colour it 2. The resulting solutions are put through coil reactor in order to complete the mixture 3. Passes the reaction through the spectrophotometer measuring cell.	YES	The Flow Injection Analysis (FIA) unit is used to measure the conversion degree of the reaction of the saccharose hydrolysis in a continuous way. It consists of a peristaltic pump that is used to impulse the right quantities of the final product together with reagents that colour it. Then the solutions are put through coil reactor in order to complete the mixture. The last stage of the QRCC-IF involves passing the reaction through the spectrophotometer measuring cell.	See Brochure Page: 49 Point: 29
2.44	The FIA unit should meet the following criteria for evaluation: 1. Four (4) channels computer controlled (PC) peristaltic pump [as stated in previous specification] with 0.01-35 ml/min feed flow for each channel 2. Six (6) ports injection valve; coil reactor 3. Continuous measuring cell for spectrophotometer	YES	QRCC-IF Flow Injection Analysis (FIA) Unit Specifications: 1. Four (4)-channel peristaltic pump, 0.01-35 ml/min for each channel, computer controlled (PC) 2. Six (6) ports injection valve; coil reactor 3. Continuous measuring cell for spectrophotometer 4. Dimensions: 500 x 500 x 350 mm 5. Weight: 15 kg approximately	See Brochure Page: 49 Point: 30
3.	**COMPUTER CONTROL & SOFTWARE**			
3.22	PC Supply	YES	The minimum characteristics for the desktop computer that Edibon recommends for their systems are:	See Brochures Pages: 97-103

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
			- Intel Core i5 processor. - 4 GB RAM. - 500 GB HD. - DVD±RW - Ethernet Card - Minimum 17" Screen. - O.S. Windows (min. Windows 7 32bits). - Slot PCIe express available. **HP280 G2 Microtower PC & 200V4LAB Philips LCD screen**	
3.23	Advanced Real-Time SCADA and PID Control: This should include Control Interface Box, Data Acquisition Board and Software	YES	Advanced Real-Time SCADA and PID control; this includes: 1. Control Interface Box 2. Data Acquisition Board 3. Software for: a. Computer control b. Data acquisition c. Data management	See Brochure Page: 46 Points: 31
3.24	Control Interface Box Specifications: • Process diagram should be shown in the front panel • Unit control elements should be permanently computer controlled • Modes of control: open-, multi- and real-time control • Capability of simultaneous visualisation of all parameters involved in the process in the computer • Ability to calibrate all sensors involved in the process • Real-time curves representation about system responses	YES	Control Interface Box Specifications: 1. Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student. 2. All sensors, with their respective signals, are properly manipulated from -10 V to +10 V computer output. Sensors connectors in the interface have different pines numbers (from 2 to 16) to avoid connection errors. Single cable between the control interface box and computer. 3. The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure. 4. Simultaneous visualization in the computer of all parameters	See Brochure Page: 48 Point: 32

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• *Shield and filtered signals to avoid external interferences* • *All the actuators' values should have the ability to be changed at any time from the keyboard, allowing this way the analysis about curves and responses of the whole process* • *Real-time PID control for parameters involved in the process simultaneously and flexibility of modifications of the PID parameters from the computer keyboard at any moment during the process* • *Control: proportional, integral and derivative, by changing the values of the three control constants; based on the real PID mathematical formula* • *Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously*		involved in the process. 5. Calibration of all sensors involved in the process. 6. Real time curves representation about system responses. Storage of all the process data and results in a file. Graphic representation, in real time, of all the process/system responses. 7. All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process. All the actuators and sensors values and their responses are displayed on only one screen in the computer. 8. Shield and filtered signals to avoid external interferences. 9. Real time PID control and flexibility of modifications from the computer keyboard of the PID parameters, at any moment during the process. Real time PID and on/off control for pumps, compressors, resistances, control valves, etc. Real time PID control for parameters involved in the process simultaneously. 10. Proportional control, integral control and derivative control, based on the real PID mathematical formula, by changing the values, at any time, of the three control constants (proportional, integral and derivative constants). 11. Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously. 12. Possibility of automatization of the actuators involved in the process. 13. Open Control & Multicontrol & Real-Time control.	

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
				See Brochure Page: 46, Pt: 33
3.25	PCI Data Acquisition Board (National Instruments) Specifications: • To be placed in a computer slot • Analog Input: 16 single-ended or 8 differential channels; 16 bits resolution, 1 in 65536; sampling rate up to 250 KS/s (Kilo samples per second) • Analog Output: 2 channels; 16 bits resolution, 1 in 65536 • Digital Input/Output: 24 inputs/outputs channels	YES	PCI Data Acquisition Board (National Instruments) specifications: 1. To be placed in a computer slot. 2. Analog Input: a. Number of channels = 16 single-ended or 8 differential. b. Resolution = 16 bits, 1 in 65536 c. Sampling rate up to: 250 KS/s d. Input range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O. DMA channels = 6 3. Analog Output: a. Number of channels = 2 b. Resolution = 16 bits, 1 in 65536 c. Maximum output rate up to: 833 KS/s d. Output range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O 4. Digital Input/Output: a. Number of channels = 24 inputs/outputs b. DO or DI Sample Clock frequency: 0 to 1 MHz 5. Timing: a. Number of Counter/timers = 4 b. Resolution: Counter/timers: 32 bits	See Brochure Page: 49 Point: 34
3.26	Software(s) Specifications:	YES	Softwares' Specifications: 1. Specialized EDIBON control software based on Labview	See Brochure

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• *Software(s) delivered with the system should be able to provide computer control, data acquisition and data management of the system (based on Labview)* • *Should be compatible with the industry standards* • *Software should be flexible and multicontrol, developed with actual windows graphic systems, acting simultaneously on all process parameters* • *Software should be open, allowing the teacher to modify texts and instructions.* • *Passwords for teachers and students in order to ease teachers' control on the students and allow the access to different work levels* • *Analog and digital PID control; PID menu and set point selection required in the whole work range* • *Should be able to perform management, processing, comparison and storage of data* • *Sampling velocity up to 250 KS/s (Kilo samples per second)* • *Should allow the registration of the alarms state and the graphic representation in real time* • *The software should have the ability to perform Calibration exercises in order to teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.*		2. Software derived with the system can provide PID computer control, data acquisition and data management. 3. Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards. 4. Registration and visualization of all process variables in an automatic and simultaneous way. 5. Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters. 6. Analog and digital PID control. PID menu and set point selection required in the whole work range. 7. Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels. 8. Management, processing, comparison and storage of data. 9. Sampling velocity up to 250 KS/s 10. It allows the registration of the alarms state and the graphic representation in real time. 11. Comparative analysis of the obtained data, after the process and modification of the conditions during the process. 12. Calibration system for the sensors involved in the process. Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.	*Page: 46, Pt: 35* *See Brochure* *Page: 49, Pt: 36* *See Brochure* *Page: 49, Pt: 37*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
				See Brochure Page: 46, Pt: 38

5. Ζητούμενη υπηρεσία (5): Corrosion study unit

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
1.	**GENERAL SPECIFICATIONS**			
1.52	Supply of a teaching corrosion study unit.	YES	Supply of teaching corrosion study unit (**EEC**)	See Brochure Page: 64, Pt: 1
1.53	Unit should allow students familiarize with the concepts of corrosion. The overall objective of the unit should be the simultaneous study of up to eight (8) corrosion cells at several conditions that influence in the corrosion processes.	YES	The Corrosion Study Unit "EEC" allow the corrosion simultaneous study up to eight (8) corrosion cells. This unit allows to study several conditions that influence in the corrosion processes.	See Brochure Page: 64 Point: 2
1.54	Experiments & Practical exercises using the system: 27. Galvanic potentials 28. Galvanic pairs study 29. Iron passivation 30. pH influence 31. Aluminumanodization 32. Cathode protection 33. Galvanic corrosion and oxidation 34. Formation of the Daniell Cell for observing the standard potentials 35. Influence of the oxygen (O_2) concentration in the corrosion 36. Simultaneous study of corrosion in several cells 37. Electrolytic corrosion 38. Chemical inhibition	YES	Exercises and Practical Possibilities: 1. Galvanic potentials 2. Galvanic pairs study 3. Iron passivation 4. pH influence 5. Aluminumanodization 6. Cathode protection 7. Galvanic corrosion and oxidation 8. Formation of the Daniell Cell for observing the standard potentials Additional practical possibilities: 9. Influence of the oxygen (O_2) concentration in the corrosion 10. Simultaneous study of corrosion in several cells 11. Electrolytic corrosion 12. Chemical inhibition	See Brochure Page: 66 Point: 3

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	39. Prevention of scaling 40. Effect of internal stress 41. Water treatment studies e.g. Calcium carbonate stabilization, oxidation of iron and manganese in ground waters, water softening by chemical precipitation, disinfection of waste water with chlorine solutions		13. Prevention of scaling 14. Effect of internal stress 15. Water treatment studies a. Calcium carbonate stabilization b. Oxidation of iron and manganese in ground waters c. Water softening by chemical precipitation d. Disinfection of waste water with chlorine solutions	
1.55	Cables and accessories for the operation of the system should also be supplied.	YES	Cables and accessories for the normal and full operation of the full set-up unit.	See Brochure Page: 65, Pt: 4
1.56	Manuals that should be submitted along with the system: • Required services • Assembly and installation • Starting-up • Safety • Maintenance • Exercises and Practical Possibilities	YES	The unit is supplied with six (6) manuals: 1. Required Services 2. Assembly and Installation 3. Starting-up 4. Safety 5. Maintenance 6. Practices	See Brochure Page: 65 Point: 5
1.57	Installation and Training of the system should be performed by Scientific personnel from the manufacturer to a team of … people and the following should be covered in the training: • Theory/Scientific background – Technology used • Training on proper operation and capabilities of the system • Applications of the system • Everyday maintenance of the system	YES	Installation and Training of the system will be performed by Scientific personnel from EDIBON and C & V Kritikos Suppliers Ltd (Chemist/Sales & Engineer) to a team of … people and the following aspects will be covered in the training: 1. Theory/Scientific background – Technology used 2. Training on proper operation and capabilities of the system 3. Applications of the system 4. Everyday maintenance of the system	

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
1.58	Unit should be designed and manufactured under several quality standards; certificates should be provided with the submission of the tender	YES	Unit is designed and manufactured under several quality standards. Please see the literature attached for the certificates of each unit.	See Certificates Pages: 105-116
1.59	Warranty Period	5 Years	Warranty Period: 5 Years	See Warranty Certificate Page: 104
2.	**UNIT PARTS & SPECIFICATIONS**			
2.45	The unit should be bench-top	YES	Bench-top unit	See Brochure Page: 65, Pt: 6
2.46	Anodized aluminium structure and panels in painted steel; main metallic elements in stainless steel	YES	Anodized aluminum structure and panels of painted steel. Main metallic elements of stainless steel.	See Brochure Page: 65, Pt: 7
2.47	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit.	See Brochure Page: 65, Pt: 8
2.48	Unit should accommodate minimum eight (8) corrosion cells, each consisting of a 600 ml glass vessel with a cover that has four (4) openings: two (2) to put the test sheets, one (1) for the reference electrode and one (1) for the gases diffuser tube	YES	Unit has eight (8) corrosion cells. Each one consisted of: A 600 ml glass vessel with a cover. Such caver has four orifices: two to put the test sheets, one for the reference electrode and another one for the gases diffuser tube.	See Brochure Page: 65, Pt: 9
2.49	The air circuit of the unit should have the	YES	The air circuit includes:	See Brochure

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	following components: 1. Air pump with a flow rate of 400 h/L that introduces ambient air into the electrolyte solution 2. Air flowmeter with range 1-7.5 L/min 3. Eight (8) air control valves to adjust the air flow rate; i.e. one (1) for each corrosion cell		An air pump to introduce ambient air into the electrolyte solution; flow rate: 400 l/h An air flowmeter; range: 1-7.5 l/min Eight (8) air control valves to adjust the gas flow rate; one for each corrosion cell.	Page: 65, Pt: 10
2.50	The gas circuit of the unit should have the following components: 1. Gas inlet 2. Gas flowmeter with range 1-7.5 L/min 3. Eight (8) gas control valves to adjust the gas flow rate; i.e. one (1) for each corrosion cell	YES	The gas circuit includes: Gas inlet A gas flowmeter; Range: 1-7.5 l/min Eight (8) air control valves to adjust the gas flow rate; one for each corrosion cell.	See Brochure Page: 65, Pt: 11
2.51	The power supply included in the system must be able to apply 0-30 V and 0-3 A output direct current, with an intensity and voltage indicator	YES	A power supply of direct current (D.C) that allows applying a direct current. Direct current with 0-30 V and 0-3 A output, with an intensity and voltage indicator.	See Brochure Page: 65, Pt: 12
2.52	The service panel of the system should include the following: 1. A milliammeter and a milivoltmeter to measure the intensity and the voltage in the electrodes 2. A voltmeter/ammeter selector 3. A cell selector 4. Connecting terminals for the test sheets	YES	The service panel includes: A milliammeter and a milivoltmeter to measure the intensity and the voltage in the electrodes. A voltmeter/ammeter selector. A cell selector. Connecting terminals for the test sheets.	See Brochure Page: 65, Pt: 13
2.53	The reference electrode should be Ag/AgCl	YES	The reference electrode is an Ag/AgCl electrode.	See Brochure Page: 65, Pt: 14
2.54	Along with the system a set of test sheets	YES	A set of test sheets (electrodes) is supplied with the system.	See Brochure

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	(electrodes) should be supplied consisting of: Sheets of variable thickness depending on the material (copper, aluminium, iron, zinc, graphite, stainless steel and brass); dimensions: 40 x 20 mm		It consists of 40 x 20 mm sheets of variable thickness depending on the material. Materials: Copper, Aluminum, Iron, Zinc, Graphite, Stainless steel and Brass.	Page: 65, Pt: 15
2.55	The unit should also include a pH-meter to study and compare the influence of the electrolyte solution on the corrosion processes.	YES	A pH meter is also included in the delivery of the system in order to study and compare the influence of the electrolyte solution on the corrosion processes.	See Brochure Page: 65, Pt: 16
2.56	Electrical supply	single-phase, 220 V / 50 Hz	Electrical supply: 220 V / 50 Hz Single phase	See Brochure Page: 66, Pt: 17

6. Ζητούμενη υπηρεσία (6): Computer controlled sedimentation tank

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
1.	**GENERAL SPECIFICATIONS**			
1.60	Supply of a teaching computer controlled sedimentation tank.	YES	Supply of a teaching computer controlled Sedimentation Tank (**PDSC**) with **SCADA**.	See Brochure Page: 67, Pt: 1
1.61	Unit should demonstrate the sedimentation process and allow students familiarize with the settling principle of discrete particles settling into a tank. Unit should also allow students to study the hydraulic characteristics of a rectangular sedimentation tank which works in continuous; also, since the unit is in laboratory scale, it should allow the user to obtain valid conclusions about its operation and apply them to the operation of a real scale unit.	YES	The Computer Controlled Sedimentation Tank "PDSC" is a teaching unit, designed by EDIBON, to demonstrate the sedimentation process and to familiarize with the settling principle of discrete particles settling into a tank. It will also allow to study the hydraulic characteristics of a rectangular sedimentation tank which works in continuous. As it is a laboratory unit, it allows to obtain valid conclusions about its operation and to apply them to the operation of a real scale unit.	See Brochure Page: 68 Point: 2
1.62	Experiments & Practical exercises using the system: 42. Study of the basic principles of solids in suspension separation 43. Efficiency of the separation by sedimentation process 44. Study of the current lines 45. Sensors calibration exercises 46. Study of the effect of flow rate, inlet water	YES	Exercises and Practical possibilities to be done with main items: 1. Study of the basic principles of solids in suspension separation 2. Efficiency of the separation by sedimentation process 3. Study of the current lines	See Brochure Page: 71 Point: 3

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	temperature and baffle position on dispersion *47. Measurement of sedimental removal efficiencies and relating these to the hydraulic characteristics* *48. Measurement of the flow short-circuiting and dead space using a tracer* *49. Comparison of real flow regimes with idealised flow models* *50. Study of the efficiency of the separation process dependent on: solid concentration of suspension, flow rate and position of the baffle* *51. Investigation of the flow condition dependent on the flow rate and the position of the baffle*		*Additional practical possibilities:* *4. Sensors calibration exercises* *5. Study of the effect of flow rate, inlet water temperature and baffle position on dispersion* *6. Measurement of sediment removal efficiencies and relating these to the hydraulic characteristics* *7. Measurement of the flow short-circuiting and dead space using a tracer* *8. Comparison of real flow regimes with idealised flow models* *9. Study of the efficiency of the separation process dependent on: solid concentration of suspension, flow rate and position of the baffle* *10. Investigation of the flow condition dependent on the flow rate and the position of the baffle*	
1.63	*The unit should include the following as part of the configuration of the complete system:* • *Sedimentation tank* • *Advanced Real-time SCADA and PID control*	*YES*	*The main items provided in our offer that enable normal and full operation of the complete system are the following:* 1. PDSC Unit – Sedimentation Tank 2. PDSC/CIB – Control Interface Box 3. DAB – Data Acquisition Box 4. PDSC/CCSOF – PID Computer Control & Data Acquisition & Data Management Software 5. Cables and Accessories (for normal operation) 6. Manuals (complete description of manuals provided is outlined in Point 1.12)	*See Brochure* *Pages: 67 & 70* *Points: 4 & 5*
1.64	*Projector and/or electronic whiteboard compatibility which would allow the unit to be explained and demonstrated (simultaneous visual demonstration of results and manipulation of the unit) to an entire class at one time during the process.*	*YES*	*Projector and/or electronic whiteboard compatibility that allows the unit to be explained and demonstrated to an entire class at one time.* *The unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic*	*See Brochure* *Page: 69, Pt: 6* *See Brochure* *Page: 70, Pt: 7*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
			whiteboard.	
1.65	The system should be capable of doing applied research, real industrial simulation, training courses, etc.	YES	The unit is capable of doing applied research, real industrial simulation, training courses, etc.	See Brochure Page: 69, Pt: 8
1.66	Remote operation and control by the user and remote control for technical support by the manufacturer	YES	Remote operation and control by the user and remote control for EDIBON technical support, are always included.	See Brochure Page: 69, Pt: 9
1.67	Unit should be totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic& Software).	YES	Totally safe utilizing four (4) safety systems i.e. Mechanical, Electrical, Electronic and Software	See Brochure Page: 69, Pt: 10
1.68	Unit should be designed and manufactured under several quality standards; certificates should be provided with the submission of the tender	YES	Unit is designed and manufactured under several quality standards. Please see the literature attached for the certificates of each unit.	See Brochure & Certificates Pages: 69 & 105-116, Point: 10
1.69	The unit should be designed for future expansion and integration. The available options should also be stated.	YES	This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.	See Brochure Page: 69, Pt: 12
1.70	Cables and accessories for the operation of the full set-up should also be supplied	YES	Cables and accessories for the normal and full operation of the full set-up unit i.e. for the parts outlined in Point 1.63	See Brochure Page: 70 Points: 5 & 13
1.71	Manuals that should be submitted along with	YES	The unit is supplied with eight (8) manuals: 1. Required Services	See Brochure

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	the system: • *Required services* • *Assembly and installation* • *Interface and control software* • *Starting-up* • *Safety* • *Maintenance* • *Calibration* • *Exercises and Practical Possibilities*		2. Assembly and Installation 3. Interface and Control Software 4. Starting-up 5. Safety 6. Maintenance 7. Calibration 8. Practices	*Page: 70* *Point: 14*
1.72	*Installation and Training of the system should be performed by Scientific personnel from the manufacturer to a team of … people and the following should be covered in the training:* • *Theory/Scientific background – Technology used* • *Training on proper operation and capabilities of the system* • *Applications of the system* • *Everyday maintenance of the system*	*YES*	*Installation and Training of the system will be performed by Scientific personnel from EDIBON and C & V Kritikos Suppliers Ltd (Chemist/Sales & Engineer) to a team of … people and the following aspects will be covered in the training:* 1. Theory/Scientific background – Technology used 2. Training on proper operation and capabilities of the system 3. Applications of the system 4. Everyday maintenance of the system	
1.73	*Warranty Period*	*5 Years*	*Warranty Period: 5 Years*	*See Warranty Certificate* *Page: 104*
2.	***UNIT PARTS & SPECIFICATIONS***			
2.57	*Unit should be mounted on an anodized aluminium structure and panels of painted steel; main metallic elements made out of stainless steel*	*YES*	*The unit is mounted on an anodized aluminum structure and panels of painted steel.* *Main metallic elements made of stainless steel.*	*See Brochure* *Page: 69* *Point: 15*
2.58	*The unit should incorporate wheels for its*	*YES*	*The unit incorporates wheels for its mobility.*	*See Brochure*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	mobility			Page: 69, Pt: 16
2.59	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit.	See Brochure Page: 69, Pt: 17
2.60	Sedimentation tank: 1. Material: Transparent in order to allows students understand the sedimentation principles and carry out several practices, as well as to make easier the comprehension of the different variables that influence this process 2. Dimensions (L x W x H): 900-1200 x 300-450 x 200-300 mm	YES	The great advantage of the PDSC unit is that its sedimentation tank is made of transparent material. So this allows the student to understand the sedimentation principles. This fact allows to carry out several practices, as well as to make easier the comprehension of the different variables influence on process. Dimensions (L x W x H): 1000 x 400 x 250 mm	See Brochure Page: 68, Pt: 18 See Brochure Page: 69, Pt: 19
2.61	Dye injection and tracer system should also be included in the system allowing the study of the fluid current lines into the sedimentation tank	YES	Dye injection and tracer system, which allows to study the fluid current lines into the sedimentation tank.	See Brochure Page: 69, Pt: 20
2.62	Unit should accommodate two (2) baffle plates that are adjustable in height: this will give the student the possibility of changing the flow lines direction and its study.	YES	Two (2) baffle plates, adjustable in height. This makes it easier for the student to change the flow lines direction and its study.	See Brochure Page: 69, Pt: 21

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
2.63	*Suspension installation consisting of:* 1. *Suspension tank of 135-155 L* 2. *Computer controlled centrifugal pump; flow up to 80 L/min* 3. *Flow regulation valve* 4. *Flow sensor*	YES	*Suspension installation consists of:* 1. *Suspension tank of 135-155 L* 2. *Computer controlled centrifugal pump; flow up to 80 L/min* 3. *Flow regulation valve* 4. *Flow sensor*	*See Brochure* *Page: 69, Pt: 22*
2.64	*Clean water installation consisting of:* 1. *Flow regulation valve* 2. *Flow sensor*	YES	*Clean water installation consists of:* 1. Flow regulation valve 2. Flow sensor	*See Brochure* *Page: 69* *Point: 23*
2.65	*Accessories that should also be included with the supply of the unit:* 1. *2 Imhoff cones of 1000 ml – To measure the solids concentrations* 2. *Graduated test tube of 1 L*	YES	*Accessories included:* 1. 2 Imhoff cones of 1000 ml to measure the solids concentrations 2. Graduated test tube of 1 L	*See Brochure* *Page: 69, Pt: 24*
3.	**COMPUTER CONTROL & SOFTWARE**			
3.27	*Advanced Real-Time SCADA and PID Control: This should include Control Interface Box, Data Acquisition Board and Software*	YES	*Advanced Real-Time SCADA and PID control, this includes:* 1. Control Interface Box 2. Data Acquisition Board 3. Software for: a. Computer control b. Data acquisition c. Data management	*See Brochure* *Page: 67* *Points: 25*
3.28	*Control Interface Box Specifications:* • *Process diagram should be shown in the front panel* • *Unit control elements should be permanently computer controlled* • *Modes of control: open-, multi- and real-time control* • *Capability of simultaneous visualisation of*	YES	*Control Interface Box Specifications:* 1. Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student. 2. All sensors, with their respective signals, are properly manipulated from -10 V to +10 V computer output. Sensors connectors in the interface have different pines numbers (from 2 to 16) to avoid connection errors. Single cable between the	*See Brochure* *Page: 70* *Point: 26*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	all parameters involved in the process in the computer • *Ability to calibrate all sensors involved in the process* • *Real-time curves representation about system responses* • *Shield and filtered signals to avoid external interferences* • *All the actuators' values should have the ability to be changed at any time from the keyboard, allowing this way the analysis about curves and responses of the whole process* • *Real-time PID control for parameters involved in the process simultaneously and flexibility of modifications of the PID parameters from the computer keyboard at any moment during the process* • *Control: proportional, integral and derivative, by changing the values of the three control constants; based on the real PID mathematical formula* • *Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously*		control interface box and computer. 3. The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure. 4. Simultaneous visualization in the computer of all parameters involved in the process. 5. Calibration of all sensors involved in the process. 6. Real time curves representation about system responses. Storage of all the process data and results in a file. Graphic representation, in real time, of all the process/system responses. 7. All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process. All the actuators and sensors values and their responses are displayed on only one screen in the computer. 8. Shield and filtered signals to avoid external interferences. 9. Real time PID control and flexibility of modifications from the computer keyboard of the PID parameters, at any moment during the process. Real time PID and on/off control for pumps, compressors, resistances, control valves, etc. Real time PID control for parameters involved in the process simultaneously. 10. Proportional control, integral control and derivative control, based on the real PID mathematical formula, by changing the values, at any time, of the three control constants (proportional, integral and derivative constants). 11. Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously. 12. Possibility of automatization of the actuators involved in the process. 13. Open Control & Multicontrol & Real-Time control.	

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
				See Brochure Page: 67, Pt: 27
3.29	PCI Data Acquisition Board (National Instruments) Specifications: • To be placed in a computer slot • Analog Input: 16 single-ended or 8 differential channels; 16 bits resolution, 1 in 65536; sampling rate up to 250 KS/s (Kilo samples per second) • Analog Output: 2 channels; 16 bits resolution, 1 in 65536 • Digital Input/Output: 24 inputs/outputs channels	YES	PCI Data Acquisition Board (National Instruments) specifications: 1. To be placed in a computer slot. 2. Analog Input: a. Number of channels = 16 single-ended or 8 differential. b. Resolution = 16 bits, 1 in 65536 c. Sampling rate up to: 250 KS/s d. Input range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O. DMA channels = 6 3. Analog Output: a. Number of channels = 2 b. Resolution = 16 bits, 1 in 65536 c. Maximum output rate up to: 900 KS/s d. Output range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O 4. Digital Input/Output:	See Brochure Page: 70 Point: 28

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
			a. Number of channels = 24 inputs/outputs b. DO or DI Sample Clock frequency: 0 to 100 MHz 5. Timing: a. Number of Counter/timers = 4 b. Resolution: Counter/timers: 32 bits	
3.30	*Software(s) Specifications:* • *Software(s) delivered with the system should be able to provide computer control, data acquisition and data management of the system (based on Labview)* • *Should be compatible with the industry standards* • *Software should be flexible and multicontrol, developed with actual windows graphic systems, acting simultaneously on all process parameters* • *Software should be open, allowing the teacher to modify texts and instructions.* • *Passwords for teachers and students in order to ease teachers' control on the students and allow the access to different work levels* • *Analog and digital PID control; PID menu and set point selection required in the whole work range* • *Should be able to perform management, processing, comparison and storage of data* • *Sampling velocity up to 250 KS/s (Kilo samples per second)* • *Should allow the registration of the alarms state and the graphic representation in real time* • *The software should have the ability to*	YES	*Softwares' Specifications:* 1. Specialized EDIBON control software based on Labview 2. Software derived with the system can provide PID computer control, data acquisition and data management. 3. Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards. 4. Registration and visualization of all process variables in an automatic and simultaneous way. 5. Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters. 6. Analog and digital PID control. PID menu and set point selection required in the whole work range. 7. Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels. 8. Management, processing, comparison and storage of data. 9. Sampling velocity up to 250 KS/s 10. It allows the registration of the alarms state and the graphic representation in real time. 11. Comparative analysis of the obtained data, after the process and modification of the conditions during the process. 12. Calibration system for the sensors involved in the process. Calibration exercises, which are included, teach the user how to	*See Brochure* *Page: 67, Pt: 29* *See Brochure* *Page: 70, Pt: 30* *See Brochure* *Page: 70* *Point: 31*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	perform Calibration exercises in order to teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.		calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.	See Brochure Page: 67 Point: 32
3.31	Electrical supply	single-phase, 220 V / 50 Hz	Electrical Supply: Single Phase 220 V / 50 Hz	See Brochure Page: 71 Point: 33
3.32	Supply PC	YES	The minimum characteristics for the desktop computer that Edibon recommends for their systems are: - Intel Core i5 processor. - 4 GB RAM. - 500 GB HD. - DVD±RW - Ethernet Card - Minimum 17" Screen. - O.S. Windows (min. Windows 7 32bits). - Slot PCIe express available. **HP280 G2 Microtower PC & 200V4LAB Philips LCD screen**	See Brochures Pages: 97-103

7. Ζητούμενη υπηρεσία (7): Computer controlled continuous distillation unit

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
1.	**GENERAL SPECIFICATIONS**			
1.74	Supply of a teaching computer controlled continuous distillation unit	YES	Supply of a teaching computer controlled Continuous Distillation Unit (**UDCC**), with **SCADA** and **PID Control.**	See Brochure Page: 80, Pt: 1
1.75	Unit should allow students familiarize with the concepts of the distillation process and study the variables that affect this process. Furthermore, the students should have the opportunity to investigate the principles that rule the mass and energy transference, as well as determine optima operation point to carry out a big quantity of separations.	YES	EDIBON's distillation unit, in its different versions, is one of the most powerful laboratory tools for the study of the variables that affect the distillation process. The student can investigate the principles that rule the mass and energy transference, as well as determine optima operation point to carry out a big quantity of separations.	See Brochure Page: 81 Point: 2
1.76	Experiments & Practical exercises using the system: 11. Preparation of solutions, analytic valuation techniques and filling of the column 12. Batch & Continuous Operation 13. Obtaining the McCabe-Thiele diagram without reflux 14. Obtaining the number of plates without reflux 15. Efficiency calculations without reflux 16. Variation of the composition of the distilled product by keeping the reflux ratio constant 17. Constant composition of the distilled product by keeping the reflux ratio	YES	Exercises and Practical possibilities to be done with the main items: 1. Preparation of solutions 2. Analytic valuation techniques 3. Filling of the column 4. Batch & Continuous Operation 5. Obtaining the McCabe-Thiele diagram without reflux 6. Obtaining the number of plates without reflux 7. Efficiency calculations without reflux 8. Variation of the composition of the distilled product by keeping the reflux ratio constant 9. Constant composition of the distilled product: variation of reflux ratio 10. Constant composition of the distilled product: constant reflux ratio	See Brochure Page: 84 Point: 3

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
	constant or by variating it 18. Continuous feeding of the column 19. Mass and energy balances across the system 20. Plates fluid dynamics studies, including load loss and column flooding 21. Study of the feed temperature effect on the continuous processes 22. Calculation of the theoretical number of floors in the plates columns, and the equivalent height of the theoretical floor (HEPT) in the Raschig rings columns 23. Pursuit of the temperatures in all plates in the column (Plates columns) 24. Study of the rectification efficiency at different pressures 25. Effect of feed pre-heat and position 26. Demonstration of azeotropic distillation 27. Work different heating contribution with regulation by the computer 28. Studies of heating interchange in glass refrigerators 29. Dosing pump, temperature-, flow- and pressure-sensors calibration exercises		11. Continuous feeding of the column 12. Mass and energy balances across the system 13. Plates fluid dynamics studies, including load loss and column flooding 14. Study of the feed temperature effect on the continuous processes 15. Calculation of the theoretical number of floors in the plates columns, and the equivalent height of the theoretical floor (HEPT) in the Raschig rings columns 16. Pursuit of the temperatures in all plates in the column (Plates columns) 17. Study of the rectification efficiency at different pressures 18. Effect of feed pre-heat 19. Effect of feed position 20. Demonstration of azeotropic distillation 21. Work different heating contribution with regulation by the computer 22. Studies of heating interchange in glass refrigerators *Additional practical possibilities:* 23. Dosing pump calibration 24. Temperature sensors calibration 25. Flow sensor calibration 26. Pressure sensor calibration 27. Study of PID controls	
1.77	*The unit should include the following as part of the configuration of the complete system:* • *Continuous distillation unit* • *Advanced Real-time SCADA and PID control*	*YES*	*The main items provided in our offer that enable normal and full operation of the complete system are the following:* 1. UDCC Unit – Continuous Distillation unit 2. UDCC/CIB – Control Interface Box 3. DAB – Data Acquisition Box 4. UDCC/CCSOF – PID Computer Control & Data Acquisition & Data Management Software 5. Cables and Accessories (for normal operation)	*See Brochure* *Page: 83* *Point: 4*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
			6. Manuals (complete description of manuals provided is outlined in Point 1.85)	
1.78	Projector and/or electronic whiteboard compatibility which would allow the unit to be explained and demonstrated (simultaneous visual demonstration of results and manipulation of the unit) to an entire class at one time during the process.	YES	Projector and/or electronic whiteboard compatibility that allows the unit to be explained and demonstrated to an entire class at one time. The unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.	See Brochure Page: 82, Pt: 5 See Brochure Page: 83, Pt: 6
1.79	The system should be capable of doing applied research, real industrial simulation, training courses, etc.	YES	The unit is capable of doing applied research, real industrial simulation, training courses, etc.	See Brochure Page: 82, Pt: 7
1.80	Remote operation and control by the user and remote control for technical support by the manufacturer.	YES	Remote operation and control by the user and remote control for EDIBON technical support, are always included.	See Brochure Page: 82, Pt: 8
1.81	Unit should be totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic& Software).	YES	Totally safe utilizing four (4) safety systems i.e. Mechanical, Electrical, Electronic and Software	See Brochure Page: 82, Pt: 9
1.82	Unit should be designed and manufactured under several quality standards; certificates should be provided with the submission of the tender	YES	Unit is designed and manufactured under several quality standards. Please see the literature attached for the certificates of each unit.	See Brochure & Certificates Pages: 82 & 105-116, Point: 10
1.83	The unit should be designed for future expansion and integration. The available options should also be stated.	YES	This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to	See Brochure Page: 82 Point: 11

A/A	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
			simultaneously operate many units in a network.	
1.84	*Cables and accessories for the operation of the full set-up should also be supplied*	YES	*Cables and accessories for the normal and full operation of the full set-up unit i.e. for the parts outlined in Point 1.77*	*See Brochure* *Page: 83* *Points: 4 & 12*
1.85	*Manuals that should be submitted along with the system:* • *Required services* • *Assembly and installation* • *Interface and control software* • *Starting-up* • *Safety* • *Maintenance* • *Calibration* • *Exercises and Practical Possibilities*	YES	*The unit is supplied with eight (8) manuals:* 1. Required Services 2. Assembly and Installation 3. Interface and Control Software 4. Starting-up 5. Safety 6. Maintenance 7. Calibration 8. Practices	*See Brochure* *Page: 83* *Point: 13*
1.86	*Installation and Training of the system should be performed by Scientific personnel from the manufacturer to a team of … people and the following should be covered in the training:* • *Theory/Scientific background – Technology used* • *Training on proper operation and capabilities of the system* • *Applications of the system* • *Everyday maintenance of the system*	YES	*Installation and Training of the system will be performed by Scientific personnel from EDIBON and C & V Kritikos Suppliers Ltd (Chemist/Sales & Engineer) to a team of … people and the following aspects will be covered in the training:* 1. Theory/Scientific background – Technology used 2. Training on proper operation and capabilities of the system 3. Applications of the system 4. Everyday maintenance of the system	
1.87	*Warranty Period*	*5 Years*	*Warranty Period: 5 Years*	*See Warranty Certificate* *Page: 104*
2.	***UNIT PARTS & SPECIFICATIONS***			

Α/Α	Απαιτήσεις - Προδιαγραφές	Απάντηση	Απάντηση - Προσφορά	Παραπομπή
2.66	Anodized aluminium structure and panels of painted steel; main metallic elements in stainless steel	YES	Anodized aluminum frame and panels of painted steel. Main metallic elements in stainless steel.	See Brochure Page: 82, Pt: 14
2.67	A diagram of the key elements of the unit should be shown in the front panel of the system	YES	Diagram in the front panel with similar distribution to the elements in the real unit.	See Brochure Page: 82, Pt: 15
2.68	Unit should accommodate a sieve plates column with at least 8 plates with temperature sensor and sample in every plate. Dimensions (Internal Diameter x Length): 40-60 mm x 1000-1100 mm Vacuumed, silver-plated and double transparent band for vision.	YES	Sieve plates column with 8 plates with temperature taking (sensor) and sample in every plate. Dimension (I.D x L): 50 x 1000 mm Vacuumed, silver-plated and double transparent band for vision. The unit allows continuous and batch operation.	See Brochure Page: 82, Pt: 16
2.69	Column head with the following features: 1. Temperature sensor, conical output for distilled product and ball refrigerator 2. Valve for steam distribution – the valve should operate in an electromagnetic way	YES	Column head with temperature taking (sensor), conical output for distilled product and ball refrigerator. Column head with a valve for the steam distribution. The valve operates in an electromagnetic way.	See Brochure Page: 82, Pt: 17
2.70	2 L Boiler (with sample outputs), with computer controlled and PID control heating mantle with adjustable power	YES	Two (2) Liters Boiler (with sample outputs), with heating mantle (computer controlled, PID Control), with adjustable power.	See Brochure Page: 82, Pt: 18
2.71	Distillation collector of graduated glass – Minimum 2 L	YES	Two (2) Liters Distillation collector of graduated glass	See Brochure Page: 82, Pt: 19
2.72	Liebig-West coolant	YES	Liebig-West coolant.	See Brochure

A/A	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
				Page: 82, Pt: 20
2.73	Computer controlled feeding system in continuous with: 1. Preheating at the specified temperature using heating element and PID control 2. Pump	YES	Feeding system in continuous with preheating (heating element, computer controlled, PID control) at the specified temperature and a pump (computer controlled).	See Brochure Page: 82, Pt: 21
2.74	Feed vessel – Minimum 10 L capacity	YES	Feed vessel with a 10 L capacity	See Brochure Page: 82, Pt: 22
2.75	Vacuum pump that allows to decrease the atmospheric pressure to 0.5 bar	YES	Vacuum pump that allows to decrease the atmospheric pressure to 0.5 bar.	See Brochure Page: 82, Pt: 23
2.76	Sensors that should be present within the unit: 1. Pressure sensor 2. Temperature sensors – Minimum 14 sensors 3. Flow sensors – Range: 0.25-6.5 l/min 4. Differential pressure sensor – Range: 0-15 psi	YES	Pressure sensor. Temperature measurement system with 14 "J" type temperature sensors. Flow sensor with range 0.25-6.5 l/min Differential pressure sensor with range 0-15 psi	See Brochure Page: 82, Pt: 24
2.77	Valves / Switches: 1. Computer controlled solenoid valve – Reflux ratio 2. Solenoid valve to discharge the boiler 3. Level switch to control the level in the boiler	YES	Solenoid valve, computer controlled (reflux ration). Solenoid valve to discharge the boiler. Level switch to control the level in the boiler. The computer control system acts directly on: 1. The temperature of the heating elements 2. The solenoid valve (Reflux ratio) 3. The feeding pump	See Brochure Page: 82, Pt: 25
3.	**COMPUTER CONTROL & SOFTWARE**			
3.33	Advanced Real-Time SCADA and PID Control: This should include Control Interface Box,	YES	Advanced Real-Time SCADA and PID control; this includes: 1. Control Interface Box 2. Data Acquisition Board	See Brochure Page: 80 Points: 26

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	Data Acquisition Board and Software		3. Software for: a. Computer control b. Data acquisition c. Data management	
3.34	*The computer control system should act directly on:* *1. The temperature of the heating elements* *2. The solenoid valve* *3. The feeding pump*	*YES*	*The computer control system acts directly on:* 1. The temperature of the heating elements 2. The solenoid valve (Reflux ratio) 3. The feeding pump	*See Brochure* *Page: 82* *Point: 27*
3.35	*Control Interface Box Specifications:* • *Process diagram should be shown in the front panel* • *Unit control elements should be permanently computer controlled* • *Modes of control: open-, multi- and real-time control* • *Capability of simultaneous visualisation of all parameters involved in the process in the computer* • *Ability to calibrate all sensors involved in the process* • *Real-time curves representation about system responses* • *Shield and filtered signals to avoid external interferences* • *All the actuators' values should have the ability to be changed at any time from the keyboard, allowing this way the analysis about curves and responses of the whole process* • *Real-time PID control for parameters involved in the process simultaneously and flexibility of modifications of the PID parameters from the computer keyboard at any moment during the process*	*YES*	*Control Interface Box Specifications:* 1. Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student. 2. All sensors, with their respective signals, are properly manipulated from -10 V to +10 V computer output. Sensors connectors in the interface have different pines numbers (from 2 to 16) to avoid connection errors. Single cable between the control interface box and computer. 3. The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure. 4. Simultaneous visualization in the computer of all parameters involved in the process. 5. Calibration of all sensors involved in the process. 6. Real time curves representation about system responses. Storage of all the process data and results in a file. Graphic representation, in real time, of all the process/system responses. 7. All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process. All the actuators and sensors values and their responses are displayed on only one screen in the computer. 8. Shield and filtered signals to avoid external interferences.	*See Brochure* *Page: 1, Pt: 83*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• *Control: proportional, integral and derivative, by changing the values of the three control constants; based on the real PID mathematical formula* • *Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously*		9. Real time PID control and flexibility of modifications from the computer keyboard of the PID parameters, at any moment during the process. Real time PID and on/off control for pumps, compressors, resistances, control valves, etc. Real time PID control for parameters involved in the process simultaneously. 10. Proportional control, integral control and derivative control, based on the real PID mathematical formula, by changing the values, at any time, of the three control constants (proportional, integral and derivative constants). 11. Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously. 12. Possibility of automatization of the actuators involved in the process. 13. Open Control & Multicontrol & Real-Time control.	*See Brochure* *Page: 80, Pt: 29*
3.36	*PCI Data Acquisition Board (National Instruments) Specifications:* • *To be placed in a computer slot* • *Analog Input: 16 single-ended or 8 differential channels; 16 bits resolution, 1 in 65536; sampling rate up to 250 KS/s*	*YES*	*PCI Data Acquisition Board (National Instruments) specifications:* 1. To be placed in a computer slot. 2. Analog Input: a. Number of channels = 16 single-ended or 8 differential.	*See Brochure* *Page: 83* *Point: 30*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	(Kilo samples per second) • *Analog Output: 2 channels; 16 bits resolution, 1 in 65536* • *Digital Input/Output: 24 inputs/outputs channels*		b. Resolution = 16 bits, 1 in 65536 c. Sampling rate up to: 250 KS/s d. Input range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O. DMA channels = 6 3. Analog Output: a. Number of channels = 2 b. Resolution = 16 bits, 1 in 65536 c. Maximum output rate up to: 900 KS/s d. Output range (V) = ± 10 V e. Data transfers = DMA, interrupts, programmed I/O 4. Digital Input/Output: a. Number of channels = 24 inputs/outputs b. DO or DI Sample Clock frequency: 0 to 100 MHz 5. Timing: a. Number of Counter/timers = 4 b. Resolution: Counter/timers: 32 bits	
3.37	*Software(s) Specifications:* • *Software(s) delivered with the system should be able to provide computer control, data acquisition and data management of the system (based on Labview)* • *Should be compatible with the industry standards* • *Software should be flexible and multicontrol, developed with actual windows graphic systems, acting simultaneously on all process parameters* • *Software should be open, allowing the teacher to modify texts and instructions.* • *Passwords for teachers and students in order to ease teachers' control on the students and allow the access to different work levels*	*YES*	*Softwares' Specifications:* 1. Specialized EDIBON control software based on Labview 2. Software derived with the system can provide PID computer control, data acquisition and data management. 3. Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards. 4. Registration and visualization of all process variables in an automatic and simultaneous way. 5. Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters. 6. Analog and digital PID control. PID menu and set point selection required in the whole work range.	*See Brochure* *Page: 80, Pt: 31* *See Brochure* *Page: 83, Pt: 32* *See Brochure* *Page: 83, Pt: 33*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
	• *Analog and digital PID control; PID menu and set point selection required in the whole work range* • *Should be able to perform management, processing, comparison and storage of data* • *Sampling velocity up to 250 KS/s (Kilo samples per second)* • *Should allow the registration of the alarms state and the graphic representation in real time* • *The software should have the ability to perform Calibration exercises in order to teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.*		7. Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels. 8. Management, processing, comparison and storage of data. 9. Sampling velocity up to 250 KS/s 10. It allows the registration of the alarms state and the graphic representation in real time. 11. Comparative analysis of the obtained data, after the process and modification of the conditions during the process. 12. Calibration system for the sensors involved in the process. Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.	*See Brochure* *Page: 80* *Point: 34*
3.38	*Electrical Supply*	*single-phase, 220 V / 50 Hz*	*Electrical Supply: Single Phase* *220 V / 50 Hz*	*See Brochure* *Page: 84, Pt: 33*
3.39	*PC Supply*	*YES*	*The minimum characteristics for the desktop computer that Edibon recommends for their systems are:* *- Intel Core i5 processor.* *- 4 GB RAM.* *- 500 GB HD.* *- DVD±RW* *- Ethernet Card & - Minimum 17" Screen.* *- O.S. Windows (min. Windows 7 32bits).*	*See Brochures* *Pages: 97-103*

Α/Α	Απαιτήσεις - Προδιαγραφές	Απαίτηση	Απάντηση - Προσφορά	Παραπομπή
			- Slot PCIe express available. **HP280 G2 Microtower PC & 200V4LAB Philips LCD screen**	

ΣΗΜΕΙΩΣΕΙΣ:

1. *Είναι υποχρεωτική η απάντηση σε όλα τα σημεία του Πίνακα. Σε περίπτωση που δεν έχει απαντηθεί οποιοδήποτε σημείο, η απάντηση θεωρείται αρνητική.*
2. *Στη Στήλη «ΧΑΡΑΚΤΗΡΙΣΤΙΚΑ-ΠΡΟΔΙΑΓΡΑΦΕΣ»ή «ΑΠΑΙΤΗΣΕΙΣ-ΠΡΟΔΙΑΓΡΑΦΕΣ», περιγράφονται αναλυτικά οι αντίστοιχοι τεχνικοί όροι, υποχρεώσεις ή επεξηγήσεις για τα οποία θα πρέπει να δοθούν αντίστοιχες απαντήσεις.*
3. *Αν στη στήλη «ΑΠΑΙΤΗΣΗ» έχει συμπληρωθεί η λέξη «ΝΑΙ», που σημαίνει ότι η αντίστοιχη προδιαγραφή είναι υποχρεωτική για τον υποψήφιο Ανάδοχο ή ένας αριθμός που σημαίνει υποχρεωτικό αριθμητικά μέγεθος της προδιαγραφής και απαιτεί συμμόρφωση, θεωρούνται ως απαράβατοι όροι και οι Προσφορές που δεν καλύπτουν τέτοιες απαιτήσεις απορρίπτονται ως απαράδεκτες.*
4. *Στη στήλη «ΑΠΑΝΤΗΣΗ» σημειώνεται η απάντηση του Προσφέροντα που είτε είναι το συγκεκριμένο προϊόν που προσφέρει είτε έχει τη μορφή ΝΑΙ/ΟΧΙ εάν η αντίστοιχη προδιαγραφή πληρούται ή όχι από την Προσφορά ή ένα αριθμητικό μέγεθος που δηλώνει την ποσότητα του αντίστοιχου χαρακτηριστικού στην Προσφορά.*
5. *Στη στήλη «ΠΑΡΑΠΟΜΠΗ» θα καταγραφεί η σαφής παραπομπή σε Παράρτημα της Τεχνικής Προσφοράς το οποίο θα περιλαμβάνει αριθμημένα Τεχνικά Φυλλάδια κατασκευαστών, ή αναλυτικές τεχνικές περιγραφές των προσφερόμενων προϊόντων, που κατά την κρίση του Προσφέροντα τεκμηριώνουν τα δηλούμενα στον Πίνακα Στοιχεία. Οι παραπομπές πρέπει να είναι συγκεκριμένες (π.χ. Τεχνικό Φυλλάδιο 3, Σελ. 4 Παράγραφος 4, κ.λ.π.), ενώ αντίστοιχα στο τεχνικό φυλλάδιο ή την αναφορά θα υπογραμμίζεται το σημείο τεκμηρίωσης και θα σημειώνεται η αντίστοιχη παράγραφος του Πίνακα στην οποία καταγράφεται το ζητούμενο χαρακτηριστικό.*

ΠΑΡΑΡΤΗΜΑ Δ – ΣΥΓΚΡΙΤΙΚΟΣ ΠΙΝΑΚΑΣ ΤΙΜΩΝ

(Να υποβληθεί ο πίνακας όπως ήταν στα έγγραφα του διαγωνισμού και οι απαντήσεις όπως δόθηκαν από τις εταιρείες)

Μόνο μία εταιρία έδωσε προσφορά για τις αιτούμενες προσφορές

ΣΥΓΚΡΙΤΙΚΟΣ ΠΙΝΑΚΑΣ ΤΙΜΩΝ	***Προσφερόμενη Τιμή (σε ευρώ, μη συμπεριλαμβανομένου ΦΠΑ)***						
Ζητούμενη υπηρεσία	*1*	*2*	*3*	*4*	*5*	*6*	*7*
	Computer Controlled Liquid mass transfer and diffusion coefficient unit ***QDTGC & SCADA & PID CONTROL & PC***	*Computer Controlled Fixed Bed Adsorption Unit* ***QALFC & SCADA & PID CONTROL & PC***	*Base Unit (computer controlled), with the following Chemical Reactors: Continuous stirred tank reactor, Batch Reactor, Stirred tank reactors in series, Plug flow reactors* ***QUSC & QRCAC & QRDC & QRSC & QRPC & SCADA & PID CONTROL & PC***	*Computer controlled catalytic reactors with Flow injection analysis (FIA) unit* ***QRCC & FIA & SCADA & PID CONTROL & PC***	*Corrosion Study unit* ***EEC***	*Computer controlled Sedimentation tank* ***PDSC & SCADA & PC***	*Computer Controlled Continuous Distillation unit, automatic feeder* ***UDCC & SCADA & PID CONTROL & PC***
Ποσότητα	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Αναμενόμενη τιμή (Ευρώ) (Ανά τεμάχιο)	**15.126**	**14.286**	**33.613**	**32.773**	**10.084**	**27.731**	**34.454**
Επωνυμία Οικονομικού Φορέα							
C&V Kriticos Suppliers Ltd	***15.094,00***	***14.194,00***	***33.488,00***	***32.684,00***	***9.084,00***	***28.970,00***	***34.274,00***