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Department of Education

SCIENCE

Equipment List, Specifications and Tendering Guidance – Physics (PHY)

Planning & Building Unit,
Department of Education

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Standards, Specifications and Conditions

There are six lists for science equipment, i.e. LAB, RES, BIO, CHE, PHY and AGR.
The provision of science equipment for science laboratories is as follows:

i) One Basic Science List – LAB – for each science laboratory.
ii) One Science Resource List– RES – for each two science laboratories and stored in the Science preparatory room, which links every two laboratories.
iii) One Agricultural Science List – AGR – for each Agricultural Science provision (in addition to i) and ii) above).
iv) One Biology List – BIO – for each Biology provision (in addition to i) and ii) above)
v) One Chemistry List – CHE –for each Chemistry provision (in addition to i) and ii) above)
vi) One Physics List – PHY – for each Physics provision (in addition to i) and ii) above).
vii) Each laboratory is supplied with a LAB list plus one of the senior science lists (i.e. BIO/CHE/PHY/AGR).

Note: Where the symbol ♣ is placed after a substance, a supplier who supplies a greater quantity than requested may be held responsible for removal and disposal of the excess.

All equipment shall be durable and safe for school use.
Equipment wholly or partly funded from public funds is subject to inspection by officers from the Department of Education and Skills.

It is essential that tenders and tenderers for equipment for school use shall:

- Comply fully with the specifications and be durable and safe for school use.
- Comply fully with the standards as detailed and shall comply fully with European Standards (EN), both established and developing.
- Comply with European electrical standards and CE marking as appropriate.
- Fully comply with requirements in the Request for Tenders (RFT) document.
- Be accompanied by documentation of sufficient detail for full evaluation.
- Include the completed and signed certificate of compliance.

Award of a contract is conditional on the production of a current tax clearance certificate.

Failure to comply with the above may result in the tender being deemed null and void.

Science Equipment (Physics)			
Code **Quantity**	**Descriptions and Specifications**		**Cost €:**
Section 1: Heat			
PHY/100 12	Calorimeter, Joule, 4 V, 3 A. Complete with stirrer, terminals and heating coil, lagged and fitted with outer jacket, lid with hole for thermometer.		
	Manufacturer:	Catalogue No:	
PHY/101 6	Calorimeter, metal block, 2 holes, to accept heater and thermometer, aluminium, 1 kg, complete with lagging jackets.		
	Manufacturer:	Catalogue No:	
PHY/102 6	Immersion heater, 12 V, suitable for use with metal block calorimeter PHY/101 above.		
	Manufacturer:	Catalogue No:	
PHY/103 6	Steam trap, all glass		
	Manufacturer:	Catalogue No:	

Section 2: Electricity/Electronics

PHY/2001	Dynamo, hand-driven (to demonstrate a.c. and d.c.)		
	Manufacturer:	Catalogue No:	
PHY/20112	Electrostatics kit, comprising acetyl rod, nylon rubber, silk rubber, fur rubber, simple form electrophorus and proof plane.		
	Manufacturer:	Catalogue No:	
PHY/2021	EHT supply, 0 – 6 kV with meter, current limiter and overload protection device. Two year warranty		
	Manufacturer:	Catalogue No:	
PHY/20312	Electronics kit to investigate semiconductors and basic electronics, mounted components with 4 mm electrical connection sockets, with test leads and batteries, suitable for senior cycle Physics		
	Manufacturer:	Catalogue No:	
PHY/2042	Galvanometer, spot, general purpose, sensitivity (direct) in the range 22 mm/μA, 2 mm/μV, 70 mm/μC, double reflecting optical system, electrical overload protection. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/2052	Induction coil, to give 50 mm spark minimum, 8 V d.c., complete with on/off switch and two 4 mm sockets. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/2066	Leaf electroscope: 100 x 60 x 140 mm approx. with a selection of rods and cloths to produce positive and negative charge.		
	Manufacturer:	Catalogue No:	
PHY/2071	Magnetic field demonstrator (Magnaprobe), to show 3-dimensional magnetic field, comprising of perspex box with 10 mm diameter tunnel extending through the centre, can be used on OHP		
	Manufacturer:	Catalogue No:	
PHY/2081	Transformer kit, demountable, suitable for student demonstrations. The kit should be capable of demonstrating the structure and principle of operation of transformers and some of their uses. Tapped coils with a range of coils of different numbers of turns, for example 50, 100, 200 turns.		
	Manufacturer:	Catalogue No:	
PHY/2091	Van de Graaff generator. Collecting sphere minimum diameter 270 mm approximately. Driven by electric motor 230 V, 50 Hz. Output up to 400 000 V.		
	Manufacturer:	Catalogue No:	
PHY/2101	Accessories for PHY209, Van de Graaff generator, set, ending in 4 mm plug, to include: Insulating rod with suspended conducting sphere Needle point discharger Rotary discharge whirl Head of hair Neon bulb on holder Insulated cylinder with conductive vibrative particles.		
	Manufacturer:	Catalogue No:	

PHY/211 1	Conductors, set of 3, on insulated pillars on metal base comprising of sphere 50 mm diameter, cylinder 125 x 50 mm, cone 100 x 50 height x base diameter, for use with Van de Graaff generator, PHY/209 above.		
	Manufacturer:	Catalogue No:	
PHY/212 1	Proof plane, 13 mm diameter approximately, on insulating handle, for use with PHY/209 above.		
	Manufacturer:	Catalogue No:	
PHY/213 6	Capacitor 10 000 µF. Mounted and fitted with 4 mm sockets.		
	Manufacturer:	Catalogue No:	
PHY/214 1	Parallel plate capacitor with moveable plates to show effect of area, distance between plates and material between plates on capacitance, supplied with a multimeter capable of reading in picofarads.		
	Manufacturer:	Catalogue No:	
PHY/215 1	Metre bridge, 4 gap, mounted on rigid PVC, with Constantan wire c.0.56 mm diameter, electrical connections via 4 mm sockets, scale graduated 0 – 100 cm x 1 mm and 100 to 0 cm x 1 mm. Complete with knife edge jockey.		
	Manufacturer:	Catalogue No:	
PHY/216 2 each	Resistors, for use with PHY/215 above 1 Ω, 2 Ω, 5 Ω, 10 Ω, 100 Ω		
	Manufacturer:	Catalogue No:	
PHY/217 6	Joulemeter/Wattmeter, low voltage d.c. or a.c. of any waveform, up to 10 kHz. Joulemeter, up to 8 digit display, max. load 20 V d.c./14 V a.c., maximum load current, 10 A d.c./7 A a.c., frequency range d.c. to 10 kHz. Wattmeter, moving coil meter display, maximum power 100 W, frequency range d.c. up to 10 kHz. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/218 1	Oscilloscope, dual trace, 20 MHz bandwidth, 8 x 10 cm screen with scale illumination, adapters to take 4 mm plugs Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/219 1	Oscilloscope (cathode ray) simulation/ demonstration on CD Rom		
	Manufacturer:	Catalogue No:	
PHY/220 1	Robust quality tube, cathode ray, demonstration type, in storage case, Teltron or equivalent, to include integrator for attachment to oscilloscope to enable display of characteristic curves		
	Manufacturer:	Catalogue No:	
PHY/221 1	Universal stand, to suit PHY/220 above.		
	Manufacturer:	Catalogue No:	
PHY/222 1	Signal generator and amplifier, frequency range 0.1 Hz – 100 kHz sine and square wave output. High and low impedance output and amplifier input, power gain 56 dB.		
	Manufacturer:	Catalogue No:	

Section 3: Mechanics

PHY/300 6	Force boards, wooden, c.610 x 485 mm, with bench mounting brackets using G-clamps		
	Manufacturer:	Catalogue No:	
PHY/301 12	G-clamp, 100 mm jaw, to suit PHY/300 above		
	Manufacturer:	Catalogue No:	
PHY/302 1	Roll of cord for use with heavy loads suitable for PHY/300 above.		
	Manufacturer:	Catalogue No:	
PHY/303 4	Centre rings for use with cord, PHY/302 above, pack 10		
	Manufacturer:	Catalogue No:	
PHY/304 12	Pulleys, 50 mm diameter, fitted with clamps for mounting on force boards, PHY/300 above.		
	Manufacturer:	Catalogue No:	
PHY/305 6	Dynamics system, kit, comprising track, trolley (2), pulley, mass pieces, ticker timer, cotton reels, ticker tape reels, carbon discs, housed in suitable wooden/plastic/metal box. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/306 1	Linear air-track, catapult arm with slots for elastic bands at each end of track. Fine adjustment of level of track possible, 3 vehicles, buffer attachment. Supplied complete with instructions for use. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/307 6	Dual/single timer with segmented millisecond timer display(s), stop/start on single timer mode, dual stop/start, gated, suitable for use with PHY/306 above and PHY/309 below. Supplied complete with light gates. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/308 1	Blower, air track, adjustable speed, complete with hose for connecting to air track above, mains 230 V, for use with PHY/306 above. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/309 6	“g” by free-fall apparatus consisting of release mechanism suitable for use with electronic timing device, PHY/307 above. Two year warranty.		
	Manufacturer:	Catalogue No:	

Section 4: Light

PHY/400 1	Fibre optic probe consisting of a bundle of non-coherent optic fibres, up to 300 mm long. Ends secured. Complete with lamp (6 V) attachment.		
	Manufacturer:	Catalogue No:	
PHY/401 1	Filters, infrared and ultraviolet, set.		
	Manufacturer:	Catalogue No:	
PHY/402 12	Glass block, optical quality, rectangular for refraction experiments. Approximate size 100 x 62 x 18 mm. Polished on all sides.		
	Manufacturer:	Catalogue No:	
PHY/403 12	Glass block, optical quality, semi-circular for refraction experiments. Approximate size 90 x 18 mm (diameter x thickness). Polished on all sides.		
	Manufacturer:	Catalogue No:	
PHY/404 12	Density Sets		
PHY/405 12	Laser pens, red		
	Manufacturer:	Catalogue No:	
PHY/406 6	Set of accessories for laser (PHY/406) to include tapered slit, metal gauge 300 mesh, two polaroid filters, grating, hologram, set of slides with 1, 2, 3, 4, 5, 6 slits having slit separation of approx. 0.25 mm.		
	Manufacturer:	Catalogue No:	
PHY/407 12	Lens, biconcave, optically worked glass with ground edge, 50 mm diameter. Focal length 150 mm.		
	Manufacturer:	Catalogue No:	
PHY/408 12	Lens, biconvex, optically worked glass with ground edge, 50 mm diameter. Focal length 150 mm.		
	Manufacturer:	Catalogue No:	
PHY/409 12	Lens holder, wooden, to suit PHY/408 and PHY/409 above		
	Manufacturer:	Catalogue No:	
PHY/410 1	Light source, compact, with tungsten halide 12 V, 100 W lamp for use on 12 V a.c. or d.c. supply.		
	Manufacturer:	Catalogue No:	
PHY/411 12	Mirror, concave, optically worked, back silvered, protective coating, 50 mm diameter. Focal length 150 mm.		
	Manufacturer:	Catalogue No:	
PHY/412 12	Mirror, convex, optically worked, back silvered, protective coating, 50 mm diameter. Focal length 150 mm.		
	Manufacturer:	Catalogue No:	

PHY/4131	Optical set, complete with light box operating from a 12 V a.c./d.c., 3 A power supply. The set comprises 3 different prisms, semi-circular and rectangular slabs, two bi-convex and one bi-concave lenses, plane, half round and parabolic mirrors, slits, bulb, colour filters and cards.		
	Manufacturer:	Catalogue No:	
PHY/4141	Optical bench, working length 1 m – 1.5 m approximately, graduated, with at least four saddles (at least two capable of fine traverse movement), levelling screws, lamp house and light source 12 V/24 W.		
	Manufacturer:	Catalogue No:	
PHY/4151	Set of accessories for optical bench (PHY/416) to include: 2 lens holder; 1 mirror holder ; 1 mounted needle; 2 optical pins; 1 pinhole screen; 1 cross wire; 1 prism table; 1 diaphragm with adjustable iris; 1 object screen; 1 receiving screen.		
	Manufacturer:	Catalogue No:	
PHY/4161	Photocell, selenium, mounted with connection for 4 mm plugs.		
	Manufacturer:	Catalogue No:	
PHY/4176	Prism, glass, 60/60/60º, 50 x 50 mm sides		
	Manufacturer:	Catalogue No:	
PHY/4186	Prism, glass, 90/60/30º, 40 x 40 mm sides		
	Manufacturer:	Catalogue No:	
PHY/4196	Prism, glass, 90/45/45º, 50 x 50 mm sides		
	Manufacturer:	Catalogue No:	
PHY/4202	Spectrometer, suitable for student use, graduated in 30 minute increments, two Verniers, 180 degrees apart, Collimeter, with c.178 mm rack and pinion focusing aperture, 25 mm diameter, variable slit, levelling screws. Prism table, diameter c.86 mm (height adjustable and lockable). Telescope, with c.178 mm rack and pinion focusing aperture, diameter 25 mm, Ramsden eyepiece. Flint prism, prism clamp, diffraction grating holder, cross line graticule, Vernier magnifier. Complete unit in packing case. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/4212	Spectral lamp, sodium, suitable for use with PHY/422 above. Also spectral lamp mercury. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/4222	Spectral transformer and lamp house, suitable for use with PHY/423 above Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/4231	Solar energy kit, comprising solar cells, motor, fan, on stand.		
	Manufacturer:	Catalogue No:	
PHY/4241	Ultraviolet lamp, hand-held, suitable for school use, dual wavelength, 254/366 nm, tubes 8 W, complete with stand		
	Manufacturer:	Catalogue No:	
PHY/42524	UV protective spectacles, for use with PHY/424 above		
	Manufacturer:	Catalogue No:	

Section 5: Atomic Physics/ Radiochemistry			
One Set only to be provided *per School*, on request, see CHE/400-404			
PHY/500 **1**	Geiger-Muller tube, suitable for classroom use.		
	Manufacturer:	Catalogue No:	
PHY/501 **1**	Holder and stand, suitable for use with Geiger-Muller tube PHY/500 above		
	Manufacturer:	Catalogue No:	
PHY/502 **1**	Scaler/ratemeter/timer for Geiger-Muller tube PHY/500 above.		
	Manufacturer:	Catalogue No:	
PHY/503 **1**	Radioactive source kit, set of 3 source types- e.g. alpha (Po-210), beta (Sr-90) and gamma (Co-60) - embedded in colour coded epoxy material, safe for use in classroom. No source to exceed 1.2 µCi. To include holder for sources and a range of items needed for demonstration of the differing absorption/ penetration powers and the effect of magnetic field on the three types of radiation. Suitable for use with equipment PHY/500-502 above.		
	Manufacturer:	Catalogue No:	
PHY/504 **1**	“Radioactive” source, electronic, simulated, allows determination of “half-life”, random numbers and Poisson distribution curve, powered 12 V a.c./d.c.		
	Manufacturer:	Catalogue No:	

Section 6: Measurement

PHY/6003	Boyle's law apparatus with Bourdon gauge, calibrated, complete with oil, pump and pressure tubing		
	Manufacturer:	Catalogue No:	
PHY/6016	Micrometer screw gauge, 0.25 mm x 0.01 mm. Also digital callipers of resolution 0.1mm		
	Manufacturer:	Catalogue No:	
PHY/6021	Hydrometer, specific gravity, universal application, calibrated, 0.700 – 2.000, up to c.340 mm long approximately, subdivisions 0.010		
	Manufacturer:	Catalogue No:	
PHY/6036	Vernier callipers, 0-120 mm x 0.1 mm with roller wheel adjustment and locking screw		
	Manufacturer:	Catalogue No:	
PHY/60412	Thermometer, digital, range **–**50 ºC to 200 ºC (approximately), hand held.		
	Manufacturer:	Catalogue No:	
PHY/6051	Thermometer, platinum resistance, enclosed in glass tube, platinum wire non-inductively wound on mica frame, leads connected to top of thermometer (one unit)		
	Manufacturer:	Catalogue No:	
PHY/6062	Thermocouple, copper-constantan, single with 0.5 m leads for connection to galvanometer.		
	Manufacturer:	Catalogue No:	
PHY/60712	Thermistor, mounted on 1 m leads terminating in 2 x 4 mm plugs, suitable for use in liquids.		
	Manufacturer:	Catalogue No:	
PHY/60812	Thermometer, ungraduated, non-roll, red spirit-filled, range –10 to 110 ºC		
	Manufacturer:	Catalogue No:	

Section 7: Energy Conversion / Waves / Sound			
PHY/7001	Ripple tank with power supply unit, illumination, motor stroboscope and accessories. Two year warranty.		
	Manufacturer:	Catalogue No:	
PHY/7016	Sonometer. Movable bridges, two wire pattern. Wire fitted to spring balance and wrest pin with key to adjust tension.		
	Manufacturer:	Catalogue No:	
PHY/7022	Slinky Spring		
	Manufacturer:	Catalogue No:	
PHY/7032	Sound level meter, digital. Low scale/ high scale, complete with microphone.		
	Manufacturer:	Catalogue No:	
PHY/7043	Tuning forks, set, mounted on resonance boxes. Frequency 426.6 Hz. One fitted with adjustable load mass.		
	Manufacturer:	Catalogue No:	
PHY/7054	Resonance tubes, comprising two glass tubes, diameter 32 mm (closed at one end) and 25 mm respectively. Length 305 mm. Smaller tube slides within the inner tube on foam plastic collars.		
	Manufacturer:	Catalogue No:	
PHY/7061	Microphone, frequency response 100 – 10 000 Hz, hand held with BNC connection for use with oscilloscope, PHY/219 above.		
	Manufacturer:	Catalogue No:	

Section 8: Data Collection Equipment – Physics

PHY/800 1	Radiation monitor sensor, to measure alpha, beta and gamma radiation, suitable for use with data logging equipment. ONE ITEM ONLY PER SCHOOL, supply if specifically requested only – SEE PART 3		
	Manufacturer:	Catalogue No:	
PHY/801 12	Photogate with digital adapter, suitable for use with data logging equipment		
	Manufacturer:	Catalogue No:	
PHY/802 12	Pulley attachment for photogate DAT/401, above		
	Manufacturer:	Catalogue No:	
PHY/803 12	Picket fence, 8 opaque bars silk-screened at intervals of 50 mm, for use with photogate, DAT/401 above.		
	Manufacturer:	Catalogue No:	
PHY/804 12	Voltage and current probe system (min.c. 0.6 A, ± 6 V a.c./d.c.). Note: Single function probes acceptable (6 no. of each)		
	Manufacturer:	Catalogue No:	
PHY/805 3	Barometric sensor, range approx. 0.8 to 1.05 atm, min. 10 bit resolution		
	Manufacturer:	Catalogue No:	
PHY/806 1	Manual for Physics experiment		
	Manufacturer:	Catalogue No:	

Section 9: Miscellaneous			
PHY/900 1	Demonstration software to simulate Rutherford's Experiment		
	Manufacturer:	Catalogue No:	
PHY/901 1 each	Charts: Set of Physics Charts (SI units) with portable tripod. Size approximately 100 x 75 mm coloured, Welch or equivalent, to illustrate the following: • Electromagnetic spectrum; • Optical instruments; • Semi-conductor devices; • Ionizing radiation detectors; • Motor and d.c. generator (dynamo); Or selection of 5 charts to be decided by school.		
	Manufacturer:	Catalogue No:	

Equipment for Physics

Section	Code	Total Costs €:
Section 1	**Heat**	
Section 2	**Electricity/Electronics**	
Section 3	**Mechanics**	
Section 4	**Light**	
Section 5	**Atomic Physics**	
Section 6	**Measurement**	
Section 7	**Energy Conversion/ Waves / Sound**	
Section 8	**Data Collection Equipment**	
Section 9	**Miscellaneous**	

Total (€)	
Add for VAT (€)	
Total amount for PHY List (€)	

Standards, Specifications and Conditions

All Equipment shall be Durable and Safe for School Use. Equipment wholly or partly funded from public funds is subject to Inspection byOfficers from the Department of Education.

It is essential that tenders for equipment for School Use shall:

i) Comply fully with the specifications and be durable and safe for School Use.
ii) Comply fully with the standards as detailed and shall comply fully with European (EN) standards, bothestablished and developing.
iii) Comply with European electrical standards and CE marking as appropriate.
iv) Fully comply with requirements in the Request for Tenders (RFT) document.
v) Be accompanied by documentation of sufficient detail for full evaluation.
vi) Include the completed and signed certificate of compliance.

Award of a contract is conditional on the production of a current tax clearance certificate.

Failure to comply with the above may result in the tender being deemed null and void.

Certificate of Compliance with Standards, Specifications & Conditions:

I/We certify that the equipment tendered complies in all respects with the Standards, Specifications and other requirements/conditions specified in this tender document and in the Request for Tenders (RFT).
I/We hold a current tax clearance certificate.

Company: _____

Signed: _____ Date: _____

Position: _____