

Product environmental attributes - THE ECO DECLARATION

The declaration may be published only when all rows and/or fields marked with an * are filled-in (n.a. for not applicable).

Additional information regarding each item may be found under P14.

Brand *	Idea Logo			
Company name *	Lenovo			
Contact information *	Lenovo Global Environmental Affairs Alvin L Carter 1009 Think Place Building 2 / 5F1 Morrisville, North Carolina 27560 alcarter@lenovo.com	Lenovo		
Internet site *	http://www.lenovo.com/social_responsibility/us/en/environment.html			
Additional information	The latest version of this document can be found at http://www.lenovo.com/social_responsibility/us/en/datasheets_notebooks.html			

	The company declares (based on product specification or test results based obtained from sample testing), that the product conforms to the statements given in this declaration.				
Type of product *	Personal Computer				
Commercial name *	ideacentre 610S-02ISH				
Model number *	90FC				
Issue date *	2016-04-15				
Intended market *	☑ Global Europe Asia, Pacific & Japan Americas Other				
Additional information	ENERGY STAR® Qualified; GREENGUARD Certified				

This is an uncontrolled copy when in printed form. Please refer to the contact information for the latest version.

Quality	Quality Control		
Item		Yes	No
QC1 *	The company enforces an internal quality control scheme to ensure the correctness of this eco declaration		
QC2 *	The company is a member of an eco declaration system that enforces regular independent quality contro such as organized by IT-Företagen (see www.itecodeclaration.org).	ol 🔀	

Model number *	90FC		
Issue date *	2016-04-15	Logo	Lenovo.

Product	roduct environmental attributes - Legal requirements				
Item		Yes	No	n.a.	
P1	Hazardous substances and preparations				
P1.1*	Products do not contain more than; 0.1% lead, 0.01% cadmium, 0.1% mercury, 0.1% hexavalent chromium, 0.1% polybrominated biphenyls (PBB) or 0.1% polybrominated diphenyl ethers (PBDE). (See legal reference and Note B1)				
P1.2*	Products do not contain Asbestos (see legal reference). Comment: Legal reference has no maximum concentration value.	\boxtimes			
P1.3*	Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC),	\square			
	hydrobromofluorocarbons (HBFC), hydrochlorofluorcarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide (see legal reference). Comment: Legal reference has no maximum				
P1.4*	concentration values. Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated				
	terphenyl (PCT) in preparations (see legal reference).				
P1.5*	Products do not contain more than 0.1% short chain chloroparaffins (SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the SCCP (see legal reference).		Ш		
P1.6*	Textile and leather parts with direct skin contact do not contain Tri-(2,3,-dibromopropyl)-phosphate (TRIS), Tris-(aziridinyl)-phosphineoxide (TEPA), polybrominated biphenyl (PBB) (see legal reference). Comment: Legal reference has no maximum concentration values.				
P1.7*	Textile and leather parts with direct skin contact do not contain more than 0.003% Azo colorants that split aromatic amines. (See legal reference and Note B1)				
P1.8*	Wooden parts do not contain arsenic and chromium as a wood preservation treatment as well as			\boxtimes	
	pentachlorophenol and derivatives (see legal reference).	ш			
	Comment: Legal reference has no maximum concentration values.				
P1.9*	Parts with direct and prolonged skin contact do not release nickel in concentrations above 0.5	\boxtimes			
	microgram/cm²/week (see legal reference).				
P1.10*	Comment: Max limit in legal reference when tested according to EN1811:1998. REACH Article 33 information about substances in articles is available at (add URL or mail contact):				
F 1.10	http://www.lenovo.com/social_responsibility/us/en/materials.html				
P2	Batteries				
P2.1*	If the product contains a battery or an accumulator, it is labeled with the disposal symbol and if it contains				
1 2.1	more than 0.0005% of mercury (for button cells only) by weight, or more than 0.004% of lead, it shall be			Ш	
	marked with the chemical symbol for the metal concerned, Hg or Pb. Information on proper disposal is				
	provided in user manual. (See legal reference)				
P2.2*	Button cells used in the product do not contain more than 2% by weight of mercury. Other batteries or				
P2.3*	accumulators do not contain more than 0.0005% of mercury or 0.002% of cadmium. (See legal reference) Batteries and accumulators are easily removable by either users or service providers (as dependent on the	\square			
1 2.5	design of the product). Exception: Batteries that are permanently installed for safety, performance, medical		Ш	Ш	
P3	or data integrity reasons do not have to be "easily removable". (See legal reference)				
P3.1*	Safety, EMC connection to the telephone network and labeling The product complies with legally required safety standards as specified (see legal reference).			_	
P3.2*	The product complies with legally required standards for electromagnetic compatibility (see legal reference).		-	-	
			<u> </u>		
P3.3*	If product is intended for connection to a public telecom network or contains a radio transmitter, it complies with legally required standards for radio and telecommunication devices (see legal reference).		<u>Ц</u>	<u>Ц</u>	
P3.4*	The product is labeled to show conformance with applicable legal requirements (see legal reference).	\boxtimes			
P4	Consumable materials				
P4.1*	If a photo conductor (drum, belt etc.) is used in the product, it does not contain cadmium max 0.01% (see legal reference and Note B1).				
P4.2*	If ink/toner is used in the product, it does not contain cadmium max 0.1% by weight (see legal reference).			X	
P4.3*	If the ink/toner formulation/preparation is classified as hazardous according to applicable regulations, the product/packaging is adequately labeled and a Safety Data Sheet (SDS) in accordance with these requirements is available (see legal reference).				
P5	Product packaging				
P5.1*	Packaging and packaging components do not contain more than 0.01% lead, mercury, cadmium and				
P5.2*	hexavalent chromium by weight of these together. Plastic packaging material is marked according to ISO 11469 referring ISO 1043 (see legal reference).				
			 	- - -	
P5.3*	The product packaging material is free from ozone depleting substances as specified in the Montreal Protocol (see legal reference).		Ш	Ш	
L	Comment: Legal reference has no maximum concentration values.				

Note B1: Restriction applies to the homogeneous material, unless other specified and expressed in weight %.

Model number *	90FC		
Issue date *	2016-04-15	Logo	Lenovo

Product	environmental attributes - Market requirements - Environmental conscious design	equire	men	t met
Item	*=mandatory to fill in. Additional information regarding each item may be found under P14.	Yes	No	n.a.
P6	Treatment information			
P6.1*	Information for recyclers/treatment facilities is available (see legal reference).	\boxtimes		
P7	Design Disassembly, recycling			
P7.1*	Parts that have to be treated separately are easily separable	\boxtimes	П	\Box
P7.2*	Plastic materials in covers/housing have no surface coating.	一		一百
P7.3*	Plastic parts >100g consist of one material or of easily separable materials.			
P7.4*	Plastic parts >25g have material codes according to ISO 11469 referring ISO 1043.	\boxtimes		
P7.5	Plastic parts are free from metal inlays or have inlays that can be removed with commonly available tools.	\boxtimes		
P7.6*	Labels are easily separable. (This requirement does not apply to safety/regulatory labels).	\boxtimes	\Box	$\overline{\sqcap}$
	Product lifetime			
P7.7*	Upgrading can be done e.g. with processor, memory, cards or drives		\boxtimes	
P7.8*	Upgrading can be done using commonly available tools		$\overline{\boxtimes}$	
P7.9.	Spare parts are available after end of production for: 5 years			币
P7.10	Service is available after end of production for: 5 years			青
	Material and substance requirements			
P7.11*	Product cover/housing material type:			
	Material type: PC+ABS Material type: PC Material type: Steel			
P7.12	Electrical cable insulation materials of power cables are PVC free.			
P7.13	Electrical cable insulation materials of signal cables are PVC free		\boxtimes	
P7.14	All cover/housing plastic parts >25g are free from chlorine and bromine.	\boxtimes		
P7.15	All printed circuit boards (without components) >25g are halogen free. as defined in IEC61249-2-21. (See Note B2)		\boxtimes	
P7.16	Flame retarded plastic parts >25g in covers / housings are marked according ISO 1043-4: Marking:			
P7.17	Alt. 1			
	Chemical specifications of flame retardants in printed circuit boards >25g (without components):	\boxtimes		
	TBBPA (additive), TBBPA (reactive), Other; chemical name: <i>Brominated Epoxy Resin</i> , CAS #:			
	26265-08-7			
	Alt. 2			
	Chemical specifications of flame retardants in printed circuit boards (without components) >25g according			
D7.40	ISO 1043-4: Brominated Epoxy Resin See P14			
P7.18	Alt. 1 Flame retarded plastic parts >25g contain the following flame retardant substances/preparations in		\square	
	concentrations above 0.1%:	ш		ш
	Comment: No legal limits exist, this is a market requirement.			
	1. Chemical name: , CAS #:			
	2. Chemical name: , CAS #:			
	3. Chemical name: , CAS #: Alt. 2			
	Chemical specifications of flame retardants in plastic parts >25g according ISO 1043-4:			
			\boxtimes	
P7.19	Plastic parts >25g are free from flame retardant substances/ preparations above 0.1% classified as R45, R40, R46, R48, R50, R51, R53, R60, R61 and any combination of these (See Note B3)			
P7.20	Of total plastic parts' weight >25g, recycled material content is 35% .			
P7.21	Of total plastic parts' weight >25g, biobased material content is 0 %.			
P7.22	Light sources are free from mercury			\boxtimes
DO	If mercury is used specify: Number of lamps: and max. mercury content per lamp: mg			
P8.1*	Batteries Battery chemical composition: Lithium Manganese Dioxide			
P8.2	Batteries meet the requirements of the following voluntary program/s:			
F 0.2	batteries meet the requirements of the following voluntary program/s.			$ \mathbb{N}$

Note B2: IEC61249-2--21 has maximum limits for chlorine and bromine but does not address fluorine, iodine and astatine which are included in the group of halogens.

Note B3: 'Starting from January 2009, Risk phrases can be replaced by Hazard phrases according to the Globally Harmonized System (GHS), mandatory by December 2010.

Model number *	90FC		
Issue date *	2016-04-15	Logo	Lenovo

Product environmental attr	ibutes - Market i	requirements (continued)	Requirement	
Item P9 Energy consumption	on			Yes No	n.a
9.1 For the product the fo		els or energy cons	umptions are re	ported: See P14	
Energy mode *	Power level at 100 V AC	Power level at 115 V AC	Power level at 230 V AC	Reference / Standard for energy modes and test method *	
Peak (On-max)	127.87 W	107.71 W	105.85 W	Full load	
Category I1		<u> </u>	<u>I</u>	I	1
Short Idle State - WOL Enabled	22.87 W	22.03 W	25.13 W	Use for ENERGY STAR V6 registration (P _{idle})	
Long Idle State - WOL Enabled	1 14.85 W	14.20 W	15.70 W	Use for ENERGY STAR V6 registration (P _{idle})	
Sleep (S3) - WOL Enabled	1.71 W	1.63 W	1.68 W	Use for ENERGY STAR V6 registration(P _{sleep})	T
Sleep (S3) - WOL Disabled	W	W	W	Reference	F
Off (S5) - WOL Enabled	0.84 W	0.82 W	1.09 W	Use for ENERGY STAR V6 registration(P _{off})	F
Off (S5) - WOL Disabled	W	W	W	Use for EuP	
Category I2					
Short Idle State - WOL Enabled	d 22.58 W	22.26 W	23.80 W	Use for ENERGY STAR V6 registration(P _{idle})	
Long Idle State - WOL Enabled		14.80 W	15.80 W	Use for ENERGY STAR V6 registration(P _{idle})	╁
Sleep (S3) - WOL Enabled	1.81 W	1.72 W	1.68 W	Use for ENERGY STAR V6 registration (P _{sleep})	├
Sleep (S3) - WOL Disabled	W	W	W	Reference	干
Off (S5) - WOL Enabled	0.88 W	0.85 W	1.10 W	Use for ENERGY STAR V6 registration(Port)	H
Off (S5) - WOL Disabled	W W	W	W	Use for EuP	₽
. ,	VV	VV	VV	OSE IOI EUF	
Category I3 Short Idle State - WOL Enabled	26.49 W	25.11 W	25 20 \\	Has for ENERGY STAR VS registration (R.)	
			25.30 W	Use for ENERGY STAR V6 registration(P _{idle})	L
Long Idle State - WOL Enabled		15.94 W	16.00 W	Use for ENERGY STAR V6 registration(P _{idle})	L
Sleep (S3) - WOL Enabled	1.73 W	1.64 W	1.67 W	Use for ENERGY STAR V6 registration (Psleep)	Ļ
Sleep (S3) - WOL Disabled	W	W	W	Reference	L
Off (S5) - WOL Enabled	1.18 W	1.13 W	1.16 W	Use for ENERGY STAR V6 registration(Poff)	L
Off (S5) - WOL Disabled	W	W	W	Use for EuP	
Category D1					
Short Idle State - WOL Enabled	35.66 W	35.65 W	36.60 W	Use for ENERGY STAR V6 registration(P _{idle})	
Long Idle State - WOL Enabled	27.44 W	27.45 W	26.70 W	Use for ENERGY STAR V6 registration(P _{idle})	
Sleep (S3) - WOL Enabled	1.77 W	1.71 W	1.72 W	Use for ENERGY STAR V6 registration (P _{sleep})	
Sleep (S3) - WOL Disabled	W	W	W	Reference	
Off (S5) - WOL Enabled	0.99 W	0.96 W	1.17 W	Use for ENERGY STAR V6 registration(Poff)	
Off (S5) - WOL Disabled	W	W	W	Use for EuP	
Category D2			•		
Short Idle State - WOL Enabled	32.73 W	32.20 W	32.30 W	Use for ENERGY STAR V6 registration(P _{idle})	
Long Idle State - WOL Enabled	22.44 W	21.89 W	22.70 W	Use for ENERGY STAR V6 registration(P _{idle})	
Sleep (S3) - WOL Enabled	1.70 W	1.65 W	1.73 W	Use for ENERGY STAR V6 registration (P _{sleep})	
Sleep (S3) - WOL Disabled	W	W	W	Reference	
Off (S5) - WOL Enabled	0.92 W	0.86 W	1.00 W	Use for ENERGY STAR V6 registration(Poff)	
Off (S5) - WOL Disabled	W	W	W	Use for EuP	
EPS No-load	W	0.156 W	0.192 W	Delta / ADP-170CB B	ΙĒ
(External power supply / charger plugged in the wall outlet but disconnected from the product.)					
PTEC * Typical Energy Consumption	W	W	W		
TEC * Typical Energy Consumption	kWh/week	kWh/week	kWh/week		×

ETEC * Annual Er	nergy Consumption	I1:102.72 I2:93.35 I3:107.05 D1:150.07 D2:134.21 kWh/year	I1:90.15 I2:91.81 I3:103.11 D1:149.91 D2:131.61 kWh/year	11:102.72 12:98.81 13:103.90 D1:152.67 D2:133.56 kWh/year	$E_{TEC} = (8760/1000) \times (P_{off} \times 0.45 + P_{long_Idle} \times 0.15 + P_{short_Idle} \times 0.35$		
B: 1		•	5) - WOL Enabled	l; P _{sleep} : Sleep Mode	(S3) - WOL Enabled; Pidle: Idle State	- WOL Enabled	
Display re	solution* : I	Megapixels					\boxtimes
Print Spee	ed * : I	lmages per minute					\boxtimes
Default time to enter energy save mode: 25 minutes							
P9.2*	P9.2* Information about the energy save function is provided with the product.						
P9.3*	•	ets the energy requirents version: Version 6.1					
P10	Emissions						
		 Declared according 	to ISO 9296				
P10.1	Mode	Mode description		Declared A-weighted sound power level $L_{W\!Ad}$	Per Sound pressure level 12 Operator position Bysi Desktop Bysi		-
		* 1155 1 11		***	Оре	erator attended)	
	Idle	* HDD:Idle		* 2.9	20		↓ <u> </u>
	Operation	* HDD: Operating		* 3.0	21		$\sqcup \sqcup$
	Other mode		_				1
	Measured accord	ling to: X ISO7779 C		vered by ECMA-74	with L _{pAm} measurement distance	m)	
P10.2	The product meets the acoustic noise requirements of the following voluntary program/s:						

Model nur	90FC						
Issue date	*	2016-04-15	Logo	ı	_eno	VO.	
Dan dan d		and the state of t					
	environn	nental attributes - Market requirements (continued)		<u> </u>	equire	ment No	
Item	01	de altre transfer and traffer and traffer			Yes	INO	n.a.
P10.3*		al emissions from printing products					
		formed according to ECMA-328 (ISO/IEC 28360) standard, other specify:					
P10.4		emission rate (print phase) is (mg/h):					\boxtimes
P10.5		Dust Ozone Styrene Benzene TVOC Il emission requirements of the following voluntary program/s are met for :				_	
P10.5			TVOC		Ш	Ш	
		nagnetic emissions					
P10.6	program.		owing volu	ıntary			
P11		able materials for printing products					
P11.1*		Data Sheet (SDS) is available for the ink/toner preparation, even if not legally requ	•				\boxtimes
P11.2*	EN1228		ne require	ments of			
P11.3*	2-sided (duplex) printing/copying is an integrated product function.					\boxtimes
P12	Ergonor	nics for computing products					
P12.1*	The disp	lay meets the ergonomic requirements of ISO 9241-307 for visual display technology	gies.				\boxtimes
P12.2*	The phys	sical input device meets the requirements of ISO 9995 and ISO 9241-410.				\boxtimes	
P13		ng and documentation					
P13.1*	Product Product	packaging material type(s): Corrugate and paper weight (kg): 0.762 packaging material type(s): EPE weight (kg): 0.076 packaging material type(s): weight (kg):					
P13.2*	Product	plastic packaging is free from PVC.			\boxtimes		
P13.3*		nedia for user and product documentation (tick box): c 🔀, Paper 📐, Other 🗌					
P13.4*	For pape fiber: %	er user and product documentation, please specify contained percentage of post-co	nsumer re	cycled			
P14		nal information (See Note B4)					
	informati knowled	supplier makes no representations, guarantees, assurances or warranties whether on contained in this document. All information provided by supplier in this documer ge available at the time of completion, and supplier shall have no obligation to updathere is approximate and provided for informational purposes only. See a Lenovo A on.	nt is provid ate such in	ed based formation	on support. The inf	olier's format	ion
P9	See Energy Star Qualified Notebooks & Tablet Computers for the latest information: http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=CO						

Note B4: Additional lines may be inserted to declare further items, by positioning the cursor at the far right of the row and hitting the <Enter> key.

Legal references Europe Annex B

Reference	Declaration item
2002/95/EC (ROHS Directive)	P1.1, P4.1
REACH, Annex XVII	P1.6, P1.8, P4.2
REACH, Annex XVII	P1.4
REACH, Annex XVII	P1.2
REACH, Annex XVII	P1.7
REACH, Annex XVII	P1.9
Regulation (EC) No. 2037/2000, 2038/2000, 2039/2000	P1.3
Norwegian regulation relating to restrictions on the use of certain dangerous chemicals 20.12.2002	P1.5
2006/66/EC (Battery and accumulators Directive)	P2.1, P2.2, P2,3, P3.4, P8.1
2006/95/EC (Low Voltage Directive)	P3.1, 3.4
2004/108/EEC (New EMC Directive)	P3.2, 3.4
1999/5/EC (R&TTE Directive)	P3.3, 3.4
"REACH" Regulation (1907/2006), annex VII	P1.10
(EC) No.1272/2008 regulation on classification, labeling and packaging (CLP)	P4.3
REACH article 31, annex II	P4.3
2004/12/EC (Directive on packaging and packaging waste)	P5.1
(97/129/EC) (Commission Decision on Identification System for Packaging Materials	P5.2
2037/2000/EC Regulation on Substances that Deplete the Ozone Layer	P5.3
2002/96/EC (WEEE directive)	P3.4, P6.1
(EC) No.1272/2008 regulation on classification, labeling and packaging (CLP)	P7.19

Lenovo ErP Lot3 Information Sheet

- PC / Notebook -

As required by COMMISSION REGULATION (EU) No 617/2013 of 26 June 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for computers and computer servers (ErP Lot3).

Products scope of this sheet:

Desktop computer, integrated desktop computer, and notebook computer

This document is only valid in connection with the IT Eco Declaration of the specific Product.

Commercial name	ideacentre 610S-02ISH	Logo
Model Number	90FC	Lenovo
Issue Date	2016-04-15	Lei IOVO.
Additional information	ENERGY STAR® Qualified;GREENGUARD Certified	

(d)	year of manu					Available on produc label		
(e)	E TEC value (kWh) per ErP Lot 3 Category and capability adjustments applied when all discrete graphics cards (dGfx) are disabled and if the system is tested with switchable graphics mode with UMA driving the display:							
	Category (a	ccording	to ErP Lot 3):		Etec:			
(f)	E TEC value	(kWh) pe	r ErP Lot 3 Cat	tegory and ca	apability adjustments applied when	all discrete graphics cards (dGfx) are		
	Category (a	•	to ErP Lot 3): to ErP Lot 3):		Etec: 61.17 Etec: 63.56			
(g)	idle state pov	wer demar	nd (Watts);			Cat B :16.10		
						Cat B : 16:10 Cat D : 16:80		
(h)	sleep mode	power den	nand (Watts);			Cat B : 1.64 Cat D : 1.61		
(i)	sleep mode	with WOL	enabled power	demand (Wa	atts) (where enabled);	0.48.400		
						Cat B : 1.62 Cat D : 1.62		
(j)	off mode pov	ver deman	id (Watts);			Cat B : 0.83 Cat D : 0.84		
(k)	off mode with	n WOL ena	abled power de	emand (Watts) (where enabled);	Cat B : 0.83 Cat D : 0.84		
(I)	internal power supply efficiency at 10 %, 20 %, 50 % and 100 % of rated output power (if applicable):							
	10%	20%	50%	100%	Average			
(m)	external power supply efficiency (if applicable):							
	10%	20%	50%	100%	Average 90.6712%;			
	or level: V							
(o)	the minimum	number o	of loading cycle	s that the bat	teries can withstand (applies only t	o notebook computers):		
(p-1)	the measurement methodology used to determine information mentioned in points (I) – internal PSU efficiency:							
(p-2)	the measurement methodology used to determine information mentioned in points (m) – external PSU efficiency: EPA "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC							
(p-3)					ine information mentioned in po			

(p-4)	the measurement methodology used to determine information mentioned in maximum, idle, sleep, off mode power as defined in Point P9.1 in the Product IT Eco Declaration:								
			ENER	GY STAR measurement methodology					
(q)	sequence of steps for achieving a stable condition with respect to power demand::								
			2. Keep	vindows operating system system inactive until 25 minutes ure power data					
(r)	description	of how sleep and/or	off mod	de was selected or programmed:					
			2. Se	windows operating system lecting sleep and/or off mode by windows startup function tem into sleep or off mode					
(s)	sequence of mode:	of events required to	reach t	he mode where the equipment automatically changes to sleep and/or					
			2. Sys	windows operating system tem will automatically changes to sleep after 25 minutes by power lager setup					
(t)	the duration of idle state condition before the computer automatically reaches sleep mode, or another condition which does not exceed the applicable power demand requirements for sleep mode (in minutes): 25								
(u)	the length of time after a period of user inactivity in which the computer automatically reaches a power mode that has a lower power demand requirement than sleep mode (in minutes): 25								
(v)	the length	of time before the	display	sleep mode is set to activate after user inactivity (in minutes):	10				
(w)	information	on the energy-savir	ng poter	ntial of power management functionality:					
			User	information described in User Guide					
(x)	user inform	ation on how to ena	ble the	power management functionality:					
			User	information described in User Guide					
(z)	test parameters for measurements: — test voltage in V and frequency in Hz, — total harmonic distortion of the electricity supply system, — information and documentation on the instrumentation, set-up and circuits used for electrical testing:								
			Voltag	strument: YOKOGAWA WT210, Chroma 61604 AC source e/Frequency Range : 0~300V/15~1000Hz Harmonic Distortion : Less than 0.3%					
	Notebook Ba	attery Information:							
Yes		No	n/a	This notebook computer is operated by battery/ies that cannot be accessed at by a non-professional user.	nd replaced				
(Battery replaceable	not user e)	(Battery user replaceable)		The battery[ies] in this product cannot be easily replaced themselves	by users				