



AN ROINN | DEPARTMENT
OIDEACHAIS | OF EDUCATION
AGUS SCILEANNA | A N D S K I L L S

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Room: Science Laboratory

Physics – PHY

Equipment List and Specification

There are six lists for science equipment, i.e. LAB, RES, DAT, CHE, PHY and BIO.

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.
- iii) One Data List – DAT, Part 1 - for each **two** science laboratories.
- iv) One Biology List – BIO – for each Biology provision (in addition to i) and ii) above) plus Part 2 of DAT List.
- v) One Chemistry List – CHE –for each Chemistry provision (in addition to i) and ii) above) plus Part 3 of DAT List.
- vi) One Physics List – PHY – for each Physics provision (in addition to i) and ii) above) plus Part 4 of DAT List
- vii) **Max. no. of Senior Lists: 3 for up to 4 labs; 4 for 5 labs; 5 for 6 labs.**

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.

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 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 2 | Calorimeter, metal block, 2 holes, to accept heater and thermometer, aluminium, 1 kg | |
| | Manufacturer: _____ Catalogue No: _____ | |
| PHY/102 2 | Immersion heater, 12 V, suitable for use with metal block calorimeter PHY/101 above. | |
| | Manufacturer: _____ Catalogue No: _____ | |
| PHY/103 2 | Steam trap, all glass | |
| | Manufacturer: _____ Catalogue No: _____ | |

| Section 2: Electricity/Electronics | | |
|---|--|---------------|
| PHY/200 1 | Dynamo, hand-driven (to demonstrate a.c. and d.c.) | |
| | Manufacturer: | Catalogue No: |
| PHY/201 2 | Electrostatics kit, comprising acetyl rod, nylon rubber, silk rubber, fur rubber, simple form electrophorus and proof plane. | |
| | Manufacturer: | Catalogue No: |
| PHY/202 1 | EHT supply, 0 – 6 kV with meter, current limiter and overload protection device. | |
| | Two year warranty. | |
| | Manufacturer: | Catalogue No: |
| PHY/203 6 | 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/204 1 | 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/205 1 | 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/206 4 | 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/207 1 | 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/208 1 | 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/209 1 | Van de Graaff generator. Collecting sphere diameter 270 mm approximately. Driven by electric motor 230 V, 50 Hz. Output up to 400 000 V. | |
| | Manufacturer: | Catalogue No: |
| PHY/210 1 | 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 1 | Capacitor 10 000 μ F. 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. | |
| | Manufacturer: | Catalogue No: |
| PHY/215 6 | 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 1 | 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 6 | 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 | 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 4 | Force boards, wooden, c.610 x 485 mm, with bench mounting brackets using G-clamps | |
| | Manufacturer: | Catalogue No: |
| PHY/301 8 | 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 10 | Pulleys, 50 mm diameter, fitted with clamps for mounting on force boards, PHY/300 above. | |
| | Manufacturer: | Catalogue No: |
| PHY/305 4 | 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. | |
| | Two year warranty. | |
| | Manufacturer: | Catalogue No: |
| PHY/307 1 | 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. | |
| | 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 4 | "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 6 | 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 6 | 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 6 | Block, acrylic plastic (clear) for refraction experiments, 19 mm thick, rectangular, 75 x 50 mm sides | |
| | Manufacturer: | Catalogue No: |
| PHY/405 | deleted | |
| | Manufacturer: | Catalogue No: |
| PHY/406 1 | Laser, 0.5- 0.7 mW approximate output power. | |
| | Manufacturer: | Catalogue No: |
| PHY/407 1 | 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/408 12 | Lens, biconcave, optically worked glass with ground edge, 50 mm diameter. Focal length 150 mm. | |
| | Manufacturer: | Catalogue No: |
| PHY/409 12 | Lens, biconvex, optically worked glass with ground edge, 50 mm diameter. Focal length 150 mm. | |
| | Manufacturer: | Catalogue No: |
| PHY/410 12 | Lens holder, wooden, to suit PHY/408 and PHY/409 above | |
| | Manufacturer: | Catalogue No: |
| PHY/411 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/412 12 | Mirror, concave, optically worked, back silvered, protective coating, 50 mm diameter. Focal length 150 mm. | |
| | Manufacturer: | Catalogue No: |
| PHY/413 12 | Mirror, convex, optically worked, back silvered, protective coating, 50 mm diameter. Focal length 150 mm. | |
| | Manufacturer: | Catalogue No: |

| | | |
|---------------|---|---------------|
| PHY/414 1 | 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/415 1 | 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/416 1 | 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/417 1 | Photocell, selenium, mounted with connection for 4 mm plugs. | |
| | Manufacturer: | Catalogue No: |
| PHY/418 1 | Prism, glass, 60/60/60°, 50 x 50 mm sides | |
| | Manufacturer: | Catalogue No: |
| PHY/419 1 | Prism, glass, 90/60/30°, 40 x 40 mm sides | |
| | Manufacturer: | Catalogue No: |
| PHY/420 1 | Prism, glass, 90/45/45°, 50 x 50 mm sides | |
| | Manufacturer: | Catalogue No: |
| PHY/421 1 | 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/422 1 | Spectral lamp, sodium, suitable for use with PHY/422 above. | |
| | Two year warranty. | |
| | Manufacturer: | Catalogue No: |
| PHY/423 1 | Spectral transformer and lamp house, suitable for use with PHY/423 above | |
| | Two year warranty. | |
| | Manufacturer: | Catalogue No: |
| PHY/424 1 | Solar energy kit, comprising solar cells, motor, fan, on stand. | |
| | Manufacturer: | Catalogue No: |
| PHY/425 1 | Ultraviolet lamp, hand-held, suitable for school use, dual wavelength, 254/366 nm, tubes 8 W, complete with stand | |
| | Manufacturer: | Catalogue No: |
| PHY/426 24 | UV protective spectacles, for use with PHY/426 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 μ Ci. 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/600 2 | Boyle's law apparatus with Bourdon gauge, calibrated, complete with oil, pump and pressure tubing | |
| | Manufacturer: | Catalogue No: |
| PHY/601 2 | Micrometer screw gauge, 0.25 mm x 0.01 mm | |
| | Manufacturer: | Catalogue No: |
| PHY/602 2 | Hydrometer, specific gravity, universal application, calibrated, 0.700 – 2.000, up to c.340 mm long approximately, subdivisions 0.010 | |
| | Manufacturer: | Catalogue No: |
| PHY/603 2 | Vernier callipers, 0-120 mm x 0.1 mm with roller wheel adjustment and locking screw | |
| | Manufacturer: | Catalogue No: |
| PHY/604 6 | Thermometer, digital, range –50 °C to 200 °C (approximately), hand held. | |
| | Manufacturer: | Catalogue No: |
| PHY/605 1 | 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/606 2 | Thermocouple, copper-constantan, single with 0.5 m leads for connection to galvanometer. | |
| | Manufacturer: | Catalogue No: |
| PHY/607 12 | Thermistor, mounted on 1 m leads terminating in 2 x 4 mm plugs, suitable for use in liquids. | |
| | Manufacturer: | Catalogue No: |
| PHY/608 12 | Thermometer, ungraduated, non-roll, red spirit-filled, range –10 to 110 °C | |
| | Manufacturer: | Catalogue No: |

| Section 7: Energy Conversion / Waves / Sound | | |
|---|---|---------------|
| PHY/700 1 | Ripple tank with power supply unit, illumination, motor stroboscope and accessories. | |
| | Two year warranty. | |
| | Manufacturer: | Catalogue No: |
| PHY/701 1 | Wave motion apparatus, "Haig" or equivalent, to demonstrate transverse and longitudinal wave motion. | |
| | Manufacturer: | Catalogue No: |
| PHY/702 6 | Sonometer. Movable bridges, two wire pattern. Wire fitted to spring balance and wrest pin with key to adjust tension. | |
| | Manufacturer: | Catalogue No: |
| PHY/703 2 | Slinky Spring | |
| | Manufacturer: | Catalogue No: |
| PHY/704 1 | Sound level meter, digital. Low scale/ high scale, complete with microphone. | |
| | Manufacturer: | Catalogue No: |
| PHY/705 1 | Tuning forks, pair, mounted on resonance boxes. Frequency 426.6 Hz. One fitted with adjustable load mass. | |
| | Manufacturer: | Catalogue No: |
| PHY/706 4 | 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/707 1 | Microphone, frequency response 100 – 10 000 Hz, hand held with BNC connection for use with oscilloscope, PHY/219 above. | |
| | Manufacturer: | Catalogue No: |

| Section 8: Miscellaneous | | |
|---------------------------------|--|---------------|
| PHY/800 1 | Demonstration software to simulate Rutherford's Experiment | |
| | Manufacturer: | Catalogue No: |
| PHY/801 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: <ul style="list-style-type: none"> • 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 Science (Physics) | | | |
|--|---------------------------|---|--------------------------|
| Nine Sections | | | |
| Section | Code Quantity. | Descriptions & Specifications: | Total Cost €: |
| Section 1 | PHY/100 - PHY/103 | Heat | |
| Section 2 | PHY/200 - PHY/222 | Electricity/Electronics | |
| Section 3 | PHY/300 - PHY/309 | Mechanics | |
| Section 4 | PHY/400 - PHY/426 | Light | |
| Section 5 | PHY/500 - PHY/504 | Atomic Physics | |
| Section 6 | PHY/600 - PHY/608 | Measurement | |
| Section 7 | PHY/700 – PHY/707 | Energy Conversion/ Waves / Sound | |
| Section 8 | PHY/800- PHY/801 | Miscellaneous | |
| Sub-total: € | | | |
| Add for VAT: € | | | |
| Total Amount for PHY List: € | | | |

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- 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.

Certificate of Compliance with Standards, Specifications and 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: _____