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GOVERNMENT NOTICES

DEPARTMENT OF AGRICULTURE

No. R. 1770

14 October 1994

MARKETING ACT, 1968
(ACT No. 59 OF 1968)

PROHIBITION OF THE SALE OF MOHAIR ACCEPTED THROUGH THE BOARD OR TO REGISTERED PERSONS: REVOCATION

I, André Isak van Niekerk, Minister of Agriculture, make known in terms of section 79 of the Marketing Act, 1968 (Act No. 59 of 1968), that—

(a) the Mohair Scheme referred to in section 6 of the Mohair Scheme published by Government Notice No. R. 1304 of 15 June 1990, has under section 41 of the said Scheme repealed the prohibition published by Government Notice No. R. 282 of 25 February 1972.

(b) the said repeal has been approved by me and shall come into operation on the date of publication hereof.

A. I. VAN NIEKERK,
Minister of Agriculture.

No. R. 1773

14 October 1994

MARKETING ACT, 1968
(ACT No. 59 OF 1968)

OILSEEDS SCHEME: LEVIES AND SPECIAL
LEVIES: AMENDMENT

I, André Isak van Niekerk, Minister of Agriculture, hereby make known in terms of section 79 of the Marketing Act, 1968 (Act No. 59 of 1968), that—

(a) the Oilseeds Board referred to in section 6 of the Oilseeds Scheme published by Proclamation No. R. 73 of 1982, as amended, has under sec-

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GOEWERMENSKENNISGEWINGS

DEPARTEMENT VAN LANDBOU

No. R. 1770

14 Oktober 1994

BEMARKINGSWET, 1968
(WET No. 59 VAN 1968)

SYBOKHAARSKEMA: VERBOD OP DIE VERKOOP VAN SYBOKHAAR BEHALWE DEUR BEMIDDELING VAN DIE SYBOKHAARRAAD OF AAN GERE-GISTREERDE PERSONE: HERROEPING

Ek, André Isak van Niekerk, Minister van Landbou, maak hiermee ingevolge artikel 79 van die Bemarkingswet, 1968 (Wet No. 59 van 1968), bekend dat—

(a) die Sybokhaarraad bedoel in artikel 6 van die Sybokhaarskema gepubliseer by Goewermenskennisgewing No. R. 1304 van 15 Junie 1990, kragtens artikel 41 van genoemde Skema die verbod gepubliseer by Goewermenskennisgewing No. R. 282 van 25 Februarie 1972, herroep het.

(b) bedoelde herroeping deur my goedgekeur is en op datum van publikasie in werking tree.

A. I. VAN NIEKERK,
Minister van Landbou.

No. R. 1773

14 Oktober 1994

BEMARKINGSWET, 1968
(WET No. 59 VAN 1968)

OLIESADESKEMA: HEFFINGS EN SPESIALE
HEFFINGS: WYSIGING

Ek, André Isak van Niekerk, Minister van Landbou, maak hierby ingevolge artikel 79 van die Bemarkingswet, 1968 (Wet No. 59 van 1968), bekend dat—

(a) die Oliesaderaad bedoel in artikel 6 van die Oliesadeskema gepubliseer by Proklamasie No. R. 73 van 1982, soos gewysig, kragtens

16021—1

tions 20 and 21 of the said Scheme amended the Schedule to Government Notice No. R. 906 of 6 May 1994, to the extent set out in the Schedule hereto; and

- (b) the said amendment has been approved by me and shall come into operation on the date of publication hereof.

A. I. VAN NIEKERK,
Minister of Agriculture.

SCHEDULE

The Schedule to Government Notice No. R. 906 of 6 May 1994 is hereby amended by the substitution of Table 1 of the following table:

"TABLE 1 • TABEL 1

| Kind of oilseeds Soort oliesade | Levy per ton on— Heffing per ton op—* | | Special levy per ton on— Spesiale heffing per ton op—* | |
|---|--|---|--|---|
| | Oilseeds pro- duced for the pur- pose of sale/Olie- sade geproduseer vir verkoop | Imported oilseed- s/Ingevoerde olie- sade | Oilseeds pro- duced for the pur- pose of sale/Olie- sade geproduseer vir verkoop | Imported oil- seeds/Ingevoerde oliesade |
| 1 | 2 | 3 | 4 | 5 |
| | R | R | R | R |
| 1. Shelled groundnuts/Gedopte grondbone | 66,00 | 16,50 | 33,25 | 8,31 |
| 2. Sunflower seed/Sonneblomsaad..... | 17,20 | 4,30 | 50,00 | 12,50 |
| 3. Soya beans/Sojabone | 20,20 | 5,05 | 42,55 | 2,39 |

* VAT calculated in accordance with arrangement with Commissioner of Inland Revenue in terms of section 9 (4) of the Law on Value Added Tax, 1991/BTW verreken volgens reëling met Kommissaris van Binnelandse Inkomste kragtens artikel 9 (4) van die Wet op Toegevoegde Waarde, 1991.

DEPARTMENT OF FINANCE

No. R. 1743

14 October 1994

CUSTOMS AND EXCISE ACT, 1964

AMENDMENT OF SCHEDULE No. 1 (No. 1/1/693)

Under section 48 of the Customs and Excise Act, 1964, Part 1 of Schedule No. 1 to the said Act is hereby amended to the extent set out in the Schedule hereto.

D. L. KEYS,
Minister of Finance.

SCHEDULE

| Head- ing | Subheading | C. D. | Article Description | Statistical Unit | Rate of Duty | Annotations |
|--------------|------------|----------|---|---------------------|--------------|-------------|
| 85.18 | | | By the substitution for subheading No. 8518.22.90 of the following: | | | |
| | “.90 | 4 | Other | no. | free" | |
| 85.25 | | | By the substitution for subheading No. 8525.30 of the following: | | | |
| | "8525.30 | 2 | Television cameras | no. | free" | |

BYLAE

| Pos | Subpos | T. S. | Artikelbeskrywing | Statistiese Eenheid | Skaal van Reg | Annotasies |
|-------|----------|----------|--|------------------------|---------------|------------|
| 85.18 | | | Deur subpos No. 8518.22.90 deur die volgende te vervang: | | | |
| | “.90 | 4 | Ander | getal | vry" | |
| 85.25 | | | Deur subpos No. 8525.30 deur die volgende te vervang: | | | |
| | "8525.30 | 2 | Televisiekameras | getal | vry" | |

artikels 20 en 21 van die genoemde Skema, die Bylae by Goewermenskennisgewing No. R. 906 van 6 Mei 1994, gewysig het in die mate in die Bylae uiteengesit; en

- (b) genoemde wysiging deur my goedgekeur is en op datum van publikasie hiervan in werking tree.

A. I. VAN NIEKERK,
Minister van Landbou.

BYLAE

Die Bylae by Goewermenskennisgewing No. R. 906 van 6 Mei 1994 word hiermee gewysig deur Tabel 1 daarvan deur die volgende tabel te vervang:

DEPARTEMENT VAN FINANSIES

No. R. 1743

14 Oktober 1994

DOEANE- EN AKSYNSWET, 1964

WYSIGING VAN BYLAE No. 1 (No. 1/1/693)

Kragtens artikel 48 van die Doeane- en Aksynswet, 1964, word Deel 1 van Bylae No. 1 by genoemde Wet hiermee gewysig in die mate in die Bylae hiervan aangetoon.

D. L. KEYS,
Minister van Finansies.

No. R. 1744**14 October 1994****No. R. 1744****14 Oktober 1994****CUSTOMS AND EXCISE ACT, 1964****AMENDMENT OF SCHEDULE No. 1 (No. 1/2/80)**

Under section 48 of the Customs and Excise Act, 1964, Part 2B of Schedule No. 1 to the said Act is hereby amended to the extent set out in the Schedule hereto.

D. L. KEYS,

Minister of Finance.

DOEANE- EN AKSYNSWET, 1964**WYSIGING VAN BYLAE No. 1 (No. 1/2/80)**

Kragtens artikel 48 van die Doeane- en Aksynswet, 1964, word Deel 2B van Bylae No. 1 by genoemde Wet hiermee gewysig in die mate in die Bylae hiervan aangetoon.

D. L. KEYS,

Minister van Finansies.

SCHEDULE

| I Item | II Head- ing | III Subheading | IV Article Description | V Rate of Duty | | Annota- tions |
|-----------|--------------------|-------------------|--|-------------------|---------|------------------|
| | | | | Excise | Customs | |
| 124.40 | | | By the deletion of subheading No. 8518.22. | | | |

BYLAE

| I Item | II Pos | III Subpos | IV Artikelbeskrywing | V Skaal van Reg | | Annota- sies |
|-----------|-----------|---------------|-----------------------------------|--------------------|--------|-----------------|
| | | | | Aksyns | Doeane | |
| 124.40 | | | Deur subpos No. 8518.22 te skrap. | | | |

No. R. 1745**14 October 1994****No. R. 1745****14 Oktober 1994****CUSTOMS AND EXCISE ACT, 1964****AMENDMENT OF SCHEDULE No. 3 (No. 3/270)**

Under section 75 of the Customs and Excise Act, 1964, Schedule No. 3 to the said Act is hereby amended to the extent set out in the Schedule hereto.

C. F. LIEBENBERG,

Minister of Finance.

DOEANE- EN AKSYNSWET, 1964**WYSIGING VAN BYLAE No. 3 (No. 3/270)**

Kragtens artikel 75 van die Doeane- en Aksynswet, 1964, word Bylae No. 3 by genoemde Wet hiermee gewysig in die mate in die Bylae hiervan aangetoon.

C. F. LIEBENBERG,

Minister van Finansies.

SCHEDULE

| I Rebate Item | II | | | III Extent of Rebate | Annota- tions |
|---------------------|-------------------|----------------|----------|----------------------------|---|
| | Tariff Heading | Rebate Code | T. S. | | |
| 308.02 | "3920.10 | 01.06 | 60 | Full duty" | |
| | | | | | By the insertion after tariff heading No. 38.09 of the following: Plates, sheets, film, foil and strip, of polymers of ethylene, non-cellular and not reinforced, laminated, supported or similarly combined with other materials, for the manufacture of briefcases and school satchels |

BYLAE

| I Korting- item | II | | | III Mate van Korting | Annota- sies |
|-----------------------|----------------|------------------|----------|----------------------------|---|
| | Tarief- pos | Korting- kode | T. S. | | |
| 308.02 | "3920.10 | 01.06 | 60 | Volle reg" | |
| | | | | | Deur na tariefpos No. 38.09 die volgende in te voeg: Plate, velle, film, foelie en reep, van polimere van etileen, nie-sellulêr en nie versterk, gelamelleer, gesteun of op dergelike wyse met ander stowwe saamgevoeg nie, vir die vervaardiging van portefeuljies en boeksakke |

No. R. 1752**14 October 1994****No. R. 1752****14 Oktober 1994****CUSTOMS AND EXCISE ACT, 1964****AMENDMENT OF SCHEDULE No. 1 (No. 1/1/694)**

Under section 48 of the Customs and Excise Act, 1964, Part 1 of Schedule No. 1 to the said Act is hereby amended to the extent set out in the Schedule hereto.

C. F. LIEBENBERG,
Minister of Finance.

DOEANE- EN AKSYNSWET, 1964**WYSIGING VAN BYLAE No. 1 (No. 1/1/694)**

Kragtens artikel 48 van die Doeane- en Aksynswet, 1964, word Deel 1 van Bylae No. 1 by genoemde Wet hiermee gewysig in die mate in die Bylae hiervan aangetoon.

C. F. LIENBERG,
Minister van Finansies.

SCHEDULE

| Heading | Subheading | C. D. | Article Description | Statistical Unit | Rate of Duty | Annotations |
|----------|------------|-------|--|------------------|--------------|-------------|
| 12.01 | | | By the substitution for heading No. 12.01 of the following: | kg | 0,65c/kg" | |
| "12.01 | 1201.00 | 6 | Soya beans, whether or not broken | | | |
| 12.06 | | | By the substitution for heading No. 12.06 of the following: | kg | 10%" | |
| "12.06 | 1206.00 | 4 | Sunflower seeds, whether or not broken | | | |
| 12.07 | | | By the substitution for subheading No. 1207.20 of the following: | kg | 10%" | |
| "1207.20 | | 7 | Cotton seeds | | | |

BYLAE

| Pos | Subpos | T. S. | Artikelbeskrywing | Statistiese Eenheid | Skaal van Reg | Annotasies |
|----------|---------|-------|---|---------------------|---------------|------------|
| 12.01 | | | Deur pos No. 12.01 deur die volgende te vervang: | kg | 0,65c/kg" | |
| "12.01 | 1201.00 | 6 | Sojabone, hetsy gebreek al dan nie | | | |
| 12.06 | | | Deur pos No. 12.06 deur die volgende te vervang: | kg | 10%" | |
| "12.06 | 1206.00 | 4 | Sonneblomsaad, hetsy gebreek al dan nie | | | |
| 12.07 | | | Deur subpos No. 1207.20 deur die volgende te vervang: | kg | 10%" | |
| "1207.20 | | 7 | Katoensaad | | | |

No. R. 1753**14 October 1994****No. R. 1753****14 Oktober 1994****CUSTOMS AND EXCISE ACT, 1964****AMENDMENT OF SCHEDULE No. 4 (No. 4/163)**

Under section 75 of the Customs and Excise Act, 1964, Schedule No. 4 to the said Act is hereby amended to the extent set out in the Schedule hereto.

C. F. LIEBENBERG,
Minister of Finance.

DOEANE- EN AKSYNSWET, 1964**WYSIGING VAN BYLAE No. 4 (No. 4/163)**

Kragtens artikel 75 van die Doeane- en Aksynswet, 1964, word Bylae No. 4 by genoemde Wet hiermee gewysig in die mate in die Bylae hiervan aangetoon.

C. F. LIEBENBERG,
Minister van Finansies.

SCHEDULE

| I Rebate Item | II | | | III Extent of Rebate | Annotations |
|---|----------------|-------------|-------|-------------------------|-------------|
| | Tariff Heading | Rebate Code | C. D. | | |
| 410.02 460.02 | "00.00 | 01.00 | 05 | Full duty" | |
| By the deletion of rebate item 410.02. By the insertion before tariff heading No. 12.05 of the following: Potatoes, dried leguminous vegetables, cereals and oil seeds, verified by the Director-General: Agriculture that it can only be used for planting or sowing | | | | | |

BYLAE

| I Korting-item | II | | | III Mate van Korting | Annotasies |
|--|------------|--------------|-------|-------------------------|------------|
| | Tarief-pos | Korting-kode | T. S. | | |
| 410.02 460.02 | "00.00 | 01.00 | 05 | Volle reg" | |
| Deur kortingitem 410.02 te skrap. Deur voor tariefpos No. 12.05 die volgende in te voeg: Aartappels, gedroogde peulgroente, graansoorte en oliesade, deur die Direkteur-generaal: Landbou geverifieer dat dit slegs vir plant of saaidoeleindes gebruik kan word | | | | | |

DEPARTMENT OF HEALTH**No. R. 1746****14 October 1994**THE SOUTH AFRICAN MEDICAL AND
DENTAL COUNCIL**REGULATIONS DEFINING THE SCOPE OF THE
PROFESSION OF BIOKINETICS**

The Minister of Health has, in terms of section 33 (1) of the Medical, Dental and Supplementary Health Service Professions Act, 1974 (Act No. 56 of 1974), on the recommendation of the South African Medical and Dental Council, made the regulations in the Schedule.

SCHEDULE

1. In these regulation "the Act" means the Medical, Dental and Supplementary Health Service Professions Act, 1974 (Act No. 56 of 1974), and any expression to which a meaning has been assigned in the Act shall bear such meaning, and unless the context otherwise indicates—

"**biokinetics**" means the profession concerned with preventive health care, the maintenance of physical abilities and final phase rehabilitation, by means of scientifically-based physical activity programmes;

"**biokineticist**" means a person registered under article 32 (1) (a) of the Act as a biokineticist;

"**scientifically-based physical activity programmes**" means specific and individual-oriented physical training programmes based on the individual's physical condition and compiled and supervised;

"**final phase rehabilitation**" means the period or phase in the rehabilitation process in which physical activity and physical conditioning constitute the primary therapeutic modality;

2. The following acts of biokineticist shall, for the purposes of the Act, be deemed to be acts that pertain especially to the profession of biokinetics:

(1) Promotion of physical abilities, prevention of certain ailments, and physical selection:

(a) Recording of general history with a view to determining the risks of exercise (if any) for the individual.

(b) Evaluation: Physical work capacity test: Determination of physical work capacity with the aid of a cycle ergometer or treadmill, monitoring equipment and available associated equipment to arrive at and determine an effective and safe exercise level for an exercise programme prescription using the following tests:

(i) Monitoring of heart rate with an electrocardiograph or heart rate monitor during multistage workloads.

(ii) Measurements of blood pressure and other physiological responses before, during and after work.

DEPARTEMENT VAN GESONDHEID**No. R. 1746****14 Oktober 1994**DIE SUID-AFRIKAANSE GENEESKUNDIGE EN
TANDHEELKUNDIGE RAAD**REGULASIES WAT DIE OMVANG VAN DIE BEROEP
BIOKINETIKA OMSKRYF**

Die Minister van van Gesondheid het, op aanbeveling van die Suid-Afrikaanse Geneeskundige en Tandheelkundige Raad, kragtens artikel 33 (1) van die Wet op Geneeshere, Tandartse en Aanvullende Gesondheidsdiensberoep, 1974 (Wet No. 56 van 1974), die regulasies in die Bylae uitgevaardig.

BYLAE

1. In hierdie regulasies beteken "die Wet" die Wet op Geneeshere, Tandartse en Aanvullende Gesondheidsdiensberoep, 1974 (Wet No. 56 van 1974), en het enige uitdrukking waaraan 'n betekenis in die Wet geheg is daardie betekenis en, tensy uit die samehang anders blyk, beteken—

"**biokinetika**" die beroep wat betrokke is by voorkomende gesondheidsorg, die instandhouding van fisieke vermoëns en finale fase rehabilitasie, deur gebruikmaking van wetenskaplike gefundeerde fisieke aktiwiteitsprogramme;

"**biokinetikus**" 'n persoon wat kragtens artikel 32 (1) (a) van die Wet as 'n biokinetikus geregistreer is;

"**wetenskaplik gefundeerde fisieke aktiwiteitsprogramme**" spesifieke en individueel gerigte fisieke inoefeningsprogramme op die individu se fisieke toestand gebaseer wat opgestel en waaroor toesig gehou word;

"**finale fase rehabilitasie**" die tydperk of fase in die rehabilitasieproses waartydens fisieke aktiwiteite en fisieke kondisionering die primêre terapeutiese modaliteit vorm;

2. Die volgende handeling van biokineticici word vir die toepassing van die Wet geag handelinge te wees wat by die beroep biokinetika tuishoort:

(1) Bevordering van fisieke vermoëns, voorkoming van bepaalde siektetoestande, en fisieke keuring:

(a) Algemene geskiedenisopname met die doel om die oefenrisiko's (indien daar is) vir die individu te bepaal.

(b) Evaluering: Fisieke werkvermoëtoets: Bepaling met behulp van 'n fietsergometer of trapmeul, monitorapparaat en beskikbare verwante apparaat ten einde vir 'n oefenprogram-voorskrif 'n effektiewe en veilige oefeningsvlak daar te stel wat bepaal word met behulp van die volgende toetse:

(i) Monitering van harttempo deur middel van 'n elektrokardiograaf of harttempo-monitor tydens meervlakkige werkloadings.

(ii) Meting van bloeddruk en ander fisiologiese response voor, tydens en na arbeid.

- (iii) Measurement of range of motion and muscle strength.
 - (iv) Evaluation of body posture and body composition.
 - (c) Exercise programme prescription: Prescription, follow-up of and guidance of specific exercise programmes.
 - (d) Physical selection: Evaluation of and exercise programme prescription for special groups and professions.
 - (2) Final phase rehabilitation: Musculoskeletal system:
 - (a) Functional ergological assessment: The assessment of the affected limb or body part to determine the functional limitations with the aid of the following:
 - (i) Specific history of the condition and previous treatment, and a general medical history.
 - (ii) Specific assessment of the affected limb or body part. This includes the manual determination of:
 - range of motion;
 - muscle strength; and
 - flexibility.
 - (iii) Analysis of posture.
 - (iv) Specialised tests for muscle strength, muscle exhaustion and range of motion of joints by means of the assessment of torque, muscle, work, ratios between antagonistic muscle groups with regard to torque and work, bilateral comparisons with regard to torque and work, range of motion and extent and position of restriction resulting from injury or deviation.

| | | |
|-------------|---------------------------|-----------|
| — Knee: | Flexion/extension: | bilateral |
| — Ankle: | Dorsi/plantar flexion: | bilateral |
| | Inversion/eversion: | bilateral |
| — Shoulder: | Abduction/adduction: | bilateral |
| | Extension/flexion: | bilateral |
| — Elbow: | Extension/flexion: | bilateral |
| — Hip: | Abduction/adduction: | bilateral |
| | Extension/flexion: | bilateral |
| — Wrist: | Extension/flexion: | bilateral |
| | Pronation/supination: | bilateral |
| — Back: | Flexion/extension | |
| | Rotation | |
| | Lateral flexion/extension | |
- (iii) Meting van bewegingsomvang en spierkrag.
- (iv) Ontleding van liggaamshouding en -samestelling.
- (c) Oefenprogramvoorskrif: Voorskryf en opvolg van en begeleiding van spesifieke oefenprogramme.
- (d) Fisieke seleksie: Evaluasie en oefenprogramvoorskrif vir spesiale groepe en beroepe.
- (2) Finale fase rehabilitasie: Spierskeletale-stelsel:
 - (a) Funksionele ergologiese evaluering: Die evaluering van die aangetaste ledemaat of liggaamsdeel om die funksionele beperkinge te bepaal met behulp van die volgende:
 - (i) Spesifieke geskiedenis oor die toestand en vorige behandeling sowel as 'n algemene mediese geskiedenis.
 - (ii) Spesifieke evaluering van die aangetaste ledemaat of liggaamsarea. Dit sluit in die handdroliese bepaling van:
 - bewegingsomvang;
 - spierkrag; en
 - soepelheid.
 - (iii) Ontleding van liggaamshouding.
 - (iv) Gespesialiseerde toetse vir spierkrag, spieruitputtings en gewrigsbewegingsomvang deur middel van die evaluering van wringkrag, spierarbeid, verhoudings tussen antagonistiese spiergroepe ten opsigte van wringkrag en arbeid, bilaterale vergelykings ten opsigte van wringkrag en arbeid, bewegingsomvang en omvang en posisie van inkorting as gevolg van besering of afwyking.

| | | |
|-----------|----------------------------|------------|
| — Knie: | Fleksie/ekstensie: | bilateraal |
| — Enkel: | Dorsi/plantaarfleksie: | bilateraal |
| | Inversie/eversie: | bilateraal |
| — Skouer: | Abduksie/adduksie: | bilateraal |
| | Ektensie/fleksie: | bilateraal |
| — Elmoog: | Ektensie/fleksie: | bilateraal |
| — Heup: | Abduksie/adduksie: | bilateraal |
| | Ektensie/fleksie: | bilateraal |
| — Gewrig: | Ektensie/fleksie: | bilateraal |
| | Pronasie/supinasie: | bilateraal |
| — Rug: | Fleksie/ekstensie | |
| | Rotasie | |
| | Laterale fleksie/ekstensie | |
- (b) Rehabilitation programme prescription: Orthopaedic final phase rehabilitation programme prescription. Taking the patient through rehabilitation programme prescription.
- (c) Rehabilitation session: Orthopaedic final phase rehabilitation session
- (d) Rehabilitation session on specialised equipment: Final phase rehabilitation with the aid of electronic-hydraulic isokinetic systems.
- (b) Rehabilitasieprogramvoorskrif: Ortopediese finale fase rehabilitasieprogramvoorskrif. Die begeleiding van die pasiënt deur die rehabilitasieprogramvoorskrif.
- (c) Rehabilitasiesessie: Ortopediese finale fase rehabilitasiesessie.
- (d) Rehabilitasiesessie op gespesialiseerde toerusting: Finale fase rehabilitasie met behulp van elektronies-hidroliese isokinetiese stelsels.

(3) Final phase rehabilitation: Medical conditions:**(a) Functional assessment:**

- (i) General history with a view to determining the risks of exercise for the patient.
- (ii) Physical work capacity test: The determination of physical work capacity with the aid of a cycle ergometer or treadmill, monitor equipment and available associated equipment to determine an effective and safe final phase rehabilitation programme prescription using the following tests:

(aa) Monitoring of heart rate by means of an electrocardiograph or heart rate monitor during multistage workloads.

(bb) Measurement of blood pressure and other physiological responses before, during and after workloads.

- (b) Rehabilitation programme prescription: Final phase rehabilitation programme prescription for specific medical conditions.

(3) Finale fase rehabilitasie: Mediese toestande:**(a) Funksionele evaluering:**

- (i) Algemene geskiedenis met die doel om die oefenrisiko's van die pasiënt te bepaal.

- (ii) Fisieke werkvermoëtoets: Bepaling van fisieke werkvermoë met behulp van 'n fietsergometer of trapmeul, monitorapparaat en beskikbare verwante apparaat ten einde 'n effektiewe en veilige oefeningsvlak vir 'n finale fase rehabilitasieprogramvoorskrif te bepaal met behulp van die volgende toetse:

(aa) Monitoring van harttempo deur middel van 'n elektrokardiograaf of harttempomonitor tydens meervlakke werkloadings.

(bb) Meting van bloeddruk en ander fisiologiese response voor, tydens en na arbeid.

- (b) Rehabilitasieprogramvoorskrif: Finale fase rehabilitasieprogram vir spesifieke mediese toestande.

No. R. 1765**14 October 1994****HAZARDOUS SUBSTANCES ACT, 1973****REGULATIONS RELATING TO THE AERIAL APPLICATION OF AGRICULTURAL REMEDIES****CORRECTION NOTICE**

The following correction to Government Notice R. 611 of 31 March 1994 is hereby published for general information:

Delete regulation 5.

No. R. 1765**14 Oktober 1994****WET OP GEVAARHOUDENDE STOWWE, 1973****REGULASIES BETREFFENDE DIE LUGTOEDIENING VAN LANDBOUMIDDELS****VERBETERINGSKENNISGEWING**

Onderstaande verbetering aan Goewermmentskennisgewing No. R. 611 van 31 Maart 1994 word hierby vir algemene inligting gepubliseer:

Skrap regulasie 5.

No. R. 1766**14 October 1994****CHIROPRACTORS, HOMEOPATHS AND ALLIED HEALTH SERVICE PROFESSIONS ACT, 1982 (ACT No. 63 OF 1982)****NOTICE IN TERMS OF THE CHIROPRACTORS, HOMEOPATHS AND ALLIED HEALTH SERVICE PROFESSIONS ACT, 1982 (ACT No. 63 OF 1982)**

I, Nkosazana Clarice Dlamini Zuma, Minister of Health, hereby, in terms of section 16 (1) of the Chiropractors, Homeopaths and Allied Health Service Professions Act, 1982 (Act No. 63 of 1982), declare the provisions of the Act to be applicable to practitioners of and students in Ayurvedic medicine.

N. C. D. ZUMA,
Minister of Health.

No. R. 1766**14 Oktober 1994****WET OP CHIROPRAKTISYNS, HOMEOPATE EN VERWANTE GESONDHEIDSDIENS BEROEPE, 1982 (WET No. 63 VAN 1982)****KENNISGEWING KRAGTENS DIE WET OP CHIROPRAKTISYNS, HOMEOPATE EN VERWANTE GESONDHEIDSDIENSBEROEPE, 1982 (WET No. 63 VAN 1982)**

Ek, Nkosazana Clarice Dlamini Zuma, Minister van Gesondheid, verklaar hierby kragtens artikel 16 (1) van die Wet op Chiropraktisyns, Homeopate en Verwante Gesondheidsdiensberoepes, 1982 (Wet No. 63 van 1982), dat die bepalings van die Wet van toepassing is op praktisyns van en studente in Ajurvediese geneeskunde.

N. C. D. ZUMA,
Minister van Gesondheid.

No. R. 1767**14 October 1994****CHIROPRACTORS, HOMEOPATHS AND ALLIED HEALTH SERVICE PROFESSIONS COUNCIL****REGULATIONS IN TERMS OF THE CHIROPRACTORS, HOMEOPATHS AND ALLIED HEALTH SERVICE PROFESSIONS ACT, 1982: AMENDMENT**

The Minister of Health has, in terms of section 38 of the Chiropractors, Homeopaths and Allied Health Service Professions Act, 1982 (Act No. 63 of 1982), on the recommendation of the Chiropractors, Homeopaths and Allied Health Service Professions Council, made the regulations in the Schedule.

SCHEDULE

1. In this Schedule "the Regulations" means the regulations published by Government Notice No. R. 2610 of 3 December 1982, as amended by Government Notices Nos. R. 870 of 29 April 1983, R. 1196 of 10 June 1983, R. 1745 of 12 August 1983, R. 2322 of 26 October 1984, R. 2712 of 14 December 1984, R. 1083 of 17 May 1985, R. 2394 of 21 November 1986, R. 1622 of 31 July 1987, R. 2366 of 23 October 1987, R. 629 of 31 March 1988, R. 2439 of 2 December 1988, R. 2855 of 7 December 1990, R. 3089 of 20 December 1991 en R. 203 of 4 February 1994.

2. Regulation 8 of the Regulations is hereby amended by the insertion after subregulation (3) of the following:

- "(4) Every person not in possession of a prescribed qualification shall on application for registration as a chiropractor, homeopath or practitioner of an allied health service profession pay an amount of R150 to the council.
- (5) Every person required by the council to sit for an examination shall on enrolling for such examination pay an amount of R500 to the council.
- (6) The amounts referred to in subregulations (4) and (5) indicate the basic fee to which the relevant Value-Added Tax must be added."

DEPARTMENT OF LABOUR**No. R. 1750****14 October 1994****LABOUR RELATIONS ACT, 1956****FURNITURE MANUFACTURING INDUSTRY, SOUTH WESTERN DISTRICTS: RENEWAL OF MAIN AGREEMENT**

I, Tito Titus Mboweni, Minister of Labour, hereby, in terms of section 48 (4) (a) (ii) of the Labour Relations Act, 1956, declare the provisions of Government Notices No. R. 2859 of 28 December 1979, R. 190 of 28 January 1983, R. 871 of 4 May 1984, R. 1819 of 17 August 1984, R. 140 of 24 January 1986, R. 1672 of 8 August 1986, R. 842 of 16 April 1987, R. 573 of 31 March 1989, R. 408 of 1 March 1991, R. 3390 of 24 December 1992 and R. 1413 of 6 August 1993, to be effective from the second Monday after the date of publication of this notice and for the period ending 30 September 1995.

T. T. MBOWENI,
Minister of Labour.

No. R. 1767**14 Oktober 1994****RAAD VIR CHIROPRAKTISYNS, HOMEOPATE EN VERWANTE GESONDHEIDSDIENSBEROEPE****REGULASIES KRAGTENS DIE WET OP CHIROPRAKTISYNS, HOMEOPATE EN VERWANTE GESONDHEIDSDIENSBEROEPE, 1982: WYSIGING**

Die Minister van Gesondheid het kragtens artikel 38 van die Wet op Chiropraktisyne, Homeopate en Verwante Gesondheidsdiensberoep, 1982 (Wet No. 63 van 1982), op aanbeveling van die Raad vir Chiropraktisyne, Homeopate en Verwante Gesondheidsdiensberoep, die regulasies in die Bylae uitgevaardig.

BYLAE

1. In hierdie Bylae beteken "die Regulasies" die regulasies afgekondig by Goewermentskennisgewing No. R. 2610 van 3 Desember 1982, soos gewysig by Goewermentskennisgewings Nos. R. 870 van 29 April 1983, R. 1196 van 10 Junie 1983, R. 1745 van 12 Augustus 1983, R. 2322 van 26 Oktober 1984, R. 2712 van 14 Desember 1984, R. 1083 van 17 Mei 1985, R. 2394 van 21 November 1986, R. 1622 van 31 Julie 1987, R. 2366 van 23 Oktober 1987, R. 629 van 31 Maart 1988, R. 2439 van 2 Desember 1988, R. 2855 van 7 Desember 1990, R. 3089 van 20 Desember 1991 en R. 203 van 4 Februarie 1994.

2. Regulasie 8 van die Regulasies word hierby gewysig deur na subregulasie (3) die volgende in te voeg:

- "(4) Elke persoon wat nie oor 'n voorgeskrewe kwalifikasie beskik nie, moet by aansoek om registrasie as 'n chiropraktisyn, homeopaat of praktisyn van 'n verwante gesondheidsdiensberoep 'n bedrag van R150 aan die raad betaal.
- (5) Elke persoon van wie die raad vereis om 'n eksamen af te lê, moet by inskrywing vir sodanige eksamen 'n bedrag van R500 aan die raad betaal.
- (6) Die gelde in subregulasies (4) en (5) bedoel, gee die basiese gelde aan waaraan die toepasslike Belasting op Toegevoegde Waarde toegevoeg moet word."

DEPARTEMENT VAN ARBEID**No. R. 1750****14 Oktober 1994****WET OP ARBEIDSVERHOUDINGE, 1956****MEUBELNYWERHEID, SUIDWESTELIKE DISTRIKTE: HERNUWING VAN HOOFOOREENKOMS**

Ek, Tito Titus Mboweni, Minister van Arbeid, verklaar hierby, kragtens artikel 48 (4) (a) (ii) van die Wet op Arbeidsverhoudinge, 1956, dat die bepalings van Goewermentskennisgewings Nos. R. 2859 van 28 Desember 1979, R. 190 van 28 Januarie 1983, R. 871 van 4 Mei 1984, R. 1819 van 17 Augustus 1984, R. 140 van 24 Januarie 1986, R. 1672 van 8 Augustus 1986, R. 842 van 16 April 1987, R. 573 van 31 Maart 1989, R. 408 van 1 Maart 1991, R. 3390 van 24 Desember 1992 en R. 1413 van 6 Augustus 1993, van krag is vanaf die tweede Maandag van die datum van publikasie van hierdie kennisgewing en vir die tydperk wat op 30 September 1995 eindig.

T. T. MBOWENI,
Minister van Arbeid.

No. R. 1751**14 October 1994****LABOUR RELATIONS ACT, 1956****FURNITURE MANUFACTURING INDUSTRY,
SOUTH WESTERN DISTRICTS: AMENDMENT OF
MAIN AGREEMENT**

I, Tito Titus Mboweni, Minister of Labour, hereby—

- (a) in terms of section 48 (1) (a) of the Labour Relations Act, 1956, declare that the provisions of the Agreement (hereinafter referred to as the Amending Agreement) which appears in the Schedule hereto and which relates to the Undertaking, Industry, Trade or Occupation referred to in the heading to this notice, shall be binding, with effect from the second Monday after the date of publication of this notice and for the period ending 30 September 1995, upon the employers' organisation and the trade union which entered into the Amending Agreement and upon the employers and employees who are members of the said organisation or union; and
- (b) in terms of section 48 (1) (b) of the said Act, declare that the provisions of the Amending Agreement, excluding those contained in clauses 1 (1) (a) and 3, shall be binding, with effect from the second Monday after the date of publication of this notice and for the period ending 30 September 1995, upon all employers and employees, other than those referred to in paragraph (a) of this notice, who are engaged or employed in the said Undertaking, Industry, Trade or Occupation in the areas specified in clause 1 of the Amending Agreement.

T. T. Mboweni,
Minister of Labour.

SCHEDULE**INDUSTRIAL COUNCIL FOR THE FURNITURE MANUFACTURING INDUSTRY OF THE SOUTH-WESTERN DISTRICTS****AGREEMENT**

in accordance with the provisions of the Labour Relations Act, 1956, made and entered into by and between the

South-Western Furniture Manufacturers' Association

(hereinafter referred to as the "employers" or the "employers' organisation"), of the one part, and the

National Union of Furniture and Allied Workers of South Africa

(hereinafter referred to as the "employees" or the "trade union"), of the other part,

being the parties to the Industrial Council for the Furniture Manufacturing Industry of the South-Western Districts,

to amend the Agreement published under Government Notice No. R. 2859 of 28 December 1979, as amended and renewed by Government Notices Nos. R. 188 and R. 190 of 28 January 1983, R. 871 of 4 May 1984, R. 1818 and R. 1819 of 17 August 1984, R. 140 of 24 January 1986, R. 1672 of 8 August 1986, R. 2331 of 7 November 1986, R. 842 of 16 April 1987, R. 2299 of 11 November 1988, R. 573 of 31 March 1989, R. 407 and R. 408 of 1 March 1991, R. 3032 of 30 October 1992, R. 3390 of 24 December 1992, R. 1412 and R. 1413 of 6 August 1993 and R. 474 of 11 March 1994.

No. R. 1751**14 Oktober 1994****WET OP ARBEIDSVIRHOUDINGE, 1956****MEUBELNYWERHEID, SUIDWESTELIKE DISTRIKTE: WYSIGING VAN HOOFOOREENKOMS**

Ek, Tito Titus Mboweni, Minister van Arbeid, verklaar hierby—

- (a) kragtens artikel 48 (1) (a) van die Wet op Arbeidsverhoudinge, 1956, dat die bepalings van die Ooreenkoms (hierna die Wysigings-ooreenkoms genoem) wat in die Bylae hiervan verskyn en betrekking het op die Onderneming, Nywerheid, Bedryf of Beroep in die opskrif by hierdie kennisgewing vermeld, met ingang van die tweede Maandag na die datum van publikasie van hierdie kennisgewing en vir die tydperk wat op 30 September 1995 eindig, bindend is vir die werkgewersorganisasie en die vakvereniging wat die Wysigingsooreenkoms aangegaan het en vir die werkgewers en werknemers wat lede van genoemde organisasie of vereniging is; en
- (b) kragtens artikel 48 (1) (b) van genoemde Wet, dat die bepalings van die Wysigingsooreenkoms, uitgesonderd dié vervat in klousules 1 (1) (a) en 3 met ingang van die tweede Maandag na die datum van publikasie van hierdie kennisgewing en vir die tydperk wat op 30 September 1995 eindig, bindend is vir alle ander werkgewers en werknemers as dié genoem in paragraaf (a) van hierdie kennisgewing wat betrokke is by of in diens is in genoemde Onderneming, Nywerheid, Bedryf of Beroep in die gebiede in klousule 1 van die Wysigingsooreenkoms gespesifiseer.

T. T. Mboweni,
Minister van Arbeid.

BYLAE**NYWERHEIDSRaad VIR DIE MEUBELNYWERHEID,
SUIDWESTELIKE DISTRIKTE****OOREENKOMS**

ooreenkomstig die Wet op Arbeidsverhoudinge, 1956, gesluit deur en aangegaan tussen die

South-Western Furniture Manufacturers' Association

(hierna die "werkgewers" of die "werkgewersorganisasie" genoem), aan die een kant, en die

National Union of Furniture and Allied Workers of South Africa

(hierna die "werknemers" of die "vakvereniging" genoem), aan die ander kant,

wat die partye is by die Nywerheidsraad vir die Meubelnywerheid, Suidwestelike Distrikte,

tot wysiging van die Ooreenkoms gepubliseer by Goewermentskennisgewing No. R. 2859 van 28 Desember 1979, soos gewysig en hernieu by Goewermentskennisgewings Nos. R. 188 en R. 190 van 28 Januarie 1983, R. 871 van 4 Mei 1984, R. 1818 en R. 1819 van 17 Augustus 1984, R. 140 van 24 Januarie 1986, R. 1672 van 8 Augustus 1986, R. 2331 van 7 November 1986, R. 842 van 16 April 1987, R. 2299 van 11 November 1988, R. 573 van 31 Maart 1989, R. 407 en R. 408 van 1 Maart 1991, R. 3032 van 30 Oktober 1992, R. 3390 van 24 Desember 1992, R. 1412 en R. 1413 van 6 Augustus 1993 en R. 474 van 11 Maart 1994.

PART I**PROVISIONS APPLICABLE TO THE INDUSTRY THROUGHOUT THE AREAS COVERED BY THE AGREEMENT UNLESS THE CONTRARY IS STATED****1. SCOPE OF APPLICATION OF AGREEMENT**

(1) The terms of this Agreement shall be observed in the Furniture Manufacturing Industry of the South-Western Districts—

- (a) by all employers who are members of the employers' organisation and by all employees who are members of the trade union, who are engaged and employed in the Industry, respectively;
- (b) in the Magisterial Districts of George, Knysna, Mossel Bay and Oudtshoorn (hereinafter referred to as the South-Western Districts).

(2) Notwithstanding the provisions of subclause (1), the terms of this Agreement shall apply—

- (a) only to employees for whom minimum wages are prescribed in this Agreement and to the employers of such employees;
- (b) to apprentices only in so far as they are not inconsistent with the provisions of the Manpower Training Act, 1981, or any contract entered into or any condition fixed thereunder.

2. CLAUSE 3: DEFINITIONS

Insert the following new definition after the definition of "short-time":

"**temporary labourer**" means an employee, other than an apprentice or a casual or permanent employee, who is employed on contract for a specific period or task, which contract shall terminate on expiry of the aforesaid period, or on completion of the aforesaid task."

3. CLAUSE 21: TRADE UNION REPRESENTATION ON THE COUNCIL

Insert the following new paragraph after the existing paragraph:

"When a trade union representative on the Council attends Industrial Council and Management Committee meetings during normal working hours, the Industrial Council shall refund to the employer the time for which wages were paid in respect of the trade union representative's attendance at such meetings."

This Agreement signed on behalf of the parties this 17th day of May 1994.

S. A. MEYER,
Chairman.

J. DIPPENAAR,
Vice-Chairman.

I. DUNSTAN,
Secretary.

No. R. 1763**14 October 1994****LABOUR RELATIONS ACT, 1956****LEATHER INDUSTRY, REPUBLIC OF SOUTH AFRICA: RENEWAL OF AGREEMENT FOR THE GENERAL GOODS SECTION**

I, Dennis van der Walt, Director; Labour Relations, duly authorised thereto by the Minister of Labour, hereby, in terms of section 48 (4) (a) (ii) of the Labour Relations Act, 1956, declare the provisions of Govern-

DEEL I**BEPALINGS WAT OOR DIE HELE GEBIED WAT DEUR DIE OOREENKOMS GEDEK WORD, OP DIE NYWERHEID VAN TOEPASSING IS, TENSY DIE TEENOORGESTELDE VERMELD WORD****1. TOEPASSINGSBESTEK VAN OOREENKOMS**

(1) Hierdie Ooreenkoms moet in die Meubelnywerheid, Suidwestelike Distrikte, nagekom word—

- (a) deur alle werkgewers wat lede is van die werkgewers-organisasie en deur alle werknemers wat lede is van die vakvereniging, en wat onderskeidelik by die Nywerheid betrokke is en daarin werksaam is;
- (b) in die landdrostdistrikte George, Knysna, Mosselbaai en Oudtshoorn (hierna die Suidwestelike Distrikte genoem).

(2) Ondanks subklousule (1) is hierdie Ooreenkoms van toepassing—

- (a) slegs op werknemers vir wie minimum lone by hierdie Ooreenkoms voorgeskryf word en op die werkgewers van sodanige werknemers;
- (b) op vakleerlinge slegs vir sover dit nie onbestaanbaar is nie met die Wet op Mannekragopleiding, 1981, of 'n kontrak wat daarkragtens aangegaan is of 'n voorwaarde wat daarkragtens vasgestel is.

2. KLOUSLE 3: WOORDOMSKRYWING

Voeg die volgende nuwe woordomskrywing in na die omskrywing van "korttyd":

"**tydelike werknemer**" 'n werknemer, uitgesonderd 'n vakleerling, los werknemer of permanent aangestelde werknemer, wat vir 'n spesifieke tydperk of taak in diens is kragtens 'n kontrak wat beëindig word by verstryking van voormelde tydperk of by voltooiing van voormelde taak."

3. KLOUSULE 21: VAKVERENIGINGVERTEENWOORDIGERS IN DIE RAAD

Voeg die volgende nuwe paragraaf in na die bestaande paragraaf:

"Wanneer 'n vakverenigingvertegenwoordiger in die Raad gedurende gewone werkure Nywerheidsraad- en Bestuurskomiteevergaderings bywoon, moet die Nywerheidsraad die werkgewer vergoed vir die werktyd waarvoor lone betaal is ten opsigte van die vakverenigingvertegenwoordiger se bywoning van sodanige vergaderings."

Hierdie Ooreenkoms is namens die partye op hede die 17de dag van Mei 1994 onderteken.

S. A. MEYER,
Voorsitter.

J. DIPPENAAR,
Ondervoorsitter.

I. DUNSTAN,
Sekretaris.

No. R. 1763**14 Oktober 1994****WET OP ARBEIDSVERHOUDINGE, 1956****LEERNYWERHEID, REPUBLIEK VAN SUID-AFRIKA: HERNUWING VAN OOREENKOMS VIR DIE ALGEMENE GOEDERE SEKSIE**

Ek, Dennis van der Walt, Direkteur: Arbeidsverhoudinge, behoorlik daartoe gemagtig deur die Minister van Arbeid, verklaar hierby kragtens artikel 48 (4) (a) (ii) van die Wet op Arbeidsverhoudinge, 1956, dat die

ment Notices No. R. 1796 of 3 September 1982, R. 2442 of 4 November 1983, R. 1946 of 31 August 1984, R. 2771 of 13 December 1985, R. 2711 of 24 December 1986, R. 2610 of 20 November 1987, R. 378 of 4 March 1988, R. 2315 of 18 November 1988, R. 571 of 31 March 1989, R. 1948 of 17 August 1990, R. 3051 of 4 January 1991, R. 3133 of 20 December 1991, R. 155 of 15 February 1993 and R. 2102 of 5 November 1993, to be effective from the date of publication of this notice and for the period ending 30 June 1995.

D. VAN DER WALT,

Director: Labour Relations.

bepalings van goewermentskennisgewings Nos. R. 1796 van 3 September 1982, R. 2442 van 4 November 1983, R. 1946 van 31 Augustus 1984, R. 2771 van 13 Desember 1985, R. 2711 van 24 Desember 1986, R. 2610 van 20 November 1987, R. 378 van 4 Maart 1988, R. 2315 van 18 November 1988, R. 571 van 31 Maart 1989, R. 1948 van 17 Augustus 1990, R. 3051 van 4 Januarie 1991, R. 3133 van 20 Desember 1991, R. 155 van 15 Februarie 1993 en R. 2102 van 5 November 1993, van krag is vanaf die datum van publikasie van hierdie kennisgewing en vir die tydperk wat op 30 Junie 1995 eindig.

D. VAN DER WALT,

Direkteur: Arbeidsverhoudinge.

No. R. 1764

14 October 1994

MANPOWER TRAINING ACT, 1981

ACCREDITATION OF THE JEWELLERY AND PRECIOUS METAL INDUSTRY TRAINING BOARD

The Jewellery and Precious Metal Industry Training Board has in terms of section 12B (1) of the Manpower Training Act, 1981, submitted to the Registrar of Manpower Training its constitution, signed by all parties to the Training Board, for accreditation.

The relevant board shall have jurisdiction over and facilitate all training and all aspects thereof in the Republic of South Africa.

The Registrar of Manpower Training is considering the accreditation of the Jewellery and Precious Metal Industry Training Board. Information concerning the relevant constitution may be obtained from the Secretary, Jewellery and Precious Metal Industry Training Board, P.O. Box 1536, Cape Town, 8000.

Interested parties may, within 30 days after publication of this notice, advance reasons in writing why there must, in their opinion, not be proceeded with the accreditation of the Jewellery and Precious Metal Industry Training Board.

Representations in the above regard must be submitted to the Registrar of Manpower Training, Department of Labour, Private Bag X117, Pretoria, 0001.

For the purposes of this notice, "Jewellery and Precious Metal Industry" means the joint enterprise in which employers and their employees are associated wholly or mainly for any one or more of the following purposes:

- (a) The manufacture of the following articles mainly from precious metals, including all activities incidental to such manufacture:
 - (i) Articles of jewellery and/or personal adornment, with or without ornamental stones;
 - (ii) mountings for ornamental stones;
 - (iii) medals, medallions, badges, masonic jewels and/or like articles;
 - (iv) ornaments, ornamental vessels, ornamental utensils and/or like ornamental articles;
 - (v) parts of any of the aforesaid articles;

No. R. 1764

14 Oktober 1994

WET OP MANNEKRAGOPLEIDING, 1981

AKKREDITERING VAN DIE OPLEIDINGSRAAD VIR DIE JUWELIERS- EN EDELMETAALNYWERHEID

Die Opleidingsraad vir die Juweliers- en Edelmetaalnywerheid het kragtens artikel 12B (1) van die Wet op Mannekragopleiding, 1981, sy konstitusie, geteken deur al die partye in die Opleidingsraad aan die Registrateur van Mannekragopleiding voorgelê vir akkreditering.

Die betrokke raad sal jurisdiksie hê oor, en alle opleiding en alle aspekte daarvan fasiliteer in die Republiek van Suid-Afrika.

Die Registrateur van Mannekragopleiding oorweeg om die Opleidingsraad vir die Juweliers- en Edelmetaalnywerheid te akkrediteer. Inligting in verband met die betrokke konstitusie kan van die Sekretaris, Opleidingsraad vir die Juweliers- en Edelmetaalnywerheid, Posbus 1536, Kaapstad, 8000, bekom word.

Belanghebbende partye kan, binne 30 dae na publikasie van die kennisgewing, skriftelik redes aanvoer waarom daar na hulle mening nie voortgegaan moet word met die akkreditering van die Opleidingsraad vir die Juweliers- en Edelmetaalnywerheid nie.

Verzoek in bovermelde verband moet aan die Registrateur van Mannekragopleiding, Departement van Arbeid, Privaatsak X117, Pretoria, 0001, voorgelê word.

Vir die doeleindes van hierdie kennisgewing beteken "Juweliers- en Edelmetaalnywerheid" die gesamentlike onderneming waarin werkgewers en werknemers met mekaar geassosieer is in die geheel of hoofsaaklik vir enige een of meer van die volgende doeleindes:

- (a) Die vervaardiging van die volgende artikels, hoofsaaklik uit edelmetale, insluitende alle aktiwiteite bykomend tot sodanige vervaardiging:
 - (i) Juweliers- en/of persoonlike versieringsartikels, met of sonder sierstene;
 - (ii) monterings vir sierstene;
 - (iii) medaljes, gedenkpenninge, kentekens, masonieke juwele en/of soortgelyke artikels;
 - (iv) ornamente, ornamentele bykomstighede, ornamentele gereedskap en/of soortgelyke ornamentele artikels;
 - (v) dele van enige van voornoemde artikels;

- (b) the setting and/or resetting of ornamental stones in any article referred to in paragraph (a);
- (c) the engraving of any article referred to in paragraph (a);
- (d) the repairing, altering and/or renovating of any articles referred to in paragraph (a);
- (e) the enamelling of any article referred to in paragraph (a);
- (f) the making and/or repairing of tools and/or dies used or intended for use in any of the activities referred to in this definition when undertaken by any employer engaged in such activities; and
- (g) the engraving of dies used or intended for use in any of the activities referred to in this definition.

G. D. HAASBROEK,

Registrar of Manpower Training.

No. R. 1791

14 October 1994

WAGE DETERMINATION 476: BUSINESS EQUIPMENT INDUSTRY, CERTAIN AREAS

CORRECTION NOTICE

The following corrections to Government Notice No. R. 1498 in *Government Gazette* No. 15947 of 9 September 1994 are published for general information:

In the Afrikaans text, substitute the following paragraph for the concluding paragraph on page 38:

“(Kragtens artikel 18 van die Loonwet, 1957, vervang die Loonvasstelling in die bostaande Bylae Loonvasstelling 413 gepubliseer by Goewermenskennisgewing No. R. 1468 van 17 Julie 1981 soos gewysig deur Goewermenskennisgewings Nos. R. 1977 van 16 September 1983, R. 1702 van 2 Augustus 1985, R. 1766 van 21 Augustus 1987 en R. 909 van 3 Mei 1991.)”.

In the English text, substitute the following paragraph for the concluding paragraph on page 38:

“(In terms of section 18 of the Wage Act, 1957, the Wage Determination in the above Schedule supersedes Wage Determination 413 published under Government Notice No. R. 1468 of 17 July 1981 as amended by Government Notices Nos. R. 1977 of 16 September 1983, R. 1702 of 2 August 1985, R. 1766 of 21 August 1987 and R. 909 of 3 May 1991.)”.

DEPARTMENT OF POST AND TELLECOMMUNICATIONS

No. R. 1742

14 October 1994

CORRECTION NOTICE

Government Notice No. R. 1463 in *Government Gazette* No. 15928 of 26 August 1994 is hereby amended by—

1. the substitution of the phrase “regulations 15 (2), 16 and 19 (3)” in paragraph 21 of the Afrikaans section by the phrase “regulations 16 (2), 17 and 20 (3)”.

- (b) die set en/of herset van sierstene in enige artikel bedoel in paragraaf (a);
- (c) die graveer van enige artikel bedoel in paragraaf (a);
- (d) die herstel, verandering en restoureer van enige artikel bedoel in paragraaf (a);
- (e) die glassuring van enige artikel bedoel in paragraaf (a);
- (f) die maak en/of herstel van gereedskap en/of stempels wat gebruik word of bedoel word vir gebruik in enige van die werksaamhede genoem in hierdie woordomskriving wanneer dit onderneem word deur enige werknemer betrokke by sodanige werksaamhede en wanneer dit onderneem word in verband daarmee; en
- (g) die graveer van stempels gebruik of bedoel vir gebruik by enige van die werksaamhede genoem in hierdie woordomskriving.

G. D. HAASBROEK,

Registrateur van Mannekragopleiding.

No. R. 1791

14 Oktober 1994

LOONVASSTELLING 476: BEDRYFSUITRUSTING-NYWERHEID, SEKERE GEBIEDE

VERBETERINGSKENNISGEWING

Die volgende verbeterings aan Goewermenskennisgewing No. R. 1498 in *Staatskoerant* No. 15947 van 9 September 1994 word vir algemene inligting gepubliseer:

In die Afrikaanse teks, vervang die slotparagraaf op bladsy 38 met die volgende paragraaf:

“(Kragtens artikel 18 van die Loonwet, 1957, vervang die Loonvasstelling in die bostaande Bylae Loonvasstelling 413 gepubliseer by Goewermenskennisgewing No. R. 1468 van 17 Julie 1981 soos gewysig deur Goewermenskennisgewings Nos. R. 1977 van 16 September 1983, R. 1702 van 2 Augustus 1985, R. 1766 van 21 Augustus 1987 en R. 909 van 3 Mei 1991.)”.

In die Engelse teks, vervang die slotparagraaf op bladsy 38 met die onderstaande paragraaf:

“(In terms of section 18 of the Wage Act, 1957, the Wage Determination in the above Schedule supersedes Wage Determination 413 published under Government Notice No. R. 1468 of 17 July 1981 as amended by Government Notices Nos. R. 1977 of 16 September 1983, R. 1702 of 2 August 1985, R. 1766 of 21 August 1987 and R. 909 of 3 May 1991.)”.

DEPARTEMENT VAN POS- EN TELLEKOMMUNIKASIEWESE

No. R. 1742

14 Oktober 1994

VERBETERINGSKENNISGEWING

Goewermenskennisgewing No. R. 1463 in *Staatskoerant* No. 15928 van 26 Augustus 1994 word hierby gewysig deur—

1. die uitdrukking “regulasies 15 (2), 16 en 19 (3)” in paragraaf 21 van die Afrikaanse gedeelte met die uitdrukking “regulasies 16 (2), 17 en 20 (3)” te vervang.

INDEPENDENT BROADCASTING AUTHORITY

ONAFHANKLIKE UITSAAI- OWERHEID

No. R. 1771

14 October 1994

APPLICATIONS RECEIVED FOR TEMPORARY COMMUNITY LICENCES

The Independent Broadcasting Authority gives notice under the Independent Broadcasting Authority (Temporary Community Broadcasting Licences) Regulations, 1994, that applications have been received for temporary community broadcasting licences as set out in the Schedules.

The applications and any written representations received pursuant thereto are open for inspection by interested parties during the normal office hours of the Authority.

Interested persons are invited to submit written representations in relation to the applications to the Authority at, IBA House, 26 Baker Street, Rosebank, Johannesburg, OR Private Bag X31, Parklands, 2121, OR by Fax No. (011) 447-6188/9 within **two weeks of the date of publication of this notice**.

Persons who submit representations in terms hereof shall, when submitting such representations, provide proof to the satisfaction of the Authority that a copy of the representations submitted have been sent by *registered post* or delivered to the applicant concerned.

SCHEDULE

- (i) **Name and address of applicant:** RADIO MARITZBURG; 1 Nonsuch Road, Chase Valley, Pietermaritzburg.
- (ii) **Community:** Greater Pietermaritzburg area.
- (iii) **Proposed licence area:** Greater Pietermaritzburg area in arc from Edenvale, Imbali, Westgate to Raisethorpe, Northdale and Chase Valley.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** Community radio service affiliated to the Association of Christian Broadcasters for Pietermaritzburg.

SCHEDULE

- (i) **Name and address of applicant:** RADIO KOPPIES FM STEREO; 80 Stein Street, Weltevrede.
- (ii) **Community:** Christian-Protestant Boere-Afrikaners of the Northern Free State and Western Transvaal.

No. R. 1771

14 Oktober 1994

AANSOEKE OM TYDELIKE GEMEENSKAPSUITSAAILISSENSIES ONTVANG

Die Onafhanklike Uitsaai-owerheid gee kennis onder die Onafhanklike Uitsaai-owerheid (Tydelike Gemeenskapsuitsaailisensies) Regulasies, 1994, dat aansoeke vir tydelike gemeenskapsuitsaailisensies soos in die Bylae uiteengesit, ontvang is.

Die aansoeke en enige skriftelike verhoë wat in verband daarmee ontvang is, is gedurende die normale kantoorure van die Owerheid ter insae van belanghebbende partye beskikbaar.

Belanghebbende partye word uitgenooi om skriftelike verhoë met betrekking tot die aansoeke te rig aan die Owerheid te IBA-huis, Bakerstraat 26, Rosebank, Johannesburg, OF Privaatsak X31, Parklands, 2121, OF Faks No. (011) 447-6188/9 binne **twee weke vanaf die datum van hierdie kennisgewing**.

Persone wat in terme hiervan verhoë rig sal, wanneer sodanige verhoë ingedien word, bewys tot bevrediging van die Owerheid voorlê dat 'n kopie van die verhoë wat ingedien is per *geregistreerde pos* aan die betrokke aansoeker gestuur is of by die aansoeker afgelewer is.

BYLAE

- (i) **Naam en adres van aansoeker:** RADIO MARITZBURG; Nonsuchweg 1, Chase Valley, Pietermaritzburg.
- (ii) **Gemeenskap:** Groter Pietermaritzburg-omgewing.
- (iii) **Voorgestelde lisensiegebied:** Groter Pietermaritzburg-omgewing insluitende Edenvale, Imbali, Westgate tot Raisethorpe, Northdale en Chase Valley.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Gemeenskapsradiodiens geaffilieerd met die Assosiasie van Christelike Uitsaaiers vir die Pietermaritzburg-omgewing.

BYLAE

- (i) **Naam en adres van aansoeker:** RADIO KOPPIES FM STEREO; Steinstraat 80, Weltevrede.
- (ii) **Gemeenskap:** Christen Protestant Boere-Afrikaners van die Noordelike Vrystaat en Westelike Transvaal.

SCHEDULE

- (iii) **Proposed licence area:** Northern Free State and Western Transvaal.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** The promotion of the Afrikaans language and culture in the community concerned through news, cultural, actuality and music programmes.

SCHEDULE

- (i) **Name and address of applicant:** RADIO VRYHEID; 49 Benadie Avenue, Trichardt Park, Bloemfontein, 901.
- (ii) **Community:** The Afrikaner Community of the Orange Free State and parts of the Northern Cape and North-West Province.
- (iii) **Proposed licence area:** Orange Free State and parts of the Northern Cape and North-West Province.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** The promotion of the culture, music and values of the Afrikaner in the Orange Free State and part of the Northern Cape and North-West Province.

SCHEDULE

- (i) **Name and address of applicant:** THE VAAL SHOW SOCIETY OPERATING AS VAAL COMMUNITY RADIO; Van Riebeeck Avenue, Vereeniging.
- (ii) **Community:** The population of the Vaal Triangle including smaller rural communities.
- (iii) **Proposed licence area:** The Vaal Triangle incorporating Vanderbijlpark, Sasolburg, Vereeniging, Meyerton, Randvaal, Sebokeng, Bophalong, Boipatong, Orange Farm and Sharpeville.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** To provide a radio service which will fill a gap on the local community level of the overall media scene in the Vaal Triangle community.

BYLAE

- (iii) **Voorgestelde lisensiegebied:** Noordelike Vrystaat en Westelike Transvaal.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Die bevordering van die Afrikaanse taal en kultuur in die betrokke gemeenskap deur middel van nuus, kultuur, aktualiteit en musiekprogramme.

BYLAE

- (i) **Naam en adres van aansoeker:** RADIO VRYHEID; Benadielaan 49, Trichardt Park, Bloemfontein, 901.
- (ii) **Gemeenskap:** Die Afrikanergemeenskap van die Oranje-Vrystaat en dele van die Noord-Kaap- en Noordwes-provinsie.
- (iii) **Voorgestelde lisensiegebied:** Oranje-Vrystaat en dele van die Noord-Kaap- en Noordwes-provinsie.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Die bevordering van die kultuur, musiek en waardes van die Afrikaner in die Oranje-Vrystaat en dele van die Noord-Kaap- en Noordwes-provinsie.

BYLAE

- (i) **Naam en adres van aansoeker:** DIE VAAL SKOU VEREENIGING WAT OPTREE AS VAAL GEMEENSKAPSRADIO; Van Riebeecklaan, Vereeniging.
- (ii) **Gemeenskap:** Die bevolking van die Vaal Driehoek uitsluitende die kleiner landelike gemeenskappe.
- (iii) **Voorgestelde lisensiegebied:** Die Vaal Driehoek insluitende Vanderbijlpark, Sasolburg, Vereeniging, Meyerton, Randvaal, Sebokeng, Bophalong, Boipatong, Orange Farm en Sharpeville.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Om 'n radiodiens te voorsien wat die gaping op die plaaslike gemeenskapsvlak sal vul wat betref die algehele mediaterrein in die Vaal Driehoek-gemeenskap.

SCHEDULE

- (i) **Name and address of applicant:** RADIO YSTERBERG; P.O. Box 2883, Pietersburg.
- (ii) **Community:** The Boer-Afrikaner Cultural Community.
- (iii) **Proposed licence area:** Northern Transvaal.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** To communicate, inform, entertain and support the Boere-Afrikaner community in their cultural and economic pursuits.

SCHEDULE

- (i) **Name and address of applicant:** RADIO MAGALIESBURG; P.O. Box 1947, Brits, 0250.
- (ii) **Community:** The Boer-Afrikaner Cultural Community.
- (iii) **Proposed licence area:** Hartebeespoort, Hekpoort, Carletonville, Koster, Rustenburg and Brits.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** To communicate, inform, entertain and support the Boere-Afrikaner community in their cultural and economic pursuits.

SCHEDULE

- (i) **Name and address of applicant:** RADIO DAGBREEK; P.O. Box 1433, Standerton.
- (ii) **Community:** The Boere-Afrikaner Cultural Community.
- (iii) **Proposed licence area:** Northern area of the Free State including Springs, Heidelberg to Standerton.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** To communicate, inform, entertain and support the Boere-Afrikaner community in their cultural and economic pursuits.

SCHEDULE

- (i) **Name and address of applicant:** RADIO PRETORIA; P.O. Box 14935, Sinoville, 0129.
- (ii) **Community:** The Boere-Afrikaner Cultural Community.

BYLAE

- (i) **Naam en adres van aansoeker:** RADIO YSTERBERG; Posbus 2883, Pietersburg.
- (ii) **Gemeenskap:** Die Boere-Afrikaner Kultuur gemeenskap.
- (iii) **Voorgestelde lisensiegebied:** Noord-Transvaal.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Kommunikasie, inlig, vermaak en ondersteun die Boere-Afrikaner Gemeenskap, in hul kulturele aktiwiteite, ekonomiese bedrywighede, ens.

BYLAE

- (i) **Naam en adres van aansoeker:** RADIO MAGALIESBURG; Posbus 1947, Brits, 0250.
- (ii) **Gemeenskap:** Die Boere-Afrikaner Kultuur gemeenskap.
- (iii) **Voorgestelde lisensiegebied:** Hartebeespoort, Hekpoort, Carletonville, Koster, Rustenburg en Brits.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Kommunikasie, inlig, vermaak en ondersteun die Boere-Afrikaner Gemeenskap, in hul kulturele aktiwiteite, ekonomiese bedrywighede, ens.

BYLAE

- (i) **Naam en adres van aansoeker:** RADIO DAGBREEK; Posbus 1433, Standerton.
- (ii) **Gemeenskap:** Die Boere-Afrikaner Kultuur gemeenskap.
- (iii) **Voorgestelde lisensiegebied:** Noordelike Vrystaat insluitende Springs, Heidelberg en Standerton.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Kommunikasie, inlig, vermaak en ondersteun die Boere-Afrikaner Gemeenskap, in hul kulturele aktiwiteite, ekonomiese bedrywighede, ens.

BYLAE

- (i) **Naam en adres van aansoeker:** RADIO PRETORIA; Posbus 14935, Sinoville, 0129.
- (ii) **Gemeenskap:** Die Boere-Afrikaner Kultuur Gemeenskap.

SCHEDULE

- (iii) **Proposed licence area:** Parts of Transvaal, Natal and Orange Free State by way of the following transmitter network:
Radio Kransberg, Radio Naboomspruit, Radio Platorand, Radio Laeveld, Radio Drakensberg, Radio Ermelo, Radio Wolkberg, Radio Tafelkop, Radio Lichtenburg.
- (iv) **Preferred frequency band:** FM.
- (v) **Nature of the proposed service:** To communicate, inform, entertain and support the Boer-Afrikaner community in their cultural and economic pursuits.

**DEPARTMENT OF TRADE
AND INDUSTRY**

No. R. 1789 **14 October 1994**

NOTICE IN TERMS OF SECTION 13 OF THE NON-PROLIFERATION OF WEAPONS OF MASS DESTRUCTION ACT, 1993

DECLARATION OF CERTAIN MISSILE TECHNOLOGY AND RELATED ITEMS AS CONTROLLED GOODS AND CONTROL MEASURES APPLICABLE TO SUCH GOODS

1. I, Trevor Andrew Manuel, in my capacity as Minister of Trade and Industry, acting under section 13 of the Non-Proliferation of Weapons of Mass Destruction Act, 1993 (Act No. 87 of 1993), hereby—
 - (a) declare all items listed in the Missile Technology Control Regime (MTCR) Equipment and Technology Annex, dated 1 July 1993 and adapted at the Plenary Session of the MTCR held at Interlaken, Switzerland, from 29 November 1993 to 2 December 1993, as quoted in Schedule A to this notice, to be controlled goods; and
 - (b) determine that the import, export, re-export and transit of such controlled goods shall take place only under a permit issued by the South African Council for the Non-Proliferation of Weapons of Mass Destruction, established under section 4 of the aforementioned Act.
2. Application forms for permits and registrations in terms of section 13 (3) of the aforementioned Act are obtainable from:

The Secretariat
Non-Proliferation Council
Private Bag X753
PRETORIA
0001.

T. A. MANUEL,
Minister of Trade and Industry.

BYLAE

- (iii) **Voorgestelde lisensiegebied:** Dele van Transvaal, Natal en Oranje-Vrystaat by wyse van die volgende sendernetwerk:
Radio Kransberg, Radio Naboomspruit, Radio Platorand, Radio Laeveld, Radio Drakensberg, Radio Ermelo, Radio Wolkberg, Radio Tafelkop, Radio Lichtenburg.
- (iv) **Verkose frekwensieband:** FM.
- (v) **Aard van die voorgestelde diens:** Kommunikasie, inlig, vermaak en ondersteun die Boer-Afrikaner Gemeenskap, kulturele aktiwiteite, ekonomiese bedrywighede, ens.

**DEPARTEMENT VAN HANDEL
EN NYWERHEID**

No. R. 1789

14 Oktober 1994

KENNISGEWING KRAGTENS ARTIKEL 13 VAN DIE WET OP DIE NIE-PROLIFERASIE VAN WAPENS VAN GROOTSKAALSE VERNIETIGING, 1993

VERKLARING VAN SEKERE MISSIELTEGNOLOGIE EN VERWANTE ITEMS TOT BEHEERDE GOEDERE EN BEHEERMAATREËLS WAT OP SODANIGE GOEDERE VAN TOEPASSING IS

1. Ek, Trevor Andrew Manuel, in my hoedanigheid van Minister van Handel en Nywerheid, handelende kragtens artikel 13 van die Wet op die Nie-proliferasie van Wapens van Grootsekaalse Vernietiging, 1993 (Wet No. 87 van 1993)—
 - (a) verklaar hierby alle items gelys in die Missile Technology Control Regime (MTCR) Equipment and Technology Annex, gedateer 1 Julie 1993 en soos aangepas deur die volle sitting van die MTCR wat van 29 November 1993 tot 2 Desember 1993 in Interlaken, Switserland, gehou is, en waarvan die oorspronklike teks in Bylae A van hierdie kennisgewing in Engels aangehaal is ten einde internasionale aanvaarding en eenduidigheid ten opsigte van tegniese definisies en begrippe te verseker, tot beheerde goedere; en
 - (b) bepaal dat die invoer, uitvoer, heruitvoer en deurvoer van sodanige beheerde goedere slegs mag plaasvind kragtens 'n permit wat deur die Suid-Afrikaanse Raad vir die Nie-proliferasie van Wapens van Grootsekaalse Vernietiging, ingestel by artikel 4 van voormelde Wet, uitgereik is.
2. Aansoekvorms vir permitte en registrasies kragtens artikel 13 (3) van voormelde Wet is verkrygbaar by:

Die Sekretariaat
Nie-proliferasieraad
Privaat Sak X753
PRETORIA
0001.

T. A. MANUEL,
Minister van Handel en Nywerheid.

SCHEDULE A**CONTROLLED GOODS CONCERNING MISSILE TECHNOLOGY AND
RELATED ITEMS****QUOTE****Definitions**

For the purpose of this Annex, the following definitions apply:

- (a) "Development" is related to all phases prior to "production" such as:
- design
 - design research
 - design analysis
 - design concepts
 - assembly and testing of prototypes
 - pilot production schemes
 - design data
 - process of transforming design data into a product
 - configuration design
 - integration design
 - layouts
- (b) A "microcircuit" is defined as a device in which a number of passive and/or active elements are considered as indivisibly associated on or within a continuous structure to perform the function of a circuit.
- (c) "Production" means all production phases such as:
- production engineering
 - manufacture
 - integration
 - assembly (mounting)
 - inspection
 - testing
 - quality assurance
- (d) "Production equipment" means tooling, templates, jigs, mandrels, moulds, dies, fixtures, alignment mechanisms, test equipment, other machinery and components therefor, limited to those specially designed or modified for "development" or for one or more phases of "production".
- (e) "Production facilities" means equipment and specially designed software therefor integrated into installations for "development" or for one or more phases of "production".
- (f) "Radiation Hardened" means that the component or equipment is designed or rated to withstand radiation levels which meet or exceed a total irradiation dose of 5×10^5 rads (Si).
- (g) "Technology" means specific information which is required for the "development", "production" or "use" of a product. The information may take the form of "technical data" or "technical assistance".
- (1) "Technical assistance" may take forms such as:
- instruction
 - skills
 - training
 - working knowledge
 - consulting services

(2) "Technical data" may take forms such as:

- blueprints
- plans
- diagrams
- models
- formulae
- engineering designs and specifications
- manuals and instructions written or recorded on other media or devices such as:
 - disk
 - tape
 - read-only memories

Note:

This definition of technology does not include technology "in the public domain" nor "basic scientific research".

- (i) "In the public domain" as it applies to this Annex means technology which has been made available without restrictions upon its further dissemination. (Copyright restrictions do not remove technology from being "in the public domain".)
 - (ii) "Basic scientific research" means experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena and observable facts, not primarily directed towards a specific practical aim or objective.
- (h) "Use" means:
- operation
 - installation (including on-site installation)
 - maintenance
 - repair
 - overhaul
 - refurbishing

Terminology

Where the following terms appear in the text, they are to be understood according to the explanations below:

- (a) "Specially Designed" describes equipment, parts, components or software which, as a result of "development", have unique properties that distinguish them for certain predetermined purposes. For example, a piece of equipment that is "specially designed" for use in a missile will only be considered so if it has no other function or use. Similarly, a piece of manufacturing equipment that is "specially designed" to produce a certain type of component will only be considered such if it is not capable of producing other types of components.
- (b) "Designed or Modified" describes equipment, parts, components or software which, as a result of "development", or modification, have specified properties that make them fit for a particular application. "Designed or Modified" equipment, parts, components or software can be used for other applications. For example, a titanium coated pump designed for a missile may be used with corrosive fluids other than propellants.
- (c) "Usable In" or "Capable Of" describes equipment, parts, components or software which are suitable for a particular purpose. There is no need for the equipment, parts, components or software to have been configured, modified or specified for the particular purpose. For example, any military specification memory circuit would be "capable of" operation in a guidance system.

ITEM 1—CATEGORY I

Complete rocket systems (including ballistic missile systems, space launch vehicles and sounding rockets) and unmanned air vehicle systems (including cruise missile systems, target drones and reconnaissance drones) capable of delivering at least a 500 kg payload to a range of at least 300 km as well as the specially designed "production facilities" for these systems.

ITEM 2—CATEGORY I

Complete subsystems usable in the systems in Item 1, as follows, as well as the specially designed "production facilities", and "production equipment" therefor:

- (a) Individual rocket stages;
- (b) Reentry vehicles, and equipment designed or modified therefor, as follows, except as provided in Note (1) below for those designed for non-weapon payloads:
 - (1) Heat shields and components thereof fabricated of ceramic or ablative materials;
 - (2) Heat sinks and components thereof fabricated of light-weight, high heat capacity materials;
 - (3) Electronic equipment specially designed for reentry vehicles;
- (c) Solid or liquid propellant rocket engines, having a total impulse capacity of 1.1×10^6 N-sec (2.5×10^5 lb-sec) or greater;
- (d) "Guidance sets" capable of achieving system accuracy of 3.33 percent or less of the range (e.g., a CEP of 10 km or less at a range of 300 km), except as provided in Note (1) below for those designed for missiles with a range under 300 km or manned aircraft;
- (e) Thrust vector control sub-systems, except as provided in Note (1) below for those designed for rocket systems that do not exceed the range/payload capability of Item 1;
- (f) Weapon or warhead safing, arming, fuzing, and firing mechanisms, except as provided in Note (1) below for those designed for systems other than those in Item 1.

Notes to Item 2:

- (1) The exceptions in (b), (d), (e) and (f) above may be treated as Category II if the subsystem is exported subject to end use statements and quantity limits appropriate for the excepted end use stated above.
- (2) CEP (circle of equal probability) is a measure of accuracy; and defined as the radius of the circle centred at the target, at a specific range, in which 50 percent of the payloads impact.
- (3) A "guidance set" integrates the process of measuring and computing a vehicle's position and velocity (i.e. navigation) with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.
- (4) Examples of methods of achieving thrust vector control which are covered by (e) include:
 - a. Flexible nozzle;
 - b. Fluid or secondary gas injection;
 - c. Movable engine or nozzle;
 - d. Deflection of exhaust gas stream (jet vanes or probes); or
 - e. Use of thrust tabs.

ITEM 3—CATEGORY II

Propulsion components and equipment usable in the systems in Item 1, as follows, as well as the specially designed "production facilities" and "production equipment" therefor and flow forming machines, specified in Note (1):

- (a) Lightweight turbojet and turbofan engines (including turbocompound engines) that are small and fuel efficient;
- (b) Ramjet/Scramjet/pulse jet/combined cycle engines, including devices to regulate combustion, and specially designed components therefor;
- (c) Rocket motor cases, "interior lining", "insulation" and nozzles therefor;
- (d) Staging mechanisms, separation mechanisms, and interstages therefor;
- (e) Liquid and slurry propellant (including oxidizers) control systems, and specially designed components therefor, designed or modified to operate in vibration environments of more than 10 g RMS between 20 Hz and 2,000 Hz.
- (f) Hybrid rocket motors and specially designed components therefor.

Notes to Item 3:

- (1) Flow-forming machines and specially designed components and specially designed software therefor, which:
 - a. according to the manufacturer's technical specification, can be equipped with numerical control units or a computer control, even when not equipped with such units at delivery, and
 - b. with more than two axes which can be coordinated simultaneously for contouring control.
- (2) (A) The only engines covered in subitem (a) above, are the following:
 - (1) Engines having both of the following characteristics:
 - (a) Maximum thrust value greater than 1000 N (achieved un-installed), excluding civil-certified engines with a maximum thrust value greater than 8.890 N (achieved un-installed), and
 - (b) specific fuel consumption of 0.13 kg/N/hr or less (at sea level static and standard conditions); or
 - (2) Engines designed or modified for systems in Item 1, regardless of thrust or specific fuel consumption.
- (B) Item 3(a) engines may be exported as part of a manned aircraft or in quantities appropriate for replacement parts for manned aircraft.
- (3) In Item 3(c), "interior lining" suited for the bond interface between the solid propellant and case or insulating liner is usually a liquid polymer based dispersion of refractory or insulating materials, e.g., carbon filled HTPB or other polymer with added curing agents to be sprayed or screeded over a case interior.
- (4) In Item 3(c), "insulation" intended to be applied to the components of a rocket motor, i.e., the case, nozzle inlets, case closures, includes cured or semi-cured compounded rubber sheet stock containing an insulating or refractory material. It may also be incorporated as stress relief boots or flaps.
- (5) the only servo valves and pumps covered in (e) above, are the following:
 - a. Servo valves designed for flow rates of 24 liters per minute or greater, at an absolute pressure of 7,000 kPa (1,000 psi) or greater, that have an actuator response time of less than 100 msec;
 - b. Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 RPM or with discharge pressures equal to or greater than 7,000 kPa (1,000 psi).
- (6) Item 3(e) systems and components may be exported as part of a satellite.

Technical Notes to Note (1):

Machines combining the function of spin-forming and flow-forming are for the purpose of this item regarded as flow-forming machines.

This Item does not include machines that are not usable in the production of propulsion components and equipment (e.g., motor cases) for systems in Item 1.

ITEM 4—CATEGORY II

Propellants and constituent chemicals for propellants as follows:

- (a) Propulsive substances:
 - (1) Hydrazine with a concentration of more than 70 percent and its derivatives including monomethylhydrazine (MMH);
 - (2) Unsymmetric dimethylhydrazine (UDMH);
 - (3) Ammonium perchlorate;
 - (4) Spherical aluminum powder with particles of uniform diameter of less than 500×10^{-6} m (500 micrometer) and an aluminum content of 97 percent by weight or greater;
 - (5) Metal fuels in particle sizes less than 500×10^{-6} m (500 microns); whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent by weight or more of any of the following: zirconium, beryllium, boron, magnesium, zinc, and alloys of these; Misch metal;
 - (6) Nitro-amines (cyclotetramethylene-tetranitramine (HMX), cyclotrimethylene-trinitramine (RDX));
 - (7) Perchlorates, chlorates or chromates mixed with powdered metals or other high energy fuel components;
 - (8) Carboranes, decaboranes, pentaboranes and derivatives thereof;
 - (9) Liquid oxidizers, as follows:
 - (i) Dinitrogen trioxide;
 - (ii) Nitrogen dioxide/dinitrogen tetroxide;
 - (iii) Dinitrogen pentoxide;
 - (iv) Inhibited Red Fuming Nitric Acid (IRFNA);
 - (v) Compounds composed of fluorine and one or more of other halogens, oxygen or nitrogen.
- (b) Polymeric substances:
 - (1) Carboxy-terminated polybutadiene (CTPB);
 - (2) Hydroxy-terminated polybutadiene (HTPB);
 - (3) Glycidyl azide polymer (GAP);
 - (4) Polybutadiene-acrylic acid (PBAA);
 - (5) Polybutadiene-acrylic acid-acrylonitrile (PBAN).
- (c) Composite propellants including moulded glue propellants and propellants with nitrated bonding.
- (d) Other high energy density propellants such as Boron Slurry, having an energy density of 40×10^6 -joules/kg or greater.
- (e) Other propellant additives and agents:
 - (1) Bonding agents as follows:
 - (i) tris(1-(2-methyl)aziridiny) phosphine oxide (MAPO);
 - (ii) trimesoyl-1(2-ethyl)aziridine (HX-868, BITA);
 - (iii) "Tepanol" (HX-878), Reaction product of tetraethylenepentamine, acrylonitrile and glycidol;

- (iv) "Tepan" (HX-879), Reaction product of tetlenepentamine and acrylonitrile;
 - (v) Polyfunctional aziridine amides with isophthalic, trimesic, isocyanuric, or trimethyladipic backbone also having a 2-methyl or 2-ethyl aziridine group (HX-752, HX-874 and HX-877).
- (2) Curing agents and catalysts as follows:
- (i) Triphenyl bismuth (TPB)
- (3) Burning rate modifiers as follows:
- (i) Catocene
 - (ii) N-butyl-ferrocene
 - (iii) Butacene
 - (iv) Other ferrocene derivatives
- (4) Nitrate esters and nitrate plasticizers as follows:
- (i) Triethylene glycol dinitrate (TEGDN)
 - (ii) Trimethylolethane trinitrate (TMETN)
 - (iii) 1,2,4-butanetriol trinitrate (BTTN)
 - (iv) Diethylene glycol dinitrate (DEGDN)
- (5) Stabilizers as follows:
- (i) 2-nitrodiphenylamine
 - (ii) N-methyl-p-nitroaniline

ITEM 5—CATEGORY II

Production technology, or "production equipment" (including its specially designed components) for:

- (a) Production, handling or acceptance testing of liquid propellants or propellant constituents described in Item 4.
- (b) Production, handling, mixing, curing, casting, pressing, machining, extruding or acceptance testing of solid propellants or propellant constituents described in Item 4.

Notes to Item 5:

- (1) Batch mixers or continuous mixers covered by (b) above, both with provision for mixing under vacuum in the range of zero to 13.326 kPa and with temperature control capability of the mixing chamber, are the following:

Batch mixers having:

- a. A total volumetric capacity of 110 litres (30 gallons) or more; and
- b. At least one mixing/kneading shaft mounted off center.

Continuous mixers having:

- a. Two or more mixing/kneading shafts; and
- b. Capability to open the mixing chamber.

- (2) The following equipment is included in (b) above:

- a. Equipment for the production of atomized or spherical metallic powder in a controlled environment;
- b. Fluid energy mills for grinding or milling ammonium perchlorate, RDX or HMX.

ITEM 6—CATEGORY II

Equipment, "technical data" and procedures for the production of structural composites usable in the systems in Item 1 as follows and specially designed components, and accessories and specially designed software therefor:

- (a) Filament winding machines of which the motions for positioning, wrapping and winding fibers can be coordinated and programmed in three or more axes, designed to fabricate composite structures or laminates from fibrous or filamentary materials, and coordinating and programming controls;
- (b) Tape-laying machines of which the motions for positioning and laying tape and sheets can be coordinated and programmed in two or more axes, designed for the manufacture of composite airframes and missile structures;
- (c) Multidirectional, multidimensional weaving machines or interlacing machines, including adapters and modification kits for weaving, interlacing or braiding fibers to manufacture composite structures, except textile machinery not modified for the above end uses;
- (d) Equipment designed or modified for the production of fibrous or filamentary materials as follows:
 - (1) Equipment for converting polymeric fibers (such as polyacrylonitrile, rayon or polycarbosilane) including special provision to strain the fibre during heating;
 - (2) Equipment for the vapor deposition of elements or compounds on heated filament substrates; and
 - (3) Equipment for the wet-spinning of refractory ceramics (such as aluminum oxide);
- (e) Equipment designed or modified for special fibre surface treatment or for producing prepreps and preforms.
- (f) "Technical data" (including processing conditions) and procedures for the regulation of temperature, pressures or atmosphere in autoclaves or hydroclaves when used for the production of composites or partially processed composites.

Notes to Item 6:

- (1) Examples of components and accessories for the machines covered by this entry are: moulds, mandrels, dies, fixtures and tooling for the preform pressing, curing, casting, sintering or bonding of composite structures, laminates and manufactures thereof.
- (2) Equipment covered by subitem (e) includes but is not limited to rollers, tension stretchers, coating equipment, cutting equipment and clicker dies.

ITEM 7—CATEGORY II

Pyrolytic deposition and densification equipment and "technology" as follows:

- (a) "Technology" for producing pyrolytically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,300 degrees C to 2,900 degrees C temperature range at pressures of 130 Pa (1 mm Hg) to 20 kPa (150 mm Hg) including technology for the composition of precursor gases, flow-rates, and process control schedules and parameters;
- (b) Specially designed nozzles for the above processes;
- (c) Equipment and process controls, and specially designed software therefor, designed or modified for densification and pyrolysis of structural composite rocket nozzles and reentry vehicle nose tips.

Notes to Item 7:

- (1) Equipment included under (c) above are isostatic presses having all of the following characteristics:
 - a. Maximum working pressure of 69 MPa (10,000 psi) or greater;
 - b. Designed to achieve and maintain a controlled thermal environment of 600 degrees C or greater; and
 - c. Possessing a chamber cavity with an inside diameter of 254 mm (10 inches) or greater.
- (2) Equipment included under (c) above are chemical vapor deposition furnaces designed or modified for the densification of carbon-carbon composites.

ITEM 8—CATEGORY II

Structural materials usable in the systems in Item 1, as follows:

- (a) Composite structures, laminates, and manufactures thereof specially designed for use in the systems in Item 1 and the subsystems in Item 2, and resin impregnated fibre prepreps and metal coated fibre preforms therefor, made either with organic matrix or metal matrix utilizing fibrous or filamentary reinforcements having a specific tensile strength greater than 7.62×10^4 m (3×10^6 inches) and a specific modulus greater than 3.18×10^6 m (1.25×10^8 inches);
- (b) Resaturated pyrolyzed (i.e. carbon-carbon) materials designed for rocket systems;
- (c) Fine grain recrystallized bulk graphites (with a bulk density of at least 1.72 g/cc measured at 15 degrees C and having a particle size of 100×10^{-6} m (100 microns) or less), pyrolytic, or fibrous reinforced graphites useable for rocket nozzles and reentry nose tips;
- (d) Ceramic composite materials (dielectric constant less than 6 at frequencies from 100 Hz to 10,000 MHz) for use in missile radomes, and bulk machinable silicon-carbide reinforced unfired ceramic useable for nose tips;
- (e) Tungsten, molybdenum and alloys of these metals in the form of uniform spherical or atomized particles of 500 micrometer diameter or less with a purity of 97 percent or higher for fabrication of rocket motor components; i.e. heat shields, nozzle substrates, nozzle throats, and thrust vector control surfaces;
- (f) Maraging steels (steels generally characterized by high nickel, very low carbon content and the use of substitutional elements or precipitates to produce age-hardening) having an Ultimate Tensile Strength of 1.5×10^9 Pa or greater, measured at 20 C.

Notes to Item 8:

- (1) The only resin impregnated fibre prepreps specified in (a) above are those with a glass transition temperature (T_g), after cure, exceeding 145 degrees C as determined by ASTM D-4065 or national equivalents.
- (2) Maraging steels are only covered by 8(f) above for the purpose of this Annex in the form of sheet, plate or tubing with a wall or plate thickness equal to or less than 5.0 mm (0.2 inch).

ITEM 9—CATEGORY II

Instrumentation, navigation and direction finding equipment and systems, and associated production and test equipment as follows, and specially designed components and software therefor:

- (a) Integrated flight instrument systems, which include gyrostabilizers or automatic pilots and integration software therefor, designed or modified for use in the systems in Item 1;
- (b) Gyro-astro compasses and other devices which derive position or orientation by means of automatically tracking celestial bodies or satellites;

- (c) Accelerometers with a threshold of 0,05 g or less, or a linearity error within 0,25 percent of full scale output, or both, which are designed for use in inertial navigation systems or in guidance systems of all types;
- (d) All types of gyros usable in the systems in Item 1, with a rated drift rate stability of less than 0,5 degree (1 sigma or rms) per hour in a 1 g environment;
- (e) Continuous output accelerometers or gyros of any type, specified to function at acceleration levels greater than 100 g;
- (f) Inertial or other equipment using accelerometers described by subitems (c) or (e) above or gyros described by subitems (d) or (e) above, and systems incorporation such equipment, and specially designed integration software therefor;
- (g) Specially designed test, calibration, and alignment equipment, and "production equipment" for the above, including the following:
 - (1) For laser gyro equipment, the following equipment used to characterize mirrors, having the threshold accuracy shown or better:
 - (i) Scatterometer (10 ppm);
 - (ii) Reflectometer (50 ppm);
 - (iii) Profilometer (5 Angstroms)
 - (2) For other inertial equipment:
 - (i) Inertial Measurement Unit (IMU Module) Tester;
 - (ii) IMU Platform Tester;
 - (iii) IMU Stable Element Handling Fixture;
 - (iv) IMU Platform Balance Fixture;
 - (v) Gyro Tuning Test Station;
 - (vi) Gyro Dynamic Balance Station;
 - (vii) Gyro Run-In/Motor Test Station;
 - (viii) Gyro Evacuation and Filling Station;
 - (ix) Centrifuge Fixture for Gyro Bearings;
 - (x) Accelerometer Axis Align Station;
 - (xi) Accelerometer Test Station.

Notes in Item 9:

- (1) Items (a) through (f) may be exported as part of a manned aircraft, satellite, land vehicle or marine vessel, or in quantities appropriate for replacement parts for such applications.
- (2) In subitem (d):
 - a. Drift rate is defined as the time rate of output deviation from the desired output. It consists of random and systematic components and is expressed as and equivalent angular displacement per unit time with respect to inertial space.
 - b. Stability is defined as standard deviation (1 sigma) of the variation of a particular parameter from its calibrated value measured under stable temperature conditions. This can be expressed as a function of time.
- (3) Accelerometers which are specially designed and developed as MWD (measurement while drilling) sensors for use in downhole well service operations are not specified in Item 9 (c).

ITEM 10—CATEGORY II

Flight control systems and "technology" as follows, designed or modified for the systems in Item 1 as well as the specially designed test, calibration, and alignment equipment therefor:

- (a) Hydraulic, mechanical, electro-optical or electro-mechanical flight control systems (including fly-by-wire systems);

- (b) Attitude control equipment;
- (c) Design technology for integration of air vehicle fuselage, propulsion system and lifting control surfaces to optimize aerodynamic performance throughout the flight regime of an unmanned air vehicle;
- (d) Design technology for integration of the flight control, guidance and propulsion data into a flight management system for optimization of rocket system trajectory.

Note to Item 10:

Items (a) and (b) may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

ITEM 11 — CATEGORY II

Avionics equipment, "technology" and components as follows; designed or modified for use in the systems in Item 1, and specially designed software therefor:

- (a) Radar and laser radar systems, including altimeters;
- (b) Passive sensors for determining bearings to specific electromagnetic sources (direction finding equipment) for terrain characteristics;
- (c) Global Positioning System (GPS) or similar satellite receivers;
 - (1) Capable of providing navigation information under the following operational conditions:
 - (i) At speeds in excess of 515 m/sec (1,000 nautical miles/hour); and
 - (ii) At altitudes in excess of 18 km (60,000 feet); or
 - (2) Designed or modified for use with unmanned air vehicles covered by Item 1.
- (d) Electronic assemblies and components specially designed for military use and operation at temperatures in excess of 125 degrees C.
- (e) Design technology for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from external sources, as follows:
 - (1) Design technology for shielding systems;
 - (2) Design technology for the configuration of hardened electrical circuits and sub-systems;
 - (3) Determination of hardening criteria for the above.

Notes to Item 11:

- (1) Item 11 equipment may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.
- (2) Examples of equipment included in this Item:
 - a. Terrain contour mapping equipment;
 - b. Scene mapping and correlation (both digital and analog) equipment;
 - c. Doppler navigation radar equipment;
 - d. Passive interferometer equipment;
 - e. Imaging sensor equipment (both active and passive);
- (3) In subitem (a), laser radar systems embody specialized transmission, scanning, receiving and signal processing techniques for utilization of lasers for echo ranging, direction finding and discrimination of targets by location, radial speed and body reflection characteristics.

ITEM 12—CATEGORY II

Launch support equipment, facilities and software for the systems in Item 1, as follows:

- (a) Apparatus and devices designed or modified for the handling, control, activation and launching of the systems in Item 1;
- (b) Vehicles designed or modified for the transport, handling, control, activation and launching of the systems in Item 1;
- (c) Gravity meters (gravimeters), gravity gradiometers, and specially designed components therefor, designed or modified for airborne or marine use, and having a static or operational accuracy of $7 \times 10^{-6} \text{m/sec}^2$ (0.7 milligal) or better, with a time to steady-state registration of two minutes or less;
- (d) Telemetry and telecontrol equipment usable for unmanned air vehicles or rocket systems;
- (e) Precision tracking systems:
 - (1) Tracking systems which use a code translator installed on the rocket or unmanned air vehicle in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;
 - (2) Range instrumentation radars including associated optical/infrared trackers and the specially designed software therefor with all of the following capabilities:
 - (i) angular resolution better than 3 milli-radians (0.5 mils);
 - (ii) range of 30 km or greater with a range resolution better than 10 meters RMS;
 - (iii) velocity resolution better than 3 meters per second.
 - (3) Software which processes post-flight, recorded data, enabling determination of vehicle position throughout its flight path.

ITEM 13—CATEGORY II

Analog computers, digital computers, or digital differential analyzers designed or modified for use in the systems in Item 1, having either of the following characteristics:

- (a) Rated for continuous operation at temperatures from below minus 45 degrees C to above plus 55 degrees C; or
- (b) Designed as ruggedized or "radiation hardened".

Note to Item 13:

Item 13 equipment may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

ITEM 14—CATEGORY II

Analog to digital converters, usable in the systems in Item 1, having either of the following characteristics:

- (a) Designed to meet military specifications for ruggedized equipment; or,
- (b) Designed or modified for military use; and being one of the following types:
 - (1) Analog-to-digital converter "microcircuits", which are "radiation hardened" or have all of the following characteristics:
 - (i) Having a resolution of 8 bits or more;
 - (ii) Rated for operation in the temperature range from below minus 54 degrees C to above plus 125 degrees C; and
 - (iii) Hermetically sealed.

- (2) Electrical input type analog-to-digital converter printed circuit boards or modules, with all of the following characteristics:
- (i) Having a resolution of 8 bits or more;
 - (ii) Rated for operation in the temperature range from below minus 45 degrees C to above plus 55 degrees C; and
 - (iii) Incorporating "microcircuits" listed in (1), above.

ITEM 15—CATEGORY II

Test facilities and test equipment usable for the systems in Item 1 and Item 2 as follows; and specially designed software therefor:

(a) Vibration test systems and components therefor, the following:

- (1) Vibration test systems employing feedback or closed loop techniques and incorporating a digital controller, capable of vibrating a system at 10 g RMS or more over the entire range 20 Hz to 2000 Hz and imparting forces of 50 kN (11,250 lbs), measured "bare table", or greater;
- (2) Digital controllers combined with specially-designed vibration test software with a real-time bandwidth greater than 5 kHz designed for use with vibration test systems in (1) above;
- (3) Vibration thrusters (shaker units) with or without associated amplifiers, capable of imparting a force of 50 kN (11,250 lbs), measured "bare table", or greater, and usable in vibration test systems in (1) above;
- (4) Test piece support structures and electronic units designed to combine multiple shaker units into a complete shaker system capable of providing an effective combined force of 50 kN, measured bare table, or greater, and usable in vibration test systems in (1) above.

(b) Wind-tunnels for speeds of Mach 0.9 or more;

(c) Test benches/stands which have the capacity to handle solid or liquid propellant rockets or rocket motors of more than 90 kN (20,000 lbs) of thrust, or which are capable of simultaneously measuring the three axial thrust components;

(d) Environmental chambers and anechoic chambers capable of simulating the following flight conditions:

- (1) Altitude of 15,000 meters or greater; or
- (2) Temperature of at least minus 50 degrees C to plus 125 degrees C; and either
- (3) Vibration environments of 10 g RMS or greater between 20 Hz and 2,000 Hz imparting forces of 5 kN or greater, for environmental chambers; or
- (4) Acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to 2×10^{-5} N per square meter) or with a rated power output of 4 kilowatts or greater, for anechoic chambers.

(e) Accelerators capable of delivering electromagnetic radiation produced by "bremsstrahlung" from accelerated electrons of 2 MeV or greater, and systems containing those accelerators.

Note to Item 15(a):

The term "digital control" refers to equipment, the functions of which are, partly or entirely, automatically controlled by stored and digitally coded electrical signals.

Note to Item 15(e):

The above equipment does not include that specially designed for medical purposes.

ITEM 16—CATEGORY II

Specially designed software, or specially designed software with related specially designed hybrid (combined analog/digital) computers, for modelling, simulation, or design integration of the systems in Item 1 and Item 2.

Note to Item 16:

The modelling includes in particular the aerodynamic and thermodynamic analysis of the systems.

ITEM 17—CATEGORY II

Materials, devices and specially designed software for reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures (i.e. stealth technology), for applications usable for the systems in Item 1 or Item 2, for example:

- (a) Structural materials and coatings specially designed for reduced radar reflectivity;
- (b) Coatings, including paints, specially designed for reduced or tailored reflectivity or emissivity in the microwave, infrared or ultraviolet spectra, except when specially used for thermal control of satellites.
- (c) Specially designed software or databases for analysis of signature reduction.
- (d) Specially designed radar cross section measurement systems.

ITEM 18—CATEGORY II

Devices for use in protecting rocket systems and unmanned air vehicles against nuclear effects (e.g. Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), and usable for the systems in Item 1, as follows:

- (a) "Radiation Hardened" "microcircuits" and detectors.
- (b) Radomes designed to withstand a combined thermal shock greater than 100 cal/sq cm accompanied by a peak over pressure of greater than 50 kPa (7 pounds per square inch).

Note to Item 18(a):

A detector is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a radioactive material.

ITEM 19—CATEGORY II

Complete rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets) and unmanned air vehicles (including cruise missile systems, target drones and reconnaissance drones), not covered in Item 1, capable of a maximum range equal or superior to 300 km.

ITEM 20—CATEGORY II

Complete subsystems, as follows, usable in systems in Item 19, but not in systems in Item 1, as well as specially designed "production facilities", and "production equipment" therefor:

- (a) Individual Rocket Stages.
- (b) Solid or liquid propellant rocket engines, having a total impulse capacity of 8.41×10^5 N-sec (1.91×10^5 lb-sec) or greater, but less than 1.1×10^6 N-sec (2.5×10^5 lb-sec).

END QUOTE

BYLAE A**BEHEERDE GOEDERE TEN OPSIGTE VAN MISSIELTEGNOLOGIE EN
VERWANTE ITEMS****AANHALING BEGIN****Definitions**

For the purpose of this Annex, the following definitions apply:

- (a) "Development" is related to all phases prior to "production" such as:
- design
 - design research
 - design analysis
 - design concepts
 - assembly and testing of prototypes
 - pilot production schemes
 - design data
 - process of transforming design data into a product
 - configuration design
 - integration design
 - layouts
- (b) A "microcircuit" is defined as a device in which a number of passive and/or active elements are considered as indivisibly associated on or within a continuous structure to perform the function of a circuit.
- (c) "Production" means all production phases such as:
- production engineering
 - manufacture
 - integration
 - assembly (mounting)
 - inspection
 - testing
 - quality assurance
- (d) "Production equipment" means tooling, templates, jigs, mandrels, moulds, dies, fixtures, alignment mechanisms, test equipment, other machinery and components therefor, limited to those specially designed or modified for "development" or for one or more phases of "production".
- (e) "Production facilities" means equipment and specially designed software therefor integrated into installations for "development" or for one or more phases of "production".
- (f) "Radiation Hardened" means that the component or equipment is designed or rated to withstand radiation levels which meet or exceed a total irradiation dose of 5×10^5 rads (Si).
- (g) "Technology" means specific information which is required for the "development", "production" or "use" of a product. The information may take the form of "technical data" or "technical assistance".
- (1) "Technical assistance" may take forms such as:
- instruction
 - skills
 - training
 - working knowledge
 - consulting services

(2) "Technical data" may take forms such as:

- blueprints
- plans
- diagrams
- models
- formulae
- engineering designs and specifications
- manuals and instructions written or recorded on other media or devices such as:
 - disk
 - tape
 - read-only memories

Note:

This definition of technology does not include technology "in the public domain" nor "basic scientific research".

- (i) "In the public domain" as it applies to this Annex means technology which has been made available without restrictions upon its further dissemination. (Copyright restrictions do not remove technology from being "in the public domain".)
 - (ii) "Basic scientific research" means experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena and observable facts, not primarily directed towards a specific practical aim or objective.
- (h) "Use" means:
- operation
 - installation (including on-site installation)
 - maintenance
 - repair
 - overhaul
 - refurbishing

Terminology

Where the following terms appear in the text, they are to be understood according to the explanations below:

- (a) "Specially Designed" describes equipment, parts, components or software which, as a result of "development", have unique properties that distinguish them for certain predetermined purposes. For example, a piece of equipment that is "specially designed" for use in a missile will only be considered so if it has no other function or use. Similarly, a piece of manufacturing equipment that is "specially designed" to produce a certain type of component will only be considered such if it is not capable of producing other types of components.
- (b) "Designed or Modified" describes equipment, parts, components or software which, as a result of "development", or modification, have specified properties that make them fit for a particular application. "Designed or Modified" equipment, parts, components or software can be used for other applications. For example, a titanium coated pump designed for a missile may be used with corrosive fluids other than propellants.
- (c) "Usable In" or "Capable Of" describes equipment, parts, components or software which are suitable for a particular purpose. There is no need for the equipment, parts, components or software to have been configured, modified or specified for the particular purpose. For example, any military specification memory circuit would be "capable of" operation in a guidance system.

ITEM 1 — CATEGORY I

Complete rocket systems (including ballistic missile systems, space launch vehicles and sounding rockets) and unmanned air vehicle systems (including cruise missile systems, target drones and reconnaissance drones) capable of delivering at least a 500 kg payload to a range of at least 300 km as well as the specially designed "production facilities" for these systems.

ITEM 2 — CATEGORY I

Complete subsystems usable in the systems in Item 1, as follows, as well as the specially designed "production facilities", and "production equipment" therefor:

- (a) Individual rocket stages;
- (b) Reentry vehicles, and equipment designed or modified therefor, as follows, except as provided in Note (1) below for those designed for non-weapon payloads:
 - (1) Heat shields and components thereof fabricated of ceramic or ablative materials;
 - (2) Heat sinks and components thereof fabricated of light-weight, high heat capacity materials;
 - (3) Electronic equipment specially designed for reentry vehicles;
- (c) Solid or liquid propellant rocket engines, having a total impulse capacity of 1.1×10^6 N-sec (2.5×10^5 lb-sec) or greater;
- (d) "Guidance sets" capable of achieving system accuracy of 3.33 percent or less of the range (e.g., a CEP of 10 km or less at a range of 300 km), except as provided in Note (1) below for those designed for missiles with a range under 300 km or manned aircraft;
- (e) Thrust vector control sub-systems, except as provided in Note (1) below for those designed for rocket systems that do not exceed the range/payload capability of Item 1;
- (f) Weapon or warhead safing, arming, fuzing, and firing mechanisms, except as provided in Note (1) below for those designed for systems other than those in Item 1.

Notes to Item 2:

- (1) The exceptions in (b), (d), (e) and (f) above may be treated as Category II if the subsystem is exported subject to end use statements and quantity limits appropriate for the excepted end use stated above.
- (2) CEP (circle of equal probability) is a measure of accuracy; and defined as the radius of the circle centred at the target, at a specific range, in which 50 percent of the payloads impact.
- (3) A "guidance set" integrates the process of measuring and computing a vehicle's position and velocity (i.e. navigation) with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.
- (4) Examples of methods of achieving thrust vector control which are covered by (e) include:
 - a. Flexible nozzle;
 - b. Fluid or secondary gas injection;
 - c. Movable engine or nozzle;
 - d. Deflection of exhaust gas stream (jet vanes or probes); or
 - e. Use of thrust tabs.

ITEM 3—CATEGORY II

Propulsion components and equipment usable in the systems in Item 1, as follows, as well as the specially designed "production facilities" and "production equipment" therefor and flow forming machines, specified in Note (1):

- (a) Lightweight turbojet and turbofan engines (including turbocompound engines) that are small and fuel efficient;
- (b) Ramjet/Scramjet/pulse jet/combined cycle engines, including devices to regulate combustion, and specially designed components therefor;
- (c) Rocket motor cases, "interior lining", "insulation" and nozzles therefor;
- (d) Staging mechanisms, separation mechanisms, and interstages therefor;
- (e) Liquid and slurry propellant (including oxidizers) control systems, and specially designed components therefor, designed or modified to operate in vibration environments of more than 10 g RMS between 20 Hz and 2,000 Hz.
- (f) Hybrid rocket motors and specially designed components therefor.

Notes to Item 3:

- (1) Flow-forming machines and specially designed components and specially designed software therefor, which:
 - a. according to the manufacturer's technical specification, can be equipped with numerical control units or a computer control, even when not equipped with such units at delivery, and
 - b. with more than two axes which can be coordinated simultaneously for contouring control.
- (2) (A) The only engines covered in subitem (a) above, are the following:
 - (1) Engines having both of the following characteristics:
 - (a) Maximum thrust value greater than 1000 N (achieved un-installed), excluding civil-certified engines with a maximum thrust value greater than 8.890 N (achieved un-installed), and
 - (b) specific fuel consumption of 0.13 kg/N/hr or less (at sea level static and standard conditions); or
 - (2) Engines designed or modified for systems in Item 1, regardless of thrust or specific fuel consumption.
- (B) Item 3(a) engines may be exported as part of a manned aircraft or in quantities appropriate for replacement parts for manned aircraft.
- (3) In Item 3(c), "interior lining" suited for the bond interface between the solid propellant and case or insulating liner is usually a liquid polymer based dispersion of refractory or insulating materials, e.g., carbon filled HTPB or other polymer with added curing agents to be sprayed or screeded over a case interior.
- (4) In Item 3(c), "insulation" intended to be applied to the components of a rocket motor, i.e., the case, nozzle inlets, case closures, includes cured or semi-cured compounded rubber sheet stock containing an insulating or refractory material. It may also be incorporated as stress relief boots or flaps.
- (5) the only servo valves and pumps covered in (e) above, are the following:
 - a. Servo valves designed for flow rates of 24 liters per minute or greater, at an absolute pressure of 7,000 kPa (1,000 psi) or greater, that have an actuator response time of less than 100 msec;
 - b. Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 RPM or with discharge pressures equal to or greater than 7,000 kPa (1,000 psi).
- (6) Item 3(e) systems and components may be exported as part of a satellite.

Technical Notes to Note (1):

Machines combining the function of spin-forming and flow-forming are for the purpose of this item regarded as flow-forming machines.

This Item does not include machines that are not usable in the production of propulsion components and equipment (e.g., motor cases) for systems in Item 1.

ITEM 4—CATEGORY II

Propellants and constituent chemicals for propellants as follows:

(a) Propulsive substances:

- (1) Hydrazine with a concentration of more than 70 percent and its derivatives including monomethylhydrazine (MMH);
- (2) Unsymmetric dimethylhydrazine (UDMH);
- (3) Ammonium perchlorate;
- (4) Spherical aluminum powder with particles of uniform diameter of less than 500×10^{-6} m (500 micrometer) and an aluminum content of 97 percent by weight or greater;
- (5) Metal fuels in particle sizes less than 500×10^{-6} m (500 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent by weight or more of any of the following: zirconium, beryllium, boron, magnesium, zinc, and alloys of these; Misch metal;
- (6) Nitro-amines (cyclotetramethylene-tetranitramine (HMX), cyclotrimethylene-trinitramine (RDX));
- (7) Perchlorates, chlorates or chromates mixed with powdered metals or other high energy fuel components;
- (8) Carboranes, decaboranes, pentaboranes and derivatives thereof;
- (9) Liquid oxidizers, as follows:
 - (i) Dinitrogen trioxide;
 - (ii) Nitrogen dioxide/dinitrogen tetroxide;
 - (iii) Dinitrogen pentoxide;
 - (iv) Inhibited Red Fuming Nitric Acid (IRFNA);
 - (v) Compounds composed of fluorine and one or more of other halogens, oxygen or nitrogen.

(b) Polymeric substances:

- (1) Carboxy-terminated polybutadiene (CTPB);
- (2) Hydroxy-terminated polybutadiene (HTPB);
- (3) Glycidyl azide polymer (GAP);
- (4) Polybutadiene-acrylic acid (PBAA);
- (5) Polybutadiene-acrylic acid-acrylonitrile (PBAN).

(c) Composite propellants including moulded glue propellants and propellants with nitrated bonding.**(d) Other high energy density propellants such as Boron Slurry, having an energy density of 40×10^6 joules/kg or greater.****(e) Other propellant additives and agents:****(1) Bonding agents as follows:**

- (i) tris(1-(2-methyl)aziridiny) phosphine oxide (MAPO);
- (ii) trimesoyl-1(2-ethyl)aziridine (HX-868, BITA);
- (iii) "Tepanol" (HX-878), Reaction product of tetraethylenepentamine, acrylonitrile and glycidol;

- (iv) "Tepan" (HX-879), Reaction product of tetlenepentamine and acrylonitrile;
 - (v) Polyfunctional aziridine amides with isophthalic, trimesic, isocyanuric, or trimethyladipic backbone also having a 2-methyl or 2-ethyl aziridine group (HX-752, HX-874 and HX-877).
- (2) Curing agents and catalysts as follows:
 - (i) Triphenyl bismuth (TPB)
 - (3) Burning rate modifiers as follows:
 - (i) Catocene
 - (ii) N-butyl-ferrocene
 - (iii) Butacene
 - (iv) Other ferrocene derivatives
 - (4) Nitrate esters and nitrate plasticizers as follows:
 - (i) Triethylene glycol dinitrate (TEGDN)
 - (ii) Trimethylolethane trinitrate (TMETN)
 - (iii) 1,2,4-butanetriol trinitrate (BTTN)
 - (iv) Diethylene glycol dinitrate (DEGDN)
 - (5) Stabilizers as follows:
 - (i) 2-nitrodiphenylamine
 - (ii) N-methyl-p-nitroaniline

ITEM 5—CATEGORY II

Production technology, or "production equipment" (including its specially designed components) for:

- (a) Production, handling or acceptance testing of liquid propellants or propellant constituents described in Item 4.
- (b) Production, handling, mixing, curing, casting, pressing, machining, extruding or acceptance testing of solid propellants or propellant constituents described in Item 4.

Notes to Item 5:

- (1) Batch mixers or continuous mixers covered by (b) above, both with provision for mixing under vacuum in the range of zero to 13.326 kPa and with temperature control capability of the mixing chamber, are the following:

Batch mixers having:

- a. A total volumetric capacity of 110 litres (30 gallons) or more; and
- b. At least one mixing/kneading shaft mounted off center.

Continuous mixers having:

- a. Two or more mixing/kneading shafts; and
- b. Capability to open the mixing chamber.

- (2) The following equipment is included in (b) above:
 - a. Equipment for the production of atomized or spherical metallic powder in a controlled environment;
 - b. Fluid energy mills for grinding or milling ammonium perchlorate, RDX or HMX.

ITEM 6—CATEGORY II

Equipment, "technical data" and procedures for the production of structural composites usable in the systems in Item 1 as follows and specially designed components, and accessories and specially designed software therefor:

- (a) Filament winding machines of which the motions for positioning, wrapping and winding fibers can be coordinated and programmed in three or more axes, designed to fabricate composite structures or laminates from fibrous or filamentary materials, and coordinating and programming controls;

- (b) Tape-laying machines of which the motions for positioning and laying tape and sheets can be coordinated and programmed in two or more axes, designed for the manufacture of composite airframes and missile structures;
- (c) Multidirectional, multidimensional weaving machines or interlacing machines, including adapters and modification kits for weaving, interlacing or braiding fibers to manufacture composite structures, except textile machinery not modified for the above end uses;
- (d) Equipment designed or modified for the production of fibrous or filamentary materials as follows:
 - (1) Equipment for converting polymeric fibers (such as polyacrylonitrile, rayon or polycarbosilane) including special provision to strain the fibre during heating;
 - (2) Equipment for the vapor deposition of elements or compounds on heated filament substrates; and
 - (3) Equipment for the wet-spinning of refractory ceramics (such as aluminum oxide);
- (e) Equipment designed or modified for special fibre surface treatment or for producing prepregs and preforms.
- (f) "Technical data" (including processing conditions) and procedures for the regulation of temperature, pressures or atmosphere in autoclaves or hydroclaves when used for the production of composites or partially processed composites.

Notes to Item 6:

- (1) Examples of components and accessories for the machines covered by this entry are: moulds, mandrels, dies, fixtures and tooling for the preform pressing, curing, casting, sintering or bonding of composite structures, laminates and manufactures thereof.
- (2) Equipment covered by subitem (e) includes but is not limited to rollers, tension stretchers, coating equipment, cutting equipment and clicker dies.

ITEM 7—CATEGORY II

Pyrolytic deposition and densification equipment and "technology" as follows:

- (a) "Technology" for producing pyrolytically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,300 degrees C to 2,900 degrees C temperature range at pressures of 130 Pa (1 mm Hg) to 20 kPa (150 mm Hg) including technology for the composition of precursor gases, flow-rates, and process control schedules and parameters;
- (b) Specially designed nozzles for the above processes;
- (c) Equipment and process controls, and specially designed software therefor, designed or modified for densification and pyrolysis of structural composite rocket nozzles and reentry vehicle nose tips.

Notes to Item 7:

- (1) Equipment included under (c) above are isostatic presses having all of the following characteristics:
 - a. Maximum working pressure of 69 MPa (10,000 psi) or greater;
 - b. Designed to achieve and maintain a controlled thermal environment of 600 degrees C or greater; and
 - c. Possessing a chamber cavity with an inside diameter of 254 mm (10 inches) or greater.
- (2) Equipment included under (c) above are chemical vapor deposition furnaces designed or modified for the densification of carbon-carbon composites.

ITEM 8—CATEGORY II

Structural materials usable in the systems in Item 1, as follows:

- (a) Composite structures, laminates, and manufactures thereof specially designed for use in the systems in Item 1 and the subsystems in Item 2, and resin impregnated fibre prepregs and metal coated fibre preforms therefor, made either with organic matrix or metal matrix utilizing fibrous or filamentary reinforcements having a specific tensile strength greater than 7.62×10^4 m (3×10^6 inches) and a specific modulus greater than 3.18×10^6 m (1.25×10^8 inches);
- (b) Resaturated pyrolyzed (i.e. carbon-carbon) materials designed for rocket systems;
- (c) Fine grain recrystallized bulk graphites (with a bulk density of at least 1.72 g/cc measured at 15 degrees C and having a particle size of 100×10^{-6} m (100 microns) or less), pyrolytic, or fibrous reinforced graphites useable for rocket nozzles and reentry nose tips;
- (d) Ceramic composite materials (dielectric constant less than 6 at frequencies from 100 Hz to 10,000 MHz) for use in missile radomes, and bulk machinable silicon-carbide reinforced unfired ceramic useable for nose tips;
- (e) Tungsten, molybdenum and alloys of these metals in the form of uniform spherical or atomized particles of 500 micrometer diameter or less with a purity of 97 percent or higher for fabrication of rocket motor components; i.e. heat shields, nozzle substrates, nozzle throats, and thrust vector control surfaces;
- (f) Maraging steels (steels generally characterized by high nickel, very low carbon content and the use of substitutional elements or precipitates to produce age-hardening) having an Ultimate Tensile Strength of 1.5×10^9 Pa or greater, measured at 20 C.

Notes to Item 8:

- (1) The only resin impregnated fibre prepregs specified in (a) above are those with a glass transition temperature (T_g), after cure, exceeding 145 degrees C as determined by ASTM D-4065 or national equivalents.
- (2) Maraging steels are only covered by 8(f) above for the purpose of this Annex in the form of sheet, plate or tubing with a wall or plate thickness equal to or less than 5.0 mm (0.2 inch).

ITEM 9—CATEGORY II

Instrumentation, navigation and direction finding equipment and systems, and associated production and test equipment as follows, and specially designed components and software therefor:

- (a) Integrated flight instrument systems, which include gyrostabilizers or automatic pilots and integration software therefor, designed or modified for use in the systems in Item 1;
- (b) Gyro-astro compasses and other devices which derive position or orientation by means of automatically tracking celestial bodies or satellites;
- (c) Accelerometers with a threshold of 0,05 g or less, or a linearity error within 0,25 percent of full scale output, or both, which are designed for use in inertial navigation systems or in guidance systems of all types;
- (d) All types of gyros usable in the systems in Item 1, with a rated drift rate stability of less than 0,5 degree (1 sigma or rms) per hour in a 1 g environment;
- (e) Continuous output accelerometers or gyros of any type, specified to function at acceleration levels greater than 100 g;
- (f) Inertial or other equipment using accelerometers described by subitems (c) or (e) above or gyros described by subitems (d) or (e) above, and systems incorporation such equipment, and specially designed integration software therefor;

(g) Specially designed test, calibration, and alignment equipment, and "production equipment" for the above, including the following:

(1) For laser gyro equipment, the following equipment used to characterize mirrors, having the threshold accuracy shown or better:

- (i) Scatterometer (10 ppm);
- (ii) Reflectometer (50 ppm);
- (iii) Profilometer (5 Angstroms)

(2) For other inertial equipment:

- (i) Inertial Measurement Unit (IMU Module) Tester;
- (ii) IMU Platform Tester;
- (iii) IMU Stable Element Handling Fixture;
- (iv) IMU Platform Balance Fixture;
- (v) Gyro Tuning Test Station;
- (vi) Gyro Dynamic Balance Station;
- (vii) Gyro Run-In/Motor Test Station;
- (viii) Gyro Evacuation and Filling Station;
- (ix) Centrifuge Fixture for Gyro Bearings;
- (x) Accelerometer Axis Align Station;
- (xi) Accelerometer Test Station.

Notes in Item 9:

- (1) Items (a) through (f) may be exported as part of a manned aircraft, satellite, land vehicle or marine vessel, or in quantities appropriate for replacement parts for such applications.
- (2) In subitem (d):
 - a. Drift rate is defined as the time rate of output deviation from the desired output. It consists of random and systematic components and is expressed as an equivalent angular displacement per unit time with respect to inertial space.
 - b. Stability is defined as standard deviation (1 sigma) of the variation of a particular parameter from its calibrated value measured under stable temperature conditions. This can be expressed as a function of time.
- (3) Accelerometers which are specially designed and developed as MWD (measurement while drilling) sensors for use in downhole well service operations are not specified in Item 9 (c).

ITEM 10—CATEGORY II

Flight control systems and "technology" as follows, designed or modified for the systems in Item 1 as well as the specially designed test, calibration, and alignment equipment therefor:

- (a) Hydraulic, mechanical, electro-optical or electro-mechanical flight control systems (including fly-by-wire systems);
- (b) Attitude control equipment;
- (c) Design technology for integration of air vehicle fuselage, propulsion system and lifting control surfaces to optimize aerodynamic performance throughout the flight regime of an unmanned air vehicle;
- (d) Design technology for integration of the flight control, guidance and propulsion data into a flight management system for optimization of rocket system trajectory.

Note to Item 10:

Items (a) and (b) may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

ITEM 11—CATEGORY II

Avionics equipment, "technology" and components as follows; designed or modified for use in the systems in Item 1, and specially designed software therefor:

- (a) Radar and laser radar systems, including altimeters;
- (b) Passive sensors for determining bearings to specific electromagnetic sources (direction finding equipment) for terrain characteristics;
- (c) Global Positioning System (GPS) or similar satellite receivers;
 - (1) Capable of providing navigation information under the following operational conditions:
 - (i) At speeds in excess of 515 m/sec (1,000 nautical miles/hour); and
 - (ii) At altitudes in excess of 18 km (60,000 feet); or
 - (2) Designed or modified for use with unmanned air vehicles covered by Item 1.
- (d) Electronic assemblies and components specially designed for military use and operation at temperatures in excess of 125 degrees C.
- (e) Design technology for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from external sources, as follows:
 - (1) Design technology for shielding systems;
 - (2) Design technology for the configuration of hardened electrical circuits and subsystems;
 - (3) Determination of hardening criteria for the above.

Notes to Item 11:

- (1) Item 11 equipment may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.
- (2) Examples of equipment included in this Item:
 - a. Terrain contour mapping equipment;
 - b. Scene mapping and correlation (both digital and analog) equipment;
 - c. Doppler navigation radar equipment;
 - d. Passive interferometer equipment;
 - e. Imaging sensor equipment (both active and passive);
- (3) In subitem (a), laser radar systems embody specialized transmission, scanning, receiving and signal processing techniques for utilization of lasers for echo ranging, direction finding and discrimination of targets by location, radial speed and body reflection characteristics.

ITEM 12—CATEGORY II

Launch support equipment, facilities and software for the systems in Item 1, as follows:

- (a) Apparatus and devices designed or modified for the handling, control, activation and launching of the systems in Item 1;
- (b) Vehicles designed or modified for the transport, handling, control, activation and launching of the systems in Item 1;

- (c) Gravity meters (gravimeters), gravity gradiometers, and specially designed components therefor, designed or modified for airborne or marine use, and having a static or operational accuracy of $7 \times 10^{-6} \text{m/sec}^2$ (0.7 milligal) or better, with a time to steady-state registration of two minutes or less;
- (d) Telemetry and telecontrol equipment usable for unmanned air vehicles or rocket systems;
- (e) Precision tracking systems:
 - (1) Tracking systems which use a code translator installed on the rocket or unmanned air vehicle in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;
 - (2) Range instrumentation radars including associated optical/infrared trackers and the specially designed software therefor with all of the following capabilities:
 - (i) angular resolution better than 3 milli-radians (0.5 mils);
 - (ii) range of 30 km or greater with a range resolution better than 10 meters RMS;
 - (iii) velocity resolution better than 3 meters per second.
 - (3) Software which processes post-flight, recorded data, enabling determination of vehicle position throughout its flight path.

ITEM 13—CATEGORY II

Analog computers, digital computers, or digital differential analyzers designed or modified for use in the systems in Item 1, having either of the following characteristics:

- (a) Rated for continuous operation at temperatures from below minus 45 degrees C to above plus 55 degrees C; or
- (b) Designed as ruggedized or "radiation hardened".

Note to Item 13:

Item 13 equipment may be exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

ITEM 14—CATEGORY II

Analog to digital converters, usable in the systems in Item 1, having either of the following characteristics:

- (a) Designed to meet military specifications for ruggedized equipment; or,
- (b) Designed or modified for military use; and being one of the following types:
 - (1) Analog-to-digital converter "microcircuits", which are "radiation hardened" or have all of the following characteristics:
 - (i) Having a resolution of 8 bits or more;
 - (ii) Rated for operation in the temperature range from below minus 54 degrees C to above plus 125 degrees C; and
 - (iii) Hermetically sealed.
 - (2) Electrical input type analog-to-digital converter printed circuit boards or modules, with all of the following characteristics:
 - (i) Having a resolution of 8 bits or more;
 - (ii) Rated for operation in the temperature range from below minus 45 degrees C to above plus 55 degrees C; and
 - (iii) Incorporating "microcircuits" listed in (1), above.

ITEM 15—CATEGORY II

Test facilities and test equipment usable for the systems in Item 1 and Item 2 as follows; and specially designed software therefor:

- (a) Vibration test systems and components therefor, the following:
- (1) Vibration test systems employing feedback or closed loop techniques and incorporating a digital controller, capable of vibrating a system at 10 g RMS or more over the entire range 20 Hz to 2000 Hz and imparting forces of 50 kN (11,250 lbs), measured "bare table", or greater;
 - (2) Digital controllers combined with specially-designed vibration test software with a real-time bandwidth greater than 5 kHz designed for use with vibration test systems in (1) above;
 - (3) Vibration thrusters (shaker units) with or without associated amplifiers, capable of imparting a force of 50 kN (11,250 lbs), measured "bare table", or greater, and usable in vibration test systems in (1) above;
 - (4) Test piece support structures and electronic units designed to combine multiple shaker units into a complete shaker system capable of providing an effective combined force of 50 kN, measured bare table, or greater, and usable in vibration test systems in (1) above.
- (b) Wind-tunnels for speeds of Mach 0.9 or more;
- (c) Test benches/stands which have the capacity to handle solid or liquid propellant rockets or rocket motors of more than 90 kN (20,000 lbs) of thrust, or which are capable of simultaneously measuring the three axial thrust components;
- (d) Environmental chambers and anechoic chambers capable of simulating the following flight conditions:
- (1) Altitude of 15,000 meters or greater; or
 - (2) Temperature of at least minus 50 degrees C to plus 125 degrees C; and either
 - (3) Vibration environments of 10 g RMS or greater between 20 Hz and 2,000 Hz imparting forces of 5 kN or greater, for environmental chambers; or
 - (4) Acoustic environments at an overall sound pressure level of 140 dB or greater (referred to 2×10^{-5} N per square meter) or with a rated power output of 4 kilowatts or greater, for anechoic chambers.
- (e) Accelerators capable of delivering electromagnetic radiation produced by "bremsstrahlung" from accelerated electrons of 2 MeV or greater, and systems containing those accelerators.

Note to Item 15(a):

The term "digital control" refers to equipment, the functions of which are, partly or entirely, automatically controlled by stored and digitally coded electrical signals.

Note to Item 15(e):

The above equipment does not include that specially designed for medical purposes.

ITEM 16—CATEGORY II

Specially designed software, or specially designed software with related specially designed hybrid (combined analog/digital) computers, for modelling, simulation, or design integration of the systems in Item 1 and Item 2.

Note to Item 16:

The modelling includes in particular the aerodynamic and thermodynamic analysis of the systems.

ITEM 17—CATEGORY II

Materials, devices and specially designed software for reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures (i.e. stealth technology), for applications usable for the systems in Item 1 or Item 2, for example:

- (a) Structural materials and coatings specially designed for reduced radar reflectivity;
- (b) Coatings, including paints, specially designed for reduced or tailored reflectivity or emissivity in the microwave, infrared or ultraviolet spectra, except when specially used for thermal control of satellites.
- (c) Specially designed software or databases for analysis of signature reduction.
- (d) Specially designed radar cross section measurement systems.

ITEM 18—CATEGORY II

Devices for use in protecting rocket systems and unmanned air vehicles against nuclear effects (e.g. Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), and usable for the systems in Item 1, as follows:

- (a) "Radiation Hardened" "microcircuits" and detectors.
- (b) Radomes designed to withstand a combined thermal shock greater than 100 cal/sq cm accompanied by a peak over pressure of greater than 50 kPa (7 pounds per square inch).

Note to Item 18(a):

A detector is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a radioactive material.

ITEM 19—CATEGORY II

Complete rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets) and unmanned air vehicles (including cruise missile systems, target drones and reconnaissance drones), not covered in Item 1, capable of a maximum range equal or superior to 300 km.

ITEM 20—CATEGORY II

Complete subsystems, as follows, usable in systems in Item 19, but not in systems in Item 1, as well as specially designed "production facilities", and "production equipment" therefor:

- (a) Individual Rocket Stages.
- (b) Solid or liquid propellant rocket engines, having a total impulse capacity of 8.41×10^5 N-sec (1.91×10^5 lb-sec) or greater, but less than 1.1×10^6 N-sec (2.5×10^5 lb-sec).

AANHALING EINDIG

No. R. 1790

14 October 1994

NOTICE IN TERMS OF SECTION 13 OF THE NON-PROLIFERATION OF WEAPONS OF MASS DESTRUCTION ACT, 1993

DECLARATION OF CERTAIN NUCLEAR-RELATED DUAL-USE EQUIPMENT, MATERIALS AND RELATED TECHNOLOGY ITEMS AS CONTROLLED GOODS AND CONTROL MEASURES APPLICABLE TO SUCH GOODS

1. I, Trevor Andrew Manuel, in my capacity as Minister of Trade and Industry, acting under section 13 of the Non-Proliferation of Weapons of Mass Destruction Act, 1993 (Act No. 87 of 1993), hereby—

(a) declare all items listed in the IAEA (International Atomic Energy Agency) document INFCIRC/254/Rev.1/Part 2, dated July 1992, as quoted in Schedule A to this notice, to be controlled goods; and

(b) determine that the import, export, re-export and transit of such controlled goods shall take place only under a permit issued by the South African Council for the Non-Proliferation of Weapons of Mass Destruction, established under section 4 of the aforementioned Act.

2. Application forms for permits and registrations in terms of section 13 (3) of the aforementioned Act are obtainable from:

The Secretariat
Non-Proliferation Council
Private Bag X753
PRETORIA
0001.

T. A. MANUEL,

Minister of Trade and Industry.

No. R. 1790

14 Oktober 1994

KENNISGEWING KRAGTENS ARTIKEL 13 VAN DIE WET OP DIE NIE-PROLIFERASIE VAN WAPENS VAN GROOTSKAALSE VERNIETIGING, 1993

VERKLARING VAN SEKERE KERNVERWANTE DUBBELDOELIGE TOERUSTING, MATERIALE EN VERWANTETEGNOLOGIE-ITEMS TOT BEHEERDE GOEDERE EN BEHEERMAATREËLS WAT OP SODANIGE GOEDERE VAN TOEPASSING IS

1. Ek, Trevor Andrew Manuel, in my hoedanigheid van Minister van Handel en Nywerheid, handelende kragtens artikel 13 van die Wet op die Nie-proliferasie van Wapens van Grootsekaalse Vernietiging, 1993 (Wet No. 87 van 1993)—

(a) verklaar hierby alle items gelys in die IAEA (Internasionale Atoomenergie-Agentskap)-dokument INFCIRC/254/Rev.1/Part 2, gedateer Julie 1992, en waarvan die oorspronklike teks in Bylae A van hierdie kennisgewing in Engels aangehaal is ten einde internasionale aanvaarding en eenduidigheid ten opsigte van tegniese definisies en begrippe te verseker, tot beheerde goedere; en

(b) bepaal dat die invoer, uitvoer, heruitvoer en deurvoer van sodanige beheerde goedere slegs mag plaasvind kragtens 'n permit wat deur die Suid-Afrikaanse Raad vir die Nie-proliferasie van Wapens van Grootsekaalse Vernietiging, ingestel by artikel 4 van voormelde Wet, uitgereik is.

2. Aansoekvorms vir permitte en registrasies kragtens artikel 13 (3) van voormelde Wet is verkrygbaar by:

Die Sekretariaat
Nie-proliferasieraad
Privaat Sak X753
PRETORIA
0001.

T. A. MANUEL,

Minister van Handel en Nywerheid.

SCHEDULE A

NUCLEAR-RELATED DUAL-USE CONTROLLED GOODS

A list of commonly used abbreviations and a list of definitions of technical terms, as well as the list of nuclear-related dual-use equipment, materials and related technology items, are quoted from the Annex to the IAEA document INFCIRC/254/Rev.1/Part 2, dated July 1992.

I. ABBREVIATIONS

QUOTE

Commonly used abbreviations (and their prefixes denoting size) in this Annex are as follows.

| | | |
|-----------------|---|---------------------|
| A | - | ampere(s) |
| °C | - | degree(s) Celsius |
| Ci | - | curie(s) |
| cm ³ | - | cubic centimeter(s) |

| | | |
|-----|---|--|
| dB | - | decibel(s) |
| dBm | - | decibel referred to in milliwatt |
| g | - | gram(s); also, acceleration of gravity (9.81 m/second ²) |
| GBq | - | gigabecquerel(s) |
| GHz | - | gigahertz |
| Hz | - | hertz |
| J | - | joule(s) |
| K | - | kelvin |
| keV | - | thousand electron volt(s) |
| kg | - | kilogram(s) |
| kHZ | - | kilohertz |
| kN | - | kilonewton(s) |
| kPa | - | kilopascal(s) |
| kW | - | kilowatt(s) |
| m | - | meter(s) |
| MeV | - | million electron volt(s) |
| MHz | - | megahertz |
| MPa | - | megapascal(s) |
| MW | - | megawatt(s) |
| μF | - | microfarad(s) |
| μm | - | micrometer(s) |
| μs | - | microsecond(s) |
| mm | - | millimeter(s) |
| N | - | newton(s) |
| nm | - | nanometer(s) |
| ns | - | nanosecond(s) |
| nH | - | nanohenry(ies) |
| ps | - | picosecond(s) |
| RMS | - | root mean square |
| TIR | - | total indicator reading |
| W | - | watt(s) |

END QUOTE**II. DEFINITIONS****QUOTE**

"Technology" - means specific information required for the "development", "production", or "use" of any item contained in the List. This information may take the form of "technical data" or "technical assistance".

"basic scientific research" - Experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena and observable facts, not primarily directed towards a specific practical aim or objective.

"development" - is related to all phases prior to "production" such as:

- design
- design research
- design analysis
- design concepts
- assembly and testing of prototypes
- pilot production schemes
- design data
- process of transforming design data into a product
- configuration design
- integration design
- layouts

"in the public domain" - "In the public domain," as it applies herein, means technology that has been made available without restrictions upon its further dissemination. (Copyright restrictions do not remove technology from being in the public domain.)

"production" - means all production phases such as:

- construction
- production engineering
- manufacture
- integration
- assembly (mounting)
- inspection
- testing
- quality assurance

"Specially designed software"

The minimum "operating systems", "diagnostic systems", "maintenance systems" and "application software" necessary to be executed on particular equipment to perform the function for which it was designed. To make other, incompatible equipment perform the same function requires:

- (a) modification of this "software" or
- (b) addition of "programs".

"technical assistance" - "Technical assistance" may take forms such as: instruction, skills, training, working knowledge, consulting services.

NOTE: "Technical assistance" may involve transfer of "technical data".

"technical data" - "Technical data" may take forms such as blueprints, plans, diagrams, models, formulae, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.

"use" - Operation, installation (including on-site installation), maintenance (checking), repair, overhaul, and refurbishing.

END QUOTE

III. LIST OF NUCLEAR-RELATED DUAL-USE CONTROLLED GOODS

QUOTE

1. INDUSTRIAL EQUIPMENT

1.1. Spin-forming and flow-forming machines which:

- a. according to the manufacturer's technical specification, can be equipped with "numerical control" units or a computer control; and
- b. with two or more axes that can be coordinated simultaneously for "contouring control",

and precision rotor-forming mandrels designed to form cylindrical rotors of inside diameter between 75 mm (3 in.) and 400 mm (16 in.) and specially designed software therefor.

Note: The only spin-forming machines controlled by this entry are those combining the function of spin-forming and flow-forming.

1.2. "Numerical control" units, specially designed "motion control boards" for "numerical control" application on machine tools, "numerically controlled" machine tools, specially designed "software", and technology as follows.

Detailed specifications of the equipment are shown in the Appendix.

1.3. Dimensional inspection machines, devices, or systems, as follows, specially designed software therefor.

- (a) Computer controlled or numerically controlled dimensional inspection machines having both of the following characteristics:

- (1) two or more axes; and

- (2) a one-dimensional length "measurement uncertainty" equal to or less (better) than $(1.25 + L/1000) \mu\text{m}$ tested with a probe of an "accuracy" of less (better) than $0.2 \mu\text{m}$ (L is the measured length in millimeters) (Ref: VDI/VDE 2617 parts 1 and 2);
- (b) Linear and angular displacement measuring devices, as follows:
- (1) linear measuring instruments having any of the following characteristics:
- (i) non-contact type measuring systems with a "resolution" equal to or less (better) than $0.2 \mu\text{m}$ within a measuring range up to 0.2 mm ;
 - (ii) linear variable differential transformer (LVDT) systems having both of the following characteristics:
 - (A) "linearity" equal to or less (better) than 0.1% within a measuring range up to 5 mm ; *and*
 - (B) drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature $\pm 1 \text{ K}$; *or*
 - (iii) measuring systems that have both of the following characteristics:
 - (A) contain a "laser"; *and*
 - (B) maintain for at least 12 hours, over a temperature range of $\pm 1 \text{ K}$ around a standard temperature and a standard pressure;
 - (1) a "resolution" over their full scale of $0.1 \mu\text{m}$ or better; *and*
 - (2) with a "measurement uncertainty" equal to or less (better) than $(0.2 + L/2000) \mu\text{m}$ (L is the measured length in millimeters); *except* measuring interferometer systems, without closed or open loop feedback, containing a "laser" to measure slide movement errors of machine tools, dimensional inspection machines, or similar equipment;
- (2) angular measuring instruments having an "angular position deviation" equal to or less (better) than 0.00025° ;
- Note: The sub-item (b) (2) of this item does not control optical instruments, such as autocollimators, using collimated light to detect angular displacement of a mirror.
- (c) Systems for simultaneously linear-angular inspection of hemishells, having both of the following characteristics:
- (1) "measurement uncertainty" along any linear axis equal to or less (better) than $3.5 \mu\text{m}$ per 5 mm ; *and*
 - (2) "angular position deviation" equal to or less than 0.02° .
- Note: Specially designed software for the systems described in paragraph (c) of this item includes software for simultaneous measurements of wall thickness and contour.

Technical Note 1: Machine tools that can be used as measuring machines are controlled if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.

Technical Note 2: A machine described in this section, 1.3., is controlled if it exceeds the control threshold anywhere within its operating range.

Technical Note 3: The probe used in determining the measurement uncertainty of a dimensional inspection system shall be as described in VDI/VDE 2617 parts 2, 3, and 4.

Technical Note 4: All parameters of measurement values in this item represent plus/minus, i.e., not total band.

"Measurement uncertainty"

The characteristic parameter which specifies in what range around the output value the correct value of the measurable variable lies with a confidence level of 95%. It includes the uncorrected systematic deviations, the uncorrected backlash, and the random deviations (Reference: VDI/VDE 2617).

"Resolution"

The least increment of a measuring device; on digital instruments, the least significant bit (Reference: ANSI B-89.1.12).

"Linearity"

(Usually measured in terms of nonlinearity) is the maximum deviation of the actual characteristic (average of upscale and downscale readings), positive or negative, from a straight line so positioned as to equalize and minimize the maximum deviations.

"Angular position deviation"

The maximum difference between angular position and the actual, very accurately measured angular position after the workpiece mount of the table has been turned out of its initial position. (Reference: VDI/VDE 2617. Draft: "Rotary table on coordinate measuring machines").

- 1.4. Vacuum or controlled environment (inert gas) induction furnaces capable of operation above 850°C and having induction coils 600 mm (24 in.) or less in diameter, and power supplies specially designed for induction furnaces with a power supply of 5 kW or more.

Technical Note: This entry does not control furnaces designed for the processing of semiconductor wafers.

- 1.5. "Isostatic presses" capable of achieving a maximum working pressure of 69 MPa (10,000 psi) or greater and having a chamber cavity with an inside diameter in excess of 152 mm (6 in.) and specially designed dies and moulds, and controls and "specially designed software" therefor.

Technical Notes:

- (1) The inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.

- (2) "Isostatic presses"

Equipment capable of pressurizing a closed cavity through various media (gas, liquid, solid particles, etc.) to create equal pressure in all directions within the cavity upon a workpiece or material.

- 1.6. "Robots" and "end-effectors" having either of the following characteristics:

(a) Specially designed to comply with national safety standards applicable to handling high explosives (for example, meeting electrical code ratings for high explosives);
or

(b) Specially designed or rated as radiation hardened to withstand greater than 5×10^4 grays (Si) (5×10^6 rad (Si)) without operational degradation;

and specially designed controllers and "specially designed software" therefor.

Technical Notes:

- (1) "Robot"

A manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use "sensors", and has all of the following characteristics:

(a) is multifunctional;

(b) is capable of positioning or orienting material, parts, tools, or special devices through variable movements in three-dimensional space;

- (c) incorporates three or more closed or open loop servo-devices which may include stepping motors; and
- (d) has "user-accessible programmability" by means of teach/playback method or by means of an electronic computer which may be a programmable logic controlled, i.e., without mechanical intervention.

NB.:

The above definition does not include the following devices:

- (a) Manipulation mechanisms which are only manually/teleoperator controllable;
- (b) Fixed sequence manipulation mechanisms which are automated moving devices operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed stops, such as pins or cams. The sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic, or electrical means;
- (c) Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed, but adjustable, stops such as pins or cams. The sequence of motions and the selection of paths or angles are variable within the fixed program pattern. Variations or modifications of the program pattern (e.g., changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;
- (d) Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is variable but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;
- (e) Stacker cranes defined as Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contents of those bins for storage or retrieval.

(2) "End-effectors"

"End-effectors" include grippers, "active tooling units," and any other tooling that is attached to the baseplate on the end of a "robot" manipulator arm.

(3) The definition in (a) above is not designed to control robots specially designed for nonnuclear industrial applications such as automobile paint-spraying booths.

1.7. Vibration test equipment using digital control techniques and feedback or closed loop test equipment and software therefor capable of vibrating a system at 10 g RMS or more between 20 Hz and 2000 Hz, imparting forces of 50 kN (11,250 lbs) or greater.

1.8. Vacuum and controlled atmosphere metallurgical melting and casting furnaces as follows; and specially configured computer control and monitoring systems and "specially designed software" therefor:

(a) Arc remelt and casting furnaces with consumable electrode capacities between 1000 cm³ and 20,000 cm³ and capable of operating with melting temperatures above 1700 °C;

(b) Electron beam melting and plasma atomization and melting furnaces with a power of 50 kW or greater and capable of operating with melting temperatures above 1200°C.

2. **MATERIALS**

2.1. Aluminum alloys capable of an ultimate tensile strength of 460 MPa (0.46×10^9 N/m²) or more at 293 K (20°C), in the form of tubes or solid forms (including forgings) with an outside diameter of more than 75 mm (3 in.).

Technical Note: The phrase "capable of" encompasses aluminum alloys before or after heat treatment.

2.2. Beryllium as follows: metal, alloys containing more than 50% of beryllium by weight, compounds containing beryllium, and manufactures thereof, except:

(a) Metal windows for X-ray machines;

- (b) Oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits.

Technical Note: This control applies to waste and scrap containing beryllium as defined here.

- 2.3. High-purity (99.99% or greater) bismuth with very low silver content (less than 10 parts per million).
- 2.4. Boron and boron compounds, mixtures, and loaded materials in which the boron-10 isotope is more than 20% by weight of the total boron content.
- 2.5. Calcium (high purity) containing both less than 1000 parts per million by weight of metallic impurities other than magnesium and less than 10 parts per million of boron.
- 2.6. Chlorine Trifluoride (ClF_3).
- 2.7. Crucibles made of materials resistant to liquid actinide metals, as follows:
 - (a) Crucibles with a volume of between 150 ml and 8 liters and made of or coated with any of the following materials having a purity of 98% or greater:
 - (i) Calcium fluoride (CaF_2)
 - (ii) Calcium zirconate (metazirconate) (Ca_2ZrO_3)
 - (iii) Cerium sulfide (Ce_2S_3)
 - (iv) Erbium oxide (erbia) (Er_2O_3)
 - (v) Hafnium oxide (hafnia) (HfO_2)
 - (vi) Magnesium oxide (MgO)
 - (vii) Nitrided niobium-titanium-tungsten alloy (approximately 50% Nb, 30% Ti, 20% W)
 - (viii) Yttrium oxide (yttria) (Y_2O_3)
 - (ix) Zirconium oxide (zirconia) (ZrO_2)
 - (b) Crucibles with a volume of between 50 ml and 2 liters and made of or lined with tantalum, having a purity of 99.9% or greater.
 - (c) Crucibles with a volume of between 50 ml and 2 liters and made of or lined with tantalum (having a purity of 98% or greater) coated with tantalum carbide, nitride, or boride (or any combination of these).
- 2.8. (a) Carbon or aramid "fibrous and filamentary" materials having a "specific modulus" of 12.7×10^6 m or greater or a "specific tensile strength" of 23.5×10^4 m or greater; or
 - (b) Glass "fibrous and filamentary" materials having a "specific modulus" of 3.18×10^6 m or greater and a "specific tensile strength" of 7.62×10^4 m or greater.
 - (c) Composite structures in the form of tubes with an inside diameter of between 75 mm (3 in.) and 400 mm (16 in.) made with "fibrous and filamentary" materials controlled in (a) above.

Technical Note:

- (a) The term "fibrous and filamentary materials" includes continuous monofilaments, continuous yarns, and tapes.
 - (b) "Specific modulus" is the Young's modulus in N/m^2 divided by the specific weight in N/m^3 when measured at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$;
 - (c) "Specific tensile strength" is the ultimate tensile strength in N/m^2 divided by the specific weight in N/m^3 when measured at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$.
- 2.9. Hafnium of the following description: metal, alloys, and compounds of hafnium containing more than 60% hafnium by weight and manufactures thereof.

2.10. Lithium (isotopically enriched in lithium-6) as follows:

- (a) Metal hydrides or alloys containing lithium enriched in the 6 isotope (^6Li) to a concentration higher than the one existing in nature (7.5% on an atom percentage basis);
- (b) Any other materials containing lithium enriched in the 6 isotope (including compounds, mixtures, and concentrates), *except ^6Li incorporated in thermoluminescent dosimeters.*

2.11. Magnesium (high purity) containing both less than 200 parts per million by weight of metallic impurities other than calcium and less than 10 parts per million of boron.

2.12. Maraging steel capable of an ultimate tensile strength of 2050 MPa ($2.050 \times 10^9 \text{ N/m}^2$) ($300,000 \text{ lb/in.}^2$) or more at 293 K (20°C) *except forms in which no linear dimension exceeds 75 mm.*

Technical Note: The phrase "capable of" encompasses maraging steel before or after heat treatment.

2.13. Radium-226 *except radium contained in medical applicators.*

2.14. Titanium alloys capable of an ultimate tensile strength of 900 MPa ($0.9 \times 10^9 \text{ N/m}^2$) ($130,500 \text{ lb/in.}^2$) or more at 293 K (20°C) in the form of tubes or solid forms (including forgings) with an outside diameter of more than 75 mm (3 in.).

Technical Note: The phrase "capable of" encompasses titanium alloys before or after heat treatment.

2.15. Tungsten, as follows: parts made of tungsten, tungsten carbide, or tungsten alloys (greater than 90% tungsten) having a mass greater than 20 kg and a hollow cylindrical symmetry (including cylinder segments) with an inside diameter greater than 100 mm (4 in.) but less than 300 mm (12 in.), *except parts specifically designed for use as weights or gamma-ray collimators.*

2.16. Zirconium as follows: metal, alloys containing more than 50% zirconium by weight, and compounds in which the ratio of hafnium content to zirconium content is less than 1 part to 500 parts by weight, and manufactures wholly thereof; *except zirconium in the form of foil having a thickness not exceeding 0.10 mm (0.004 in.).*

Technical Note: This control applies to waste and scrap containing zirconium as defined here.

3. URANIUM ISOTOPE SEPARATION EQUIPMENT AND COMPONENTS

3.1. Electrolytic cells for fluorine production with a production capacity greater than 250 g of fluorine per hour.

3.2. Rotor fabrication and assembly equipment and bellows-forming mandrels and dies, as follows:

- (a) Rotor assembly equipment for assembly of gas centrifuge rotor tube sections, baffles, and end caps. Such equipment includes precision mandrels, clamps, and shrink fit machines.
- (b) Rotor straightening equipment for alignment of gas centrifuge rotor tube sections to a common axis. (Note: Normally such equipment will consist of precision measuring probes linked to a computer that subsequently controls the action of, for example, pneumatic rams used for aligning the rotor tube sections).
- (c) Bellows-forming mandrels and dies for producing single-convolution bellows (bellows made of high-strength aluminum alloys, maraging steel, or high-strength filamentary materials). The bellows have all of the following dimensions:
 - (1) 75-mm to 400-mm (3-in. to 16-in.) inside diameter;
 - (2) 12.7 mm (0.5 in.) or more in length; and
 - (3) single convolution depth more than 2 mm (0.08 in.).

- 3.3. Centrifugal multiplane balancing machines, fixed or portable, horizontal or vertical, as follows:
- (a) Centrifugal balancing machines designed for balancing flexible rotors having a length of 600 mm or more and having all of the following characteristics:
 - (1) a swing or journal diameter of 75 mm or more;
 - (2) mass capability of from 0.9 to 23 kg (2 to 50 lb.); and
 - (3) capable of balancing speed of revolution more than 5000 rpm;
 - (b) Centrifugal balancing machines designed for balancing hollow cylindrical rotor components and having all of the following characteristics:
 - (1) a journal diameter of 75 mm or more;
 - (2) mass capability of from 0.9 to 23 kg (2 to 50 lb.);
 - (3) capable of balancing to a residual inbalance of 0.010 kg mm/kg per plane or better; and
 - (4) belt drive type;and "specially designed software" therefor.
- 3.4. Filament winding machines in which the motions for positioning, wrapping, and winding fibers are coordinated and programmed in two or more axes, specially designed to fabricate composite structures or laminates from fibrous and filamentary materials and capable of winding cylindrical rotors of diameter between 75 mm (3 in.) and 400 mm (16 in.) and lengths of 600 mm (24 in.) or greater; coordinating and programming controls therefor; precision mandrels; and "specially designed software" therefor.
- 3.5. Frequency changers (also known as converters or inverters) or generators having all of the following characteristics:
- (a) A multiphase output capable of providing a power of 40 W or more;
 - (b) Capable of operating in the frequency range between 600 and 2000 Hz;
 - (c) Total harmonic distortion below 10%; and
 - (d) Frequency control better than 0.1%;
- except such frequency changers specially designed or prepared to supply "motor stators" (as defined below) and having the characteristics listed in (b) and (d) above, together with a total harmonic distortion of less than 2% and an efficiency of greater than 80%.

Definition:

"Motor stators": specially designed or prepared ring-shaped stators for high-speed multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in the frequency range of 600–2000 Hz and a power range of 50–1000 VA. The stators consist of multiphase windings on a laminated low-loss iron core comprising thin layers typically 2.0 mm (0.08 in.) thick or less.

- 3.6. Lasers, laser amplifiers, and oscillators as follows:
- (a) Copper vapor lasers with 40 W or greater average output power operating at wavelengths between 500 nm and 600 nm;
 - (b) Argon ion lasers with greater than 40 W average output power operating at wavelengths between 400 nm and 515 nm;
 - (c) Neodymium-doped (other than glass) lasers as follows:
 - (1) having an output wavelength between 1000 nm and 1100 nm, being pulse-excited and Q-switched with a pulse duration equal to or greater than 1 ns, and having either of the following:
 - (a) A single-transverse mode output having an average output power exceeding 40 W;
 - (b) A multiple-transverse mode output having an average output power exceeding 50 W;

- (2) operating at a wavelength between 1000 nm and 1100 nm and incorporated frequency doubling giving an output wavelength between 500 nm and 550 nm with an average power at the doubled frequency (new wavelength) of greater than 40 W;
- (d) Tunable pulsed single-mode dye oscillators capable of an average power output of greater than 1 W, a repetition rate greater than 1 kHz, a pulse less than 100 ns, and a wavelength between 300 nm and 800 nm;
- (e) Tunable pulsed dye laser amplifiers and oscillators, *except single mode oscillators*, with an average power output of greater than 30 W, a repetition rate greater than 1 kHz, a pulse width less than 100 ns, and a wavelength between 300 nm and 800 nm;
- (f) Alexandrite lasers with a bandwidth of 0.005 nm or less, a repetition rate of greater than 125 Hz, and an average power output greater than 30 W operating at wavelengths between 720 nm and 800 nm;
- (g) Pulsed carbon dioxide lasers with a repetition rate greater than 250 Hz, an average power output of greater than 500 W, and a pulse of less than 200 ns operating at wavelengths between 9000 nm and 11,000 nm;
- N. B. This specification is not intended to control the higher power (typically 1 to 5 kW) industrial CO₂ lasers used in applications such as cutting and welding, as these latter lasers are either continuous wave or are pulsed with a pulse width more than 200 ns.
- (h) Pulsed excimer lasers (XeF, XeCl, KrF) with a repetition rate greater than 250 Hz and an average power output of greater than 500 W operating at wavelengths of between 240 and 360 nm;
- (i) Para-hydrogen Raman shifters designed to operate at 16 μ m output wavelength and at a repetition rate greater than 250 Hz.

Technical Note: Machine tools, measuring devices, and associated technology that have the potential for use in the nuclear industry are controlled under items 1.2 and 1.3 of this list.

3.7 Mass spectrometers capable of measuring ions of 230 atomic mass units or greater and having a resolution of better than 2 parts in 230, and ion sources therefor as follows:

- (a) Inductively coupled plasma mass spectrometers (ICP/MS);
- (b) Glow discharge mass spectrometers (GDMS);
- (c) Thermal ionization mass spectrometers (TIMS);
- (d) Electron bombardment mass spectrometers which have a source chamber constructed from or lined with or plated with materials resistant to UF₆;
- (e) Molecular beam mass spectrometers as follows:
 - (1) which have a source chamber constructed from or lined with or plated with stainless steel or molybdenum and have a cold trap capable of cooling to 193 K (-80 °C) or less; or
 - (2) which have a source chamber constructed from or lined with or plated with materials resistant to UF₆; or
- (f) Mass spectrometers equipped with a microfluorination ion source designed for use with actinides or actinide fluorides;

except

specially designed or prepared magnetic or quadrupole mass spectrometers capable of taking "on-line" samples of feed, product, or tails from UF₆ gas streams and having all of the following characteristics:

- (1) Unit resolution for mass greater than 320;
- (2) Ion sources constructed of or lined with nichrome or monel or nickel-plated;
- (3) Electron bombardment ionization sources;
- (4) Having a collector system suitable for isotopic analysis.

- 3.8. Instruments capable of measuring pressures up to 13 kPa (2 psi, 100 torr) to an accuracy of better than 1% (full-scale), with corrosion-resistant pressuresensing elements constructed of nickel, nickel alloys, phosphor bronze, stainless steel, aluminum or aluminum alloys.
- 3.9. Valves 5 mm (0.2 in.) or greater in diameter, with a bellows seal, wholly made of or lined with aluminum, aluminum alloy, nickel, or alloy containing 60% or more nickel, either manually or automatically operated.
- 3.10. Superconducting solenoidal electromagnets with all of the following characteristics:
 - (a) capable of creating magnetic fields of more than 2 teslas (20 kilogauss);
 - (b) with an L/D (length divided by inner diameter) greater than 2;
 - (c) with an inner diameter of more than 300 mm; and
 - (d) with a magnetic field uniform to better than 1% over the central 50% of the inner volume.

Note:

The item does not cover magnets specially designed for and exported as parts of medical nuclear magnetic resonance (NMR) imaging systems. It is understood that the wording "as part of" does not necessarily mean physical part in the same shipment. Separate shipments from different sources are allowed, provided the related export documents clearly specify the "part of" relationship.

- 3.11. Vacuum pumps with an input throat size of 38 cm (15 in.) or greater with a pumping speed of 15,000 liters/second or greater and capable of producing an ultimate vacuum better than 10^{-4} Torr (0.76×10^{-4} mbar).

Technical Note: The ultimate vacuum is determined at the input of the pump with the input of the pump blocked off.

- 3.12. Direct current high-power supplies capable of continuously producing, over a time period of 8 hours, 100 V or greater with current output of 500 amps or greater and with current or voltage regulation better than 0.1%.
- 3.13. High-voltage direct current power supplies capable of continuously producing, over a time period of 8 hours, 20,000 V or greater with current output of 1 amp or greater and with current or voltage regulation better than 0.1%.
- 3.14. Electromagnetic isotope separators, designed for or equipped with, single or multiple ion sources capable of providing a total ion beam current of 50 mA or greater.

Notes:

1. This entry will control separators capable of enriching stable isotopes as well as those for uranium. A separator capable of separating the isotopes of lead with a one-mass unit difference is inherently capable of enriching the isotopes of uranium with a three-unit mass difference.
2. This entry includes separators with the ion sources and collectors both in the magnetic field and those configurations in which they are external to the field.
3. A single 50-mA ion source will produce less than 3 g of separated HEU per year from natural abundance feed.
4. **HEAVY WATER PRODUCTION PLANT RELATED EQUIPMENT**
(Other Than Trigger List Items)
 - 4.1. Specialized packings for use in separating heavy water from ordinary water and made of phosphor bronze mesh or copper (both chemically treated to improve wettability) and designed for use in vacuum distillation towers.
 - 4.2. Pumps circulating solutions of diluted or concentrated potassium amide catalyst in liquid ammonia (KNH_2/NH_3), with all the following characteristics:
 - (a) airtight (i.e., hermetically sealed);

- (b) for concentrated potassium amide solutions (1% or greater), operating pressure of 1.5-60 MPa [15-600 atmospheres (atm)]; for dilute potassium amide solutions (less than 1%), operating pressure of 20-60 MPa (200-600 atm); and
 - (c) a capacity greater than 8.5 m³/h (5 cubic feet per minute).
- 4.3. Water-hydrogen sulfide exchange tray columns constructed from fine carbon steel (such as ASTM A516) with a diameter of 1.8 m (6 ft.) or greater to operate at a nominal pressure of 2 Mpa (300 psi) or greater, except columns which are specially designed or prepared for the production of heavy water. Internal contactors of the columns are segmented trays with an effective assembled diameter of 1.8 m (6 ft.) or greater, such as sieve trays, valve trays, bubble cap trays, and turbogrid trays designed to facilitate countercurrent contacting and constructed of materials resistant to corrosion by hydrogen sulfide/water mixtures, such as 304L or 316 stainless steel.
- 4.4. Hydrogen-cryogenic distillation columns having all of the following applications:
- (a) designed to operate with internal temperatures of -238 °C (35 K) or less;
 - (b) designed to operate at internal pressure of 0.5 to 5 MPa (5 to 50 atmospheres);
 - (c) constructed of fine-grain stainless steels of the 300 series with low sulphur content or equivalent cryogenic and H₂-compatible materials; and
 - (d) with internal diameters of 1 m or greater and effective lengths of 5 m or greater.
- 4.5. Ammonia synthesis converters, ammonia synthesis units in which the synthesis gas (nitrogen and hydrogen) is withdrawn from an ammonia/hydrogen high-pressure exchange column and the synthesized ammonia is returned to said column.

5. IMPLOSION SYSTEMS DEVELOPMENT EQUIPMENT

- 5.1. Flash x-ray generators or pulsed electron accelerators with peak energy of 500 keV or greater, as follows, *except accelerators that are component parts of devices designed for purposes other than electron beam or x-ray radiation (electron microscopy, for example) and those designed for medical purposes:*

- (a) Having an accelerator peak electron energy of 500 keV or greater but less than 25 MeV and with a figure of merit (K) of 0.25 or greater, where K is defined as:

$$K = 1.7 \times 10^3 V^{2.65} Q,$$

where V is the peak electron energy in million electron volts and Q is the total accelerated charge in coulombs if the accelerator beam pulse duration is less than or equal to 1 μ s; if the accelerator beam pulse duration is greater than 1 μ s, Q is the maximum accelerated charge in 1 μ s [Q equals the integral of i with respect to t , over the lesser of 1 μ s or the time duration of the beam pulse ($Q = \int i dt$), where i is beam current in amperes and t is time in seconds]; or

- (b) Having an accelerator peak electron energy of 25 MeV or greater and a peak power greater than 50 MW. [Peak power = (peak potential in volts) \times (peak beam current in amperes).]

Technical Note:

Time duration of the beam pulse - In machines, based on microwave accelerating cavities, the time duration of the beam pulse is the lesser of 1 μ s or the duration of the bunched beam packet resulting from one microwave modulator pulse.

Peak beam current - In machines based on microwave accelerating cavities, the peak beam current is the average current in the time duration of a bunched beam packet.

- 5.2. Multistage light gas guns or other high-velocity gun systems (coil, electromagnetic, electrothermal, or other advanced systems) capable of accelerating projectiles to 2 km per second or greater.
- 5.3. Mechanical rotating mirror cameras
- Mechanical framing cameras with recording rates greater than 225,000 frames per second; streak cameras with writing speeds greater than 0.5 mm per microsecond; and parts, including specially designed synchronizing electronics and specially designed rotor assemblies (consisting of turbines, mirrors, and bearings).

- 5.4. Electronic streak and framing cameras and tubes as follows:
- (a) Electronic streak cameras capable of 50 ns or less time resolution and streak tubes therefor;
 - (b) Electronic (or electronically shuttered) framing cameras capable of 50 ns or less frame exposure time;
 - (c) Framing tubes and solid-state imaging devices for use with cameras controlled in sub-item (b) above, as follows:
 - (1) proximity focused image intensifier tubes having the photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;
 - (2) gate silicon intensifier target (SIT) vidicon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;
 - (3) Kerr or pockel cell electro-optical shuttering; or
 - (4) Other framing tubes and solid-state imaging devices having a fast-image gating time of less than 50 ns specially designed for cameras controlled by sub-item (b) above.
- 5.5. Specialized instrumentation for hydrodynamic experiments as follows:
- (a) Velocity interferometers for measuring velocities in excess of 1 km per second during time intervals less than 10 μ s. (VISARs, Doppler laser interferometers, DLIs, etc.);
 - (b) manganin gauges for pressures greater than 100 kilobars; or
 - (c) quartz pressure transducers for pressures greater than 100 kilobars.

6. EXPLOSIVES AND RELATED EQUIPMENT

6.1. Detonators and multipoint initiation systems (exploding bridge wire, slapper, etc.)

- (a) Electrically driven explosive detonators as follows:
 - (1) exploding bridge (EB);
 - (2) exploding bridge wire (EBW);
 - (3) slapper; and
 - (4) exploding foil initiators (EFI).
- (b) Arrangements using single or multiple detonators designed to nearly simultaneously initiate an explosive surface (over greater than 5 000 mm²) from a single firing signal (with an initiation timing spread over the surface of less than 2.5 μ s).

Description clarification: The detonators of concern all utilize a small electrical conductor (bridge, bridge wire, or foil) that explosively vaporizes when a fast, high-current electrical pulse is passed through it. In nonslapper types, the exploding conductor starts a chemical detonation in a contacting high-explosive material such as PETN (pentaerythritoltetranitrate). In slapper detonators, the explosive vaporization of the electrical conductor drives a "flyer" or "slapper" across a gap, and the impact of the slapper on an explosive starts a chemical detonation. The slapper in some designs is driven by magnetic force. The term "exploding foil" detonator may refer to either an EB or a slapper-type detonator. Also, the word "initiator" is sometimes used in place of the word "detonator".

Detonators using only primary explosives, such as lead azide, are not subject to control.

- 6.2. Electronic components for firing sets (switching devices and pulse discharge capacitors)
- 6.2.1. Switching devices
- (a) Cold-cathode tubes (including gas krytron tubes and vacuum spraytron tubes), whether gas filled or not, operating similarly to a spark gap, containing three or more electrodes, and having all of the following characteristics:
 - (1) Anode peak voltage rating of 2500 V or more,
 - (2) Anode peak current rating of 100 A or more,
 - (3) Anode delay time of 10 μ s or less, and
 - (b) Triggered spark-gaps having an anode delay time of 15 μ s or less and rated for a peak current of 500 A or more;
 - (c) Modules or assemblies with a fast switching function having all of the following characteristics:
 - (1) Anode peak voltage rating greater than 2000 V;
 - (2) anode peak current rating of 500 A or more; and
 - (3) turn-on time of 1 μ s or less.
- 6.2.2. Capacitors with the following characteristics:
- (a) Voltage rating greater than 1.4 kV, energy storage greater than 10 J, capacitance greater than 0.5 μ F, and series inductance less than 50 nH; or
 - (b) Voltage rating greater than 750 V, capacitance greater than 0.25 μ F, and series inductance less than 10 nH.
- 6.3. Firing sets and equivalent high-current pulse generators (for controlled detonators), as follows:
- (a) Explosive detonator firing sets designed to drive multiple controlled detonators covered under item 6.1. above;
 - (b) Modular electrical pulse generators (pulsers) designed for portable, mobile, or ruggedized use (including xenon flash-lamp drivers) having all the following characteristics:
 - (1) capable of delivering their energy in less than 15 μ s;
 - (2) having an output greater than 100 A;
 - (3) having a rise time of less than 10 μ s into loads of less than 40 ohms. (Rise time is defined as the time interval from 10% to 90% current amplitude when driving a resistive load);
 - (4) enclosed in a dust-tight enclosure;
 - (5) no dimension greater than 25.4 cm (10 in.);
 - (6) weight less than 25 kg (55 lb.); and
 - (7) specified for use over an extended temperature range (-50°C to 100°C) or specified as suitable for aerospace use.
- 6.4. High explosives or substances or mixtures containing more than 2% of any of the following:
- (a) Cyclotetramethylenetetranitramine (HMX);
 - (b) Cyclotrimethylenetrinitramine (RDX);
 - (c) Triaminotrinitrobenzene (TATB);
 - (d) Any explosive with a crystal density greater than 1.8 g/cm³ and having a detonation velocity greater than 8000 m/s; or
 - (e) Hexanitrostilbene (HNS).

7. NUCLEAR TESTING EQUIPMENT AND COMPONENTS

7.1. Oscilloscopes and transient recorders and specially designed components as follows: plug-in units, external amplifiers, pre-amplifiers, sampling devices, and cathode ray tubes for analog oscilloscopes.

- (a) Non-modular analog oscilloscopes having a "bandwidth" of 1 GHz or greater;
- (b) Modular analog oscilloscope systems having either of the following characteristics:
 - (i) a mainframe with a "bandwidth" of 1 GHz or greater; or
 - (ii) Plug-in modules with an individual "bandwidth" of 4 GHz or greater;
- (c) Analog sampling oscilloscopes for the analysis of recurring phenomena with an effective "bandwidth" greater than 4 GHz;
- (d) Digital oscilloscopes and transient recorders, using analog-to-digital conversion techniques, capable of storing transients by sequentially sampling single-shot inputs at successive intervals of less than 1 ns (greater than 1 giga-sample per second), digitizing to 8 bits or greater resolution and storing 256 or more samples.

Technical Note: "Bandwidth" is defined as the band of frequencies over which the deflection on the cathode ray tube does not fall below 70.7% of that at the maximum point measured with a constant input voltage to the oscilloscope amplifier.

7.2. Photomultiplier tubes with a photocathode area of greater than 20 cm² having an anode pulse rise time of less than 1 ns.

7.3. High-speed pulse generators with output voltages greater than 6 V into a less than 55-ohm resistive load, and with pulse transition times less than 500 ps (defined as the time interval between 10% and 90% voltage amplitude).

8. OTHER

8.1. Neutron generator systems, including tubes, designed for operation without an external vacuum system and utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction.

8.2. Equipment related to nuclear material handling and processing and to nuclear reactors as follows:

8.2.1. Remote manipulators that provide mechanical translation of human operator actions by electrical, hydraulic, or mechanical means to an operating arm and terminal fixture that can be used to provide remote actions in radiochemical separation operations and "hot cells". The manipulators have a capability to penetrate 0.6 m or more (2 ft. or more) of cell wall or, alternatively, bridge over the top of a cell wall with a thickness of 0.6 m or more (2 ft. or more);

8.2.2. High-density (lead glass or other) radiation shielding windows greater than 0.3 m (1 ft.) on a side and with a density greater than 3 g/cm³ and a thickness of 100 mm or greater; and specially designed frames therefor;

8.2.3. Radiation-hardened TV cameras specially designed or rated as radiation hardened to withstand greater than 5×10^4 grays (Si) (5×10^6 rad (Si)) without operational degradation and specially designed lenses used therein.

8.3. Tritium, tritium compounds, and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1000, *except a product or device containing not more than 40 Ci of tritium in any chemical or physical form.*

8.4. Facilities or plants for the production, recovery, extraction, concentration, or handling of tritium, and equipment as follows:

(a) Hydrogen or helium refrigeration units capable of cooling to -250°C (23 K) or less, with heat removal capacity greater than 150 watts; or

(b) Hydrogen isotope and purification systems using metal hydrides as the storage, or purification medium.

- 8.5. Platinized catalysts specially designed or prepared for promoting the hydrogen isotope exchange reaction between hydrogen and water for the recovery of tritium from heavy water or for the production of heavy water.
- 8.6. Helium in any form isotopically enriched in the helium-3 isotope, whether or not mixed with other materials or contained in any equipment or device, *except products or devices containing less than 1 g of helium-3.*
- 8.7. Alpha-emitting radionuclides and equipment containing such radionuclides as follows:
All alpha-emitting radionuclides having an alpha half-life of 10 days or greater but less than 200 years, including compounds and mixtures containing these radionuclides with a total alpha activity of 1 curie per kilogram (37 GBq/kg) or greater, *except for devices containing less than 100 millicuries (3.7 GBq) of alpha activity per device.*

ANNEX APPENDIX: Detailed Specifications for Machine Tools
(Item 1.2. in List of Nuclear Dual-Use Export Controls)

- 1.2. "Numerical control" units, specially designed "motion control boards" for "numerical control" applications on machine tools, "numerically controlled" machine tools, specially designed "software," and technology as follows.
- (a) "Numerical control" units for machine tools, as follows:
- (1) Having more than four interpolating axes that can be coordinated simultaneously for "contouring control" or
 - (2) Having two, three, or four interpolating axes that can be coordinated simultaneously for "contouring control" and one or more of the following conditions are fulfilled:
 - (i) Capable of "real-time processing" of data to modify the tool path during the machining operation by automatic calculation and modification of "part program" data for machining in two or more axes by means of measuring cycles and access to source data;
 - (ii) Capable of receiving directly (on-line) and processing computer-aided design (CAD) data for internal preparation of machine instructions; *or*
 - (iii) Capable, without modification, according to the manufacturer's technical specifications, of accepting additional boards that would permit increasing the number of interpolating axes that can be coordinated simultaneously for "contouring control," above the control levels, even if they do not contain these additional boards.
- (b) "Motion control boards" specially designed for machine tools having one or more of the following characteristics:
- (1) Providing interpolation in more than four axes;
 - (2) Capable of "real time processing" described in (a) (2) (i); *or*
 - (3) Capable of receiving and processing CAD data as described in (a) (2) (ii) above.

Note 1: Subitems (a) and (b) do not control "numerical control" units and "motion control boards" if:

- (a) *Modified for and incorporated in uncontrolled machines; or*
- (b) *Specially designed for uncontrolled machines.*

Note 2: "Software" (including documentation) for "numerical control" units that may be exported must be:

- (a) *In machine executable form only; and*
- (b) *Limited to the minimum necessary for the use (i.e., installation, operation, and maintenance) of these units.*

- (c) Machine tools, as follows, for removing or cutting metals, ceramics, or composites, which, according to the manufacturer's technical specifications, can be equipped with electronic devices for simultaneous "contouring control" in two or more axes:

Technical Note:

1. The c-axis on jig grinders used to maintain grinding wheels normal to the work surfaces is not considered a contouring rotary axis.
2. Not counted in the total number of contouring axes are secondary parallel contouring axes, e.g., a secondary rotary axis, the center line of which is parallel to the primary rotary axis.
3. Axis nomenclature shall be in accordance with International Standard ISO 841, "Numerical Control Machines Axis and Motion Nomenclature."
4. Rotary axes do not necessarily have to rotate over 360°. A rotary axis can be driven by a linear device, e.g., a screw or a rack-and-pinion.

- (1) Machine tools for turning, grinding, milling, or any combination thereof that:

- (i) Have two or more axes that can be coordinated simultaneously for "contouring control", and

- (ii) Have any of the following characteristics:

(A) Two or more contouring rotary axes;

(B) One or more contouring "tilting spindles";

Note: (c)(1)(ii)(B) applies to machine tools for grinding or milling only.

(C) "Camming" (axial displacement) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

Note: (c)(1)(ii)(C) applies to machine tools for turning only.

(D) "Run out" (out-of-true running) in one revolution of the spindle less (better) than 0.0006 mm TIR.

(E) The "positioning accuracies," with all compensations available, are less (better) than:

(1) 0.001° on any rotary axis

(2) (a) 0.004 mm along any linear axis (overall positioning) for grinding machines

(b) 0.006 mm along any linear axis (overall positioning) for milling or turning machines

Note: (c)(1)(ii)(E)(2)(b) does not control milling or turning machine tools with a positioning accuracy along one linear axis, with all compensations available, equal to or greater (worse) than 0.005 mm.

Notes:

- (1) Sub-item (c) does not control cylindrical external, internal, and external-internal grinding machines having all of the following characteristics:

(a) Not centreless (shoe-type) grinding machines;

(b) Limited to cylindrical grinding;

(c) A maximum workpiece outside diameter or length of 150 mm;

(d) Only two axes that can be coordinated simultaneously for "contouring control"; and

(e) No contouring c-axis.

- (2) Sub-item (c) does not control machines designed specifically as jig grinders having both of the following characteristics:
 - (a) Axes limited to x, y, c, and a, where the c-axis is used to maintain the grinding wheel normal to the work surface, and the a-axis is configured to grind barrel cams and
 - (b) A spindle "run-out" not less (not better) than 0.0006 mm.
 - (3) Sub-item (c) does not control tool or cutter grinding machines having all of the following characteristics:
 - (a) Shipped as a complete system with "software" specially designed for the production of tools or cutters;
 - (b) No more than two rotary axes that can be coordinated simultaneously for "contouring control";
 - (c) "Run-out" (out-of-true running) in one revolution of the spindle not less (not better) than 0.0006 mm TIR; and
 - (d) The "positioning accuracies", with all compensations available, are not less (not better) than:
 - (i) 0.004 mm along any linear axis for overall positioning; or
 - (ii) 0.001° for any rotary axis.
 - (2) Electrical discharge machines (EDM);
 - (i) Of the wire feed type that have five or more axes that can be coordinated simultaneously for "contouring control";
 - (ii) Non-wire EDMs that have two or more contouring rotary axes and that can be coordinated simultaneously for "contouring control".
 - (3) Other machine tools for removing metals, ceramics, or composites:
 - (i) By means of:
 - (A) Water or other liquid jets, including those employing abrasive additives;
 - (B) Electron beam; *or*
 - (C) "Laser" beam; *and*
 - (ii) Having two or more rotary axes that:
 - (A) Can be coordinated simultaneously for "contouring control"; *and*
 - (B) Have a "positioning accuracy" or less than (better than) 0.003°.
 - (d) "Software"
 - (1) "Software" specially designed or modified for the "development," "production," or "use" of equipment, controlled by sub-categories (a), (b) or (c) above;
 - (2) Specific "software," as follows:
 - (i) "Software" to provide "adaptive control" and having both of the following characteristics:
 - (A) For "flexible manufacturing units" (FMUs) that consist at least of equipment described in (b)(1) and (b)(2) of the definition of "flexible manufacturing units"; *and*
 - (B) Capable of generating or modifying in "real time processing", "part program" data by using the signals obtained simultaneously by means of at least two detection techniques, such as:
 - (1) Machine vision (optical ranging);
 - (2) Infrared imaging;
 - (3) Acoustical imaging (acoustical ranging);

- (4) Tactile measurement;
- (5) Inertial positioning;
- (6) Force measurement;
- (7) Torque measurement.

Note: This sub-item does not control "software" that only provides rescheduling of functionally identical equipment within "flexible manufacturing units" using prestored "part programs" and a prestored strategy for the distribution of the "part programs".

- (ii) "Software" for electronic devices other than those described in sub-items (a) or (b) that provides the "numerical control" capability of the equipment controlled in sub-item 1.2.

(e) Technology

- (1) "Technology" for the "development" of equipment controlled by sub-items (a), (b) or (c) above, (f) or (g) below, and of the sub-item (d).
- (2) "Technology" for the "production" of equipment controlled by sub-items (a), (b) or (c) above, (f) or (g) below;
- (3) Other "technology":
 - (i) For the "development" of interactive graphics as an integrated part in "numerical control" units for preparation or modification of "part programs";
 - (ii) For the "development" of integration "software" for incorporation of expert systems for advanced decision support of shop floor operations into "numerical control" units.

(f) Components and parts for machine tools controlled by sub-item (c) as follows:

- (1) Spindle assemblies, consisting of spindles and bearings as a minimal assembly, with radial ("run-out") or axial ("camming") axis motion in one revolution of the spindle less (better) than 0.0006 mm TIR;
- (2) Linear position feedback units (e.g., inductive-type devices, graduated scales, "laser," or infrared systems) having, with compensation, an overall "accuracy" better than $800 + (600 \times L \times 10^{-3})$ nm, where L equals the effective length in mm of the linear measurement; *except* measuring interferometer systems, without closed or open loop feedback, containing a "laser" to measure slide movement errors of machine tools, dimensional inspection machines, or similar equipment;
- (3) Rotary position feedback units (e.g., inductive-type devices, graduated scales, "laser," or infrared systems) having, with compensation, an "accuracy" less (better) than 0.00025° of arc; *except* measuring interferometer systems, without closed or open loop feedback, containing a "laser" to measure slide movement errors of machine tools, dimensional inspection machines, or similar equipment;
- (4) Slide way assemblies consisting of a minimal assembly of ways, bed, and slide having all of the following characteristics:
 - (i) A yaw, pitch, or roll of less (better) than 2 seconds of arc TIR (Ref. ISO/DIS 230-1) over full travel;
 - (ii) A horizontal straightness of less (better) than 2 μ m per 300 mm length; *and*
 - (iii) A vertical straightness of less (better) than 2 μ m over full travel per 300 mm length;
- (5) Single-point diamond-cutting tool inserts having all of the following characteristics:
 - (i) A flawless and chip-free cutting edge when magnified 400 times in any direction;
 - (ii) A cutting radius out-of-roundness less (better) than 0.002 mm TIR (also peak-to-peak); *and*
 - (iii) A cutting radius between 0.1 mm and 5.0 mm, inclusive.

- (g) Specially designed components or sub-assemblies, capable of upgrading, according to the manufacturer's specifications, "numerical control" units, motion control boards, machine tools, or feedback devices to or above the levels controlled in sub-items (a), (b), (c), (f)(2), or (f)(3):
- (1) Printed circuit boards with mounted components and "software" therefor;
 - (2) "Compound rotary tables".

Technical Note: Definitions of Terms:

"accuracy" - Usually measured in terms of inaccuracy, defined as the maximum deviation, positive or negative, of an indicated value from an accepted standard or true value.

"adaptive control" - a control system that adjusts the response from conditions detected during the operation (Ref. ISO 2806-1980).

"camming" (axial displacement) - Axial displacement in one revolution of the main spindle measured in a plane perpendicular to the spindle faceplate at a point next to the circumference of the spindle faceplate (Ref. ISO 230 Part 1-1986, paragraph 5.63).

"compound rotary table" - A table allowing the workpiece to rotate and tilt about two non-parallel axes, which can be coordinated simultaneously for "contouring control".

"contouring control" - Two or more "numerically controlled" motions operating in accordance with instructions that specify the next required position and the required feed rates to that position. These feed rates are varied in relation to each other so that a desired contour is generated (Ref ISO/DIS 2806-1980).

"digital computer" - Equipment which can, in the form of one or more discrete variables:

- a. Accept data;
- b. Store data or instructions in fixed or alterable (writable) storage devices;
- c. Process data by means of a stored sequence of instructions which is modifiable; and
- d. Provide output of data.

N.B.: Modifications of a stored sequence of instructions include replacement of fixed storage devices, but not a physical change in writing or interconnections.

"flexible manufacturing unit (FMU)" [sometimes also referred to as "flexible manufacturing system" (FMS) or "flexible manufacturing cell (FMC)"]

An entity which includes a combination of at least:

- a. A "digital computer" including its own "main storage" and its own related equipment; and
- b. Two or more of the following:
 1. A machine tool described in Section 1.2.;
 2. A dimensional inspection machine described in Section 1.3.;
 3. A "robot" controlled by Section 1.6.;
 4. Digitally controlled equipment controlled by Section 3.4.

"laser" - An assembly of components which produce coherent light that is amplified by stimulated emission of radiation.

"main storage" - The primary storage for data or instructions for rapid access by a central processing unit. It consists of the internal storage of a "digital computer" and any hierarchical extension thereto, such as cache storage or non-sequentially accessed extended storage.

"microprogram" - A sequence of elementary instructions, maintained in a special storage, the execution of which is initiated by the introduction of its reference instruction into an instruction register.

"motion control board" - An electronic assembly specially designed to provide a computer system with the capability to coordinate simultaneously the motion of axes of machine tools for "contouring control".

"numerical control" - The automatic control of a process performed by a device that makes use of numeric data usually introduced as the operation is in progress (Ref. ISO 2382).

"part program" - An ordered set of instructions in a language and in a format required to cause operations to be effected under automatic control, which is either written in the form of a machine program on an input medium or prepared as input data for processing in a computer to obtain a machine program (Ref. ISO 2806-1980).

"positioning accuracy"

Of "numerically controlled" machine tools is to be determined and presented in accordance with paragraph 2.13, in conjunction with the requirements below:

(a) Test conditions (ISO/DIS/230/2, paragraph 3):

- (1) For 12 hours before and during measurements, the machine tool and accuracy measuring equipment will be kept at the same ambient temperature. During the premeasurement time, the slides of the machine will be continuously cycled identically to the way they will be cycled during the accuracy measurements;
- (2) The machine shall be equipped with any mechanical, electronic, or software compensation to be exported with the machine;
- (3) Accuracy of measuring equipment for the measurements shall be at least four times more accurate than the expected machine tool accuracy;
- (4) Power supply for slide drives shall be as follows:
 - (i) Line voltage variation shall not be greater than $\pm 10\%$ of nominal rated voltage;
 - (ii) Frequency variation shall not be greater than ± 2 Hz of normal frequency;
 - (iii) Lineouts or interrupted service are not permitted.

(b) Test Program (paragraph 4):

- (1) Feed rate (velocity of slides) during measurement shall be the rapid traverse rate;
N.B.: In the case of machine tools which generate optical quality surfaces, the feed rate shall be equal to or less than 50 mm per minute;
- (2) Measurements shall be made in an incremental manner from one limit of the axis travel to the other without returning to the starting position for each move to the target position;
- (3) Axes not being measured shall be retained at mid-travel during test of an axis.

(c) Presentation of test results (paragraph 2):

The results of the measurements must include:

- (1) "positioning accuracy" (A) and
- (2) The mean reversal error (B).

"program" - A sequence of instructions to carry out a process in, or convertible into, a form executable by an electronic computer.

"real-time processing" - Processing of data by an electronic computer in response to an external event according to time requirements imposed by the external event.

"robot" - A manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use "sensors" and has all the following characteristics:

- a. Is multifunctional;
- b. Is capable of positioning or orienting material, parts, tools or special devices through variable movements in three-dimensional space;

- c. Incorporates three or more closed or open loop servo-devices which may include stepping motors; and
- d. has "user-accessible programmability" by means of teach/playback method or by means of an electronic computer which may be a programmable logic controller, i.e., without mechanical intervention.

N.B.: The above definition does not include the following devices:

- a. Manipulation mechanisms which are only manually/teleoperator controllable;
- b. Fixed sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed stops, such as pins or cams. The sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic or electrical means;
- c. Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed, but adjustable, stops, such as pins or cams. The sequence of motions and the selection of paths or angles are variable within the fixed program pattern. Variations or modifications of the program pattern (e.g. changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;
- d. Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is variable, but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;
- e. Stacker cranes defined as Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contents of those bins for storage or retrieval.

"run out" (out-of-true running) - Radial displacement in one revolution of the main spindle measured in a plane perpendicular to the spindle axis at a point on the external or internal revolving surface to be tested (Ref. ISO 230 Part 1-1986, paragraph 5.61).

"sensors" - Detectors of a physical phenomenon, the output of which (after conversion into a signal that can be interpreted by a controller) is able to generate "programs" or modify programmed instructions or numerical program data. This includes "sensors" with machine vision, infrared imaging, acoustical imaging, tactile feel, inertial position measuring, optical or acoustic ranging or force or torque measuring capabilities.

"software" - A collection of one or more "programs" or "microprograms" fixed in any tangible medium of expression.

"tilting spindle" - A tool-holding spindle that, during the machining process, alters the angular position of its centre line with respect to any other axis.

"user-accessible programmability"

The facility allowing a user to insert, modify or replace "programs" by means other than:

- (a) A physical change in wiring or interconnections; or
- (b) The setting of function controls including entry of parameters.

END QUOTE

BYLAE A**KERNVERWANTE DUBBELDOELIGE BEHEERDE GOEDERE**

'n Lys van afkortings wat deurgaans gebruik word en 'n lys van definisies van tegniese terme asook die lys van kernverwante dubbeldoelige toerusting, materiale en verwantetegnologie-items, word aangehaal uit die Bylae by die IAEA-dokument INFCIRC/254/Rev.1/Part 2, gedateer Julie 1992.

I. AFKORTINGS**AANHALING BEGIN**

Commonly used abbreviations (and their prefixes denoting size) in this Annex are as follows.

| | | |
|-----------------|---|--|
| A | - | ampere(s) |
| °C | - | degree(s) Celsius |
| Ci | - | curie(s) |
| cm ³ | - | cubic centimeter(s) |
| dB | - | decibel(s) |
| dBm | - | decibel referred to in milliwatt |
| g | - | gram(s); also, acceleration of gravity (9.81 m/second ²) |
| GBq | - | gigabecquerel(s) |
| GHz | - | gigahertz |
| Hz | - | hertz |
| J | - | joule(s) |
| K | - | kelvin |
| keV | - | thousand electron volt(s) |
| kg | - | kilogram(s) |
| kHz | - | kilohertz |
| kN | - | kilonewton(s) |
| kPa | - | kilopascal(s) |
| kW | - | kilowatt(s) |
| m | - | meter(s) |
| MeV | - | million electron volt(s) |
| MHz | - | megahertz |
| MPa | - | megapascal(s) |
| MW | - | megawatt(s) |
| μF | - | microfarad(s) |
| μm | - | micrometer(s) |
| μs | - | microsecond(s) |
| mm | - | millimeter(s) |
| N | - | newton(s) |
| nm | - | nanometer(s) |
| ns | - | nanosecond(s) |
| nH | - | nanohenry(ies) |
| ps | - | picosecond(s) |
| RMS | - | root mean square |
| TIR | - | total indicator reading |
| W | - | watt(s) |

AANHALING EINDIG**II. DEFINISIES****AANHALING BEGIN**

"Technology" - means specific information required for the "development", "production", or "use" of any item contained in the List. This information may take the form of "technical data" or "technical assistance".

"basic scientific research" - Experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena and observable facts, not primarily directed towards a specific practical aim or objective.

"development" - is related to all phases prior to "production" such as:

- design
- design research
- design analysis
- design concepts
- assembly and testing of prototypes
- pilot production schemes
- design data
- process of transforming design data into a product
- configuration design
- integration design
- layouts

"in the public domain" - "In the public domain," as it applies herein, means technology that has been made available without restrictions upon its further dissemination. (Copyright restrictions do not remove technology from being in the public domain.)

"production" - means all production phases such as:

- construction
- production engineering
- manufacture
- integration
- assembly (mounting)
- inspection
- testing
- quality assurance

'Specially designed software'

The minimum "operating systems", "diagnostic systems", "maintenance systems" and "application software" necessary to be executed on particular equipment to perform the function for which it was designed. To make other, incompatible equipment perform the same function requires:

- (a) modification of this "software" or
- (b) addition of "programs".

"technical assistance" - "Technical assistance" may take forms such as: instruction, skills, training, working knowledge, consulting services.

NOTE: "Technical assistance" may involve transfer of "technical data".

"technical data" - "Technical data" may take forms such as blueprints, plans, diagrams, models, formulae, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.

"use" - Operation, installation (including on-site installation), maintenance (checking), repair, overhaul, and refurbishing.

AANHALING EINDIG

III. LIST OF NUCLEAR-RELATED DUAL-USE CONTROLLED GOODS

AANHALING BEGIN

1. INDUSTRIAL EQUIPMENT

1.1. Spin-forming and flow-forming machines which:

- a. according to the manufacturer's technical specification, can be equipped with "numerical control" units or a computer control; and
- b. with two or more axes that can be coordinated simultaneously for "contouring control",

and precision rotor-forming mandrels designed to form cylindrical rotors of inside diameter between 75 mm (3 in.) and 400 mm (16 in.) and specially designed software therefor.

Note: The only spin-forming machines controlled by this entry are those combining the function of spin-forming and flow-forming.

- 1.2. "Numerical control" units, specially designed "motion control boards" for "numerical control" application on machine tools, "numerically controlled" machine tools, specially designed "software", and technology as follows.

Detailed specifications of the equipment are shown in the Appendix.

- 1.3. Dimensional inspection machines, devices, or systems, as follows, specially designed software therefor.

- (a) Computer controlled or numerically controlled dimensional inspection machines having both of the following characteristics:

- (1) two or more axes; *and*
- (2) a one-dimensional length "measurement uncertainty" equal to or less (better) than $(1.25 + L/1000) \mu\text{m}$ tested with a probe of an "accuracy" of less (better) than $0.2 \mu\text{m}$ (L is the measured length in millimeters) (Ref: VDI/VDE 2617 parts 1 and 2);

- (b) Linear and angular displacement measuring devices, as follows:

- (1) linear measuring instruments having any of the following characteristics:
 - (i) non-contact type measuring systems with a "resolution" equal to or less (better) than $0.2 \mu\text{m}$ within a measuring range up to 0.2 mm;
 - (ii) linear variable differential transformer (LVDT) systems having both of the following characteristics:
 - (A) "linearity" equal to or less (better) than 0.1% within a measuring range up to 5 mm; *and*
 - (B) drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature $\pm 1 \text{ K}$; *or*
 - (iii) measuring systems that have both of the following characteristics:
 - (A) contain a "laser"; *and*
 - (B) maintain for at least 12 hours, over a temperature range of $\pm 1 \text{ K}$ around a standard temperature and a standard pressure;
 - (1) a "resolution" over their full scale of $0.1 \mu\text{m}$ or better; *and*
 - (2) with a "measurement uncertainty" equal to or less (better) than $(0.2 + L/2000) \mu\text{m}$ (L is the measured length in millimeters); *except* measuring interferometer systems, without closed or open loop feedback, containing a "laser" to measure slide movement errors of machine tools, dimensional inspection machines, or similar equipment;

- (2) angular measuring instruments having an "angular position deviation" equal to or less (better) than 0.00025° ;

Note: The sub-item (b) (2) of this item does not control optical instruments, such as autocollimators, using collimated light to detect angular displacement of a mirror.

- (c) Systems for simultaneously linear-angular inspection of hemishells, having both of the following characteristics:

- (1) "measurement uncertainty" along any linear axis equal to or less (better) than $3.5 \mu\text{m}$ per 5 mm; *and*

- (2) "angular position deviation" equal to or less than 0.02° .

Note: Specially designed software for the systems described in paragraph (c) of this item includes software for simultaneous measurements of wall thickness and contour.

Technical Note 1: Machine tools that can be used as measuring machines are controlled if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.

Technical Note 2: A machine described in this section, 1.3., is controlled if it exceeds the control threshold anywhere within its operating range.

Technical Note 3: The probe used in determining the measurement uncertainty of a dimensional inspection system shall be as described in VDI/VDE 2617 parts 2, 3, and 4.

Technical Note 4: All parameters of measurement values in this item represent plus/minus, i.e., not total band.

"measurement uncertainty"

The characteristic parameter which specifies in what range around the output value the correct value of the measurable variable lies with a confidence level of 95%. It includes the uncorrected systematic deviations, the uncorrected backlash, and the random deviations (Reference: VDI/VDE 2617).

"Resolution"

The least increment of a measuring device; on digital instruments, the least significant bit (Reference: ANSI B-89.1.12).

"Linearity"

(Usually measured in terms of nonlinearity) is the maximum deviation of the actual characteristic (average of upscale and downscale readings), positive or negative, from a straight line so positioned as to equalize and minimize the maximum deviations.

"Angular position deviation"

The maximum difference between angular position and the actual, very accurately measured angular position after the workpiece mount of the table has been turned out of its initial position. (Reference: VDI/VDE 2617. Draft: "Rotary table on coordinate measuring machines").

- 1.4. Vacuum or controlled environment (inert gas) induction furnaces capable of operation above 850°C and having induction coils 600 mm (24 in.) or less in diameter, and power supplies specially designed for induction furnaces with a power supply of 5 kW or more.

Technical Note: This entry does not control furnaces designed for the processing of semiconductor wafers.

- 1.5. "Isostatic presses" capable of achieving a maximum working pressure of 69 MPa (10,000 psi) or greater and having a chamber cavity with an inside diameter in excess of 152 mm (6 in.) and specially designed dies and moulds, and controls and "specially designed software" therefor.

Technical Notes:

- (1) The inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.

- (2) "Isostatic presses"

Equipment capable of pressurizing a closed cavity through various media (gas, liquid, solid particles, etc.) to create equal pressure in all directions within the cavity upon a workpiece or material.

- 1.6. "Robots" and "end-effectors" having either of the following characteristics:
- (a) Specially designed to comply with national safety standards applicable to handling high explosives (for example, meeting electrical code ratings for high explosives); or
 - (b) Specially designed or rated as radiation hardened to withstand greater than 5×10^4 grays (Si) (5×10^6 rad (Si)) without operational degradation;
- and specially designed controllers and "specially designed software" therefor.

Technical Notes:

(1) "Robot"

A manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use "sensors", and has all of the following characteristics:

- (a) is multifunctional;
- (b) is capable of positioning or orienting material, parts, tools, or special devices through variable movements in three-dimensional space;
- (c) incorporates three or more closed or open loop servo-devices which may include stepping motors; and
- (d) has "user-accessible programmability" by means of teach/playback method or by means of an electronic computer which may be a programmable logic controlled, i.e., without mechanical intervention.

NB.:

The above definition does not include the following devices:

- (a) Manipulation mechanisms which are only manually/teleoperator controllable;
- (b) Fixed sequence manipulation mechanisms which are automated moving devices operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed stops, such as pins or cams. The sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic, or electrical means;
- (c) Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed, but adjustable, stops such as pins or cams. The sequence of motions and the selection of paths or angles are variable within the fixed program pattern. Variations or modifications of the program pattern (e.g., changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;
- (d) Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is variable but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;
- (e) Stacker cranes defined as Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contents of those bins for storage or retrieval.

(2) "End-effectors"

"End-effectors" include grippers, "active tooling units," and any other tooling that is attached to the baseplate on the end of a "robot" manipulator arm.

- (3) The definition in (a) above is not designed to control robots specially designed for nonnuclear industrial applications such as automobile paint-spraying booths.

- 1.7. Vibration test equipment using digital control techniques and feedback or closed loop test equipment and software therefor capable of vibrating a system at 10 g RMS or more between 20 Hz and 2000 Hz, imparting forces of 50 kN (11,250 lbs) or greater.

1.8. Vacuum and controlled atmosphere metallurgical melting and casting furnaces as follows; and specially configured computer control and monitoring systems and "specially designed software" therefor:

- (a) Arc remelt and casting furnaces with consumable electrode capacities between 1000 cm³ and 20,000 cm³ and capable of operating with melting temperatures above 1700 °C;
- (b) Electron beam melting and plasma atomization and melting furnaces with a power of 50 kW or greater and capable of operating with melting temperatures above 1200 °C.

2. MATERIALS

2.1. Aluminum alloys capable of an ultimate tensile strength of 460 MPa (0.46×10^9 N/m²) or more at 293 K (20°C), in the form of tubes or solid forms (including forgings) with an outside diameter of more than 75 mm (3 in.).

Technical Note: The phrase "capable of" encompasses aluminum alloys before or after heat treatment.

2.2. Beryllium as follows: metal, alloys containing more than 50% of beryllium by weight, compounds containing beryllium, and manufactures thereof, *except:*

- (a) *Metal windows for X-ray machines;*
- (b) *Oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits.*

Technical Note: This control applies to waste and scrap containing beryllium as defined here.

2.3. High-purity (99.99% or greater) bismuth with very low silver content (less than 10 parts per million).

2.4. Boron and boron compounds, mixtures, and loaded materials in which the boron-10 isotope is more than 20% by weight of the total boron content.

2.5. Calcium (high purity) containing both less than 1000 parts per million by weight of metallic impurities other than magnesium and less than 10 parts per million of boron.

2.6. Chlorine Trifluoride (ClF₃).

2.7. Crucibles made of materials resistant to liquid actinide metals, as follows:

- (a) Crucibles with a volume of between 150 ml and 8 liters and made of or coated with any of the following materials having a purity of 98% or greater:

- (i) Calcium fluoride (CaF₂)
- (ii) Calcium zirconate (metazirconate) (Ca₂ZrO₃)
- (iii) Cerium sulfide (Ce₂S₃)
- (iv) Erbium oxide (erbia) (Er₂O₃)
- (v) Hafnium oxide (hafnia) (HfO₂)
- (vi) Magnesium oxide (MgO)
- (vii) Nitrided niobium-titanium-tungsten alloy (approximately 50% Nb, 30% Ti, 20% W)
- (viii) Yttrium oxide (yttria) (Y₂O₃)
- (ix) Zirconium oxide (zirconia) (ZrO₂)

- (b) Crucibles with a volume of between 50 ml and 2 liters and made of or lined with tantalum, having a purity of 99.9% or greater.

- (c) Crucibles with a volume of between 50 ml and 2 liters and made of or lined with tantalum (having a purity of 98% or greater) coated with tantalum carbide, nitride, or boride (or any combination of these).

2.8. (a) Carbon or aramid "fibrous and filamentary" materials having a "specific modulus" of 12.7×10^6 m or greater or a "specific tensile strength" of 23.5×10^4 m or greater; or

- (b) Glass "fibrous and filamentary" materials having a "specific modulus" of 3.18×10^6 m or greater and a "specific tensile strength" of 7.62×10^4 m or greater.

- (c) Composite structures in the form of tubes with an inside diameter of between 75 mm (3 in.) and 400 mm (16 in.) made with "fibrous and filamentary" materials controlled in (a) above.

Technical Note:

- (a) The term "fibrous and filamentary materials" includes continuous monofilaments, continuous yarns, and tapes.
 - (b) "Specific modulus" is the Young's modulus in N/m^2 divided by the specific weight in N/m^3 when measured at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$;
 - (c) "Specific tensile strength" is the ultimate tensile strength in N/m^2 divided by the specific weight in N/m^3 when measured at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$.
- 2.9. Hafnium of the following description: metal, alloys, and compounds of hafnium containing more than 60% hafnium by weight and manufactures thereof.
- 2.10. Lithium (isotopically enriched in lithium-6) as follows:
- (a) Metal hydrides or alloys containing lithium enriched in the 6 isotope (^6Li) to a concentration higher than the one existing in nature (7.5% on an atom percentage basis);
 - (b) Any other materials containing lithium enriched in the 6 isotope (including compounds, mixtures, and concentrates), *except ^6Li incorporated in thermoluminescent dosimeters.*
- 2.11. Magnesium (high purity) containing both less than 200 parts per million by weight of metallic impurities other than calcium and less than 10 parts per million of boron.
- 2.12. Maraging steel capable of an ultimate tensile strength of 2050 MPa ($2.050 \times 10^9 \text{ N/m}^2$) ($300,000 \text{ lb/in.}^2$) or more at 293 K (20°C) *except forms in which no linear dimension exceeds 75 mm.*

Technical Note: The phrase "capable of" encompasses maraging steel before or after heat treatment.

- 2.13. Radium-226 *except radium contained in medical applicators.*
- 2.14. Titanium alloys capable of an ultimate tensile strength of 900 MPa ($0.9 \times 10^9 \text{ N/m}^2$) ($130,500 \text{ lb/in.}^2$) or more at 293 K (20°C) in the form of tubes or solid forms (including forgings) with an outside diameter of more than 75 mm (3 in.).

Technical Note: The phrase "capable of" encompasses titanium alloys before or after heat treatment.

- 2.15. Tungsten, as follows: parts made of tungsten, tungsten carbide, or tungsten alloys (greater than 90% tungsten) having a mass greater than 20 kg and a hollow cylindrical symmetry (including cylinder segments) with an inside diameter greater than 100 mm (4 in.) but less than 300 mm (12 in.), *except parts specifically designed for use as weights or gamma-ray collimators.*
- 2.16. Zirconium as follows: metal, alloys containing more than 50% zirconium by weight, and compounds in which the ratio of hafnium content to zirconium content is less than 1 part to 500 parts by weight, and manufactures wholly thereof; *except zirconium in the form of foil having a thickness not exceeding 0.10 mm (0.004 in.).*

Technical Note: This control applies to waste and scrap containing zirconium as defined here.

3. URANIUM ISOTOPE SEPARATION EQUIPMENT AND COMPONENTS

- 3.1. Electrolytic cells for fluorine production with a production capacity greater than 250 g of fluorine per hour.
- 3.2. Rotor fabrication and assembly equipment and bellows-forming mandrels and dies, as follows:
- (a) Rotor assembly equipment for assembly of gas centrifuge rotor tube sections, baffles, and end caps. Such equipment includes precision mandrels, clamps, and shrink fit machines.

- (b) Rotor straightening equipment for alignment of gas centrifuge rotor tube sections to a common axis. (Note: Normally such equipment will consist of precision measuring probes linked to a computer that subsequently controls the action of, for example, pneumatic rams used for aligning the rotor tube sections).
 - (c) Bellows-forming mandrels and dies for producing single-convolution bellows (bellows made of high-strength aluminum alloys, maraging steel, or high-strength filamentary materials). The bellows have all of the following dimensions:
 - (1) 75-mm to 400-mm (3-in. to 16-in.) inside diameter;
 - (2) 12.7 mm (0.5 in.) or more in length; and
 - (3) single convolution depth more than 2 mm (0.08 in.).
- 3.3. Centrifugal multiplane balancing machines, fixed or portable, horizontal or vertical, as follows:
- (a) Centrifugal balancing machines designed for balancing flexible rotors having a length of 600 mm or more and having all of the following characteristics:
 - (1) a swing or journal diameter of 75 mm or more;
 - (2) mass capability of from 0.9 to 23 kg (2 to 50 lb.); and
 - (3) capable of balancing speed of revolution more than 5000 rpm;
 - (b) Centrifugal balancing machines designed for balancing hollow cylindrical rotor components and having all of the following characteristics:
 - (1) a journal diameter of 75 mm or more;
 - (2) mass capability of from 0.9 to 23 kg (2 to 50 lb.);
 - (3) capable of balancing to a residual imbalance of 0.010 kg mm/kg per plane or better; and
 - (4) belt drive type;and "specially designed software" therefor.
- 3.4. Filament winding machines in which the motions for positioning, wrapping, and winding fibers are coordinated and programmed in two or more axes, specially designed to fabricate composite structures or laminates from fibrous and filamentary materials and capable of winding cylindrical rotors of diameter between 75 mm (3 in.) and 400 mm (16 in.) and lengths of 600 mm (24 in.) or greater; coordinating and programming controls therefor; precision mandrels; and "specially designed software" therefor.
- 3.5. Frequency changers (also known as converters or inverters) or generators having all of the following characteristics:
- (a) A multiphase output capable of providing a power of 40 W or more;
 - (b) Capable of operating in the frequency range between 600 and 2000 Hz;
 - (c) Total harmonic distortion below 10%; and
 - (d) Frequency control better than 0.1%;
- except such frequency changers specially designed or prepared to supply "motor stators" (as defined below) and having the characteristics listed in (b) and (d) above, together with a total harmonic distortion of less than 2% and an efficiency of greater than 80%.

Definition:

"Motor stators": specially designed or prepared ring-shaped stators for high-speed multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in the frequency range of 600–2000 Hz and a power range of 50–1000 VA. The stators consist of multiphase windings on a laminated low-loss iron core comprising thin layers typically 2.0 mm (0.08 in.) thick or less.

3.6. Lasers, laser amplifiers, and oscillators as follows:

- (a) Copper vapor lasers with 40 W or greater average output power operating at wavelengths between 500 nm and 600 nm;
- (b) Argon ion lasers with greater than 40 W average output power operating at wavelengths between 400 nm and 515 nm;
- (c) Neodymium-doped (other than glass) lasers as follows:
 - (1) having an output wavelength between 1000 nm and 1100 nm, being pulse-excited and Q-switched with a pulse duration equal to or greater than 1 ns, and having either of the following:
 - (a) A single-transverse mode output having an average output power exceeding 40 W;
 - (b) A multiple-transverse mode output having an average output power exceeding 50 W;
 - (2) operating at a wavelength between 1000 nm and 1100 nm and incorporated frequency doubling giving an output wavelength between 500 nm and 550 nm with an average power at the doubled frequency (new wavelength) of greater than 40 W;
- (d) Tunable pulsed single-mode dye oscillators capable of an average power output of greater than 1 W, a repetition rate greater than 1 kHz, a pulse less than 100 ns, and a wavelength between 300 nm and 800 nm;
- (e) Tunable pulsed dye laser amplifiers and oscillators, *except single mode oscillators*, with an average power output of greater than 30 W, a repetition rate greater than 1 kHz, a pulse width less than 100 ns, and a wavelength between 300 nm and 800 nm;
- (f) Alexandrite lasers with a bandwidth of 0.005 nm or less, a repetition rate of greater than 125 Hz, and an average power output greater than 30 W operating at wavelengths between 720 nm and 800 nm;
- (g) Pulsed carbon dioxide lasers with a repetition rate greater than 250 Hz, an average power output of greater than 500 W, and a pulse of less than 200 ns operating at wavelengths between 9000 nm and 11,000 nm;

N. B. This specification is not intended to control the higher power (typically 1 to 5 kW) industrial CO₂ lasers used in applications such as cutting and welding, as these latter lasers are either continuous wave or are pulsed with a pulse width more than 200 ns.

- (h) Pulsed excimer lasers (XeF, XeCl, KrF) with a repetition rate greater than 250 Hz and an average power output of greater than 500 W operating at wavelengths of between 240 and 360 nm;
- (i) Para-hydrogen Raman shifters designed to operate at 16 μ m output wavelength and at a repetition rate greater than 250 Hz.

Technical Note: Machine tools, measuring devices, and associated technology that have the potential for use in the nuclear industry are controlled under items 1.2 and 1.3 of this list.

3.7 Mass spectrometers capable of measuring ions of 230 atomic mass units or greater and having a resolution of better than 2 parts in 230, and ion sources therefor as follows:

- (a) Inductively coupled plasma mass spectrometers (ICP/MS);
- (b) Glow discharge mass spectrometers (GDMS);
- (c) Thermal ionization mass spectrometers (TIMS);
- (d) Electron bombardment mass spectrometers which have a source chamber constructed from or lined with or plated with materials resistant to UF₆;

(e) Molecular beam mass spectrometers as follows:

- (1) which have a source chamber constructed from or lined with or plated with stainless steel or molybdenum and have a cold trap capable of cooling to 193 K (-80 °C) or less; or
- (2) which have a source chamber constructed from or lined with or plated with materials resistant to UF₆; or

(f) Mass spectrometers equipped with a microfluorination ion source designed for use with actinides or actinide fluorides;

except

specially designed or prepared magnetic or quadrupole mass spectrometers capable of taking "on-line" samples of feed, product, or tails from UF₆ gas streams and having all of the following characteristics:

- (1) Unit resolution for mass greater than 320;
- (2) Ion sources constructed of or lined with nichrome or monel or nickel-plated;
- (3) Electron bombardment ionization sources;
- (4) Having a collector system suitable for isotopic analysis.

3.8. Instruments capable of measuring pressures up to 13 kPa (2 psi, 100 torr) to an accuracy of better than 1% (full-scale), with corrosion-resistant pressuresensing elements constructed of nickel, nickel alloys, phosphor bronze, stainless steel, aluminum or aluminum alloys.

3.9. Valves 5 mm (0.2 in.) or greater in diameter, with a bellows seal, wholly made of or lined with aluminum, aluminum alloy, nickel, or alloy containing 60% or more nickel, either manually or automatically operated.

3.10. Superconducting solenoidal electromagnets with all of the following characteristics:

- (a) capable of creating magnetic fields of more than 2 teslas (20 kilogauss);
- (b) with an L/D (length divided by inner diameter) greater than 2;
- (c) with an inner diameter of more than 300 mm; and
- (d) with a magnetic field uniform to better than 1% over the central 50% of the inner volume.

Note:

The item does not cover magnets specially designed for and exported as parts of medical nuclear magnetic resonance (NMR) imaging systems. It is understood that the wording "as part of" does not necessarily mean physical part in the same shipment. Separate shipments from different sources are allowed, provided the related export documents clearly specify the "part of" relationship.

3.11. Vacuum pumps with an input throat size of 38 cm (15 in.) or greater with a pumping speed of 15,000 liters/second or greater and capable of producing an ultimate vacuum better than 10⁻⁴ Torr (0.76 × 10⁻⁴ mbar).

Technical Note: The ultimate vacuum is determined at the input of the pump with the input of the pump blocked off.

3.12. Direct current high-power supplies capable of continuously producing, over a time period of 8 hours, 100 V or greater with current output of 500 amps or greater and with current or voltage regulation better than 0.1%.

3.13. High-voltage direct current power supplies capable of continuously producing, over a time period of 8 hours, 20,000 V or greater with current output of 1 amp or greater and with current or voltage regulation better than 0.1%.

3.14. Electromagnetic isotope separators, designed for or equipped with, single or multiple ion sources capable or providing a total ion beam current of 50 mA or greater.

Notes:

1. This entry will control separators capable of enriching stable isotopes as well as those for uranium. A separator capable of separating the isotopes of lead with a one-mass unit difference is inherently capable of enriching the isotopes of uranium with a three-unit mass difference.
2. This entry includes separators with the ion sources and collectors both in the magnetic field and those configurations in which they are external to the field.
3. A single 50-mA ion source will produce less than 3 g of separated HEU per year from natural abundance feed.
4. **HEAVY WATER PRODUCTION PLANT RELATED EQUIPMENT**
(Other Than Trigger List Items)
 - 4.1. Specialized packings for use in separating heavy water from ordinary water and made of phosphor bronze mesh or copper (both chemically treated to improve wettability) and designed for use in vacuum distillation towers.
 - 4.2. Pumps circulating solutions of diluted or concentrated potassium amide catalyst in liquid ammonia (KNH_2/NH_3), with all the following characteristics:
 - (a) airtight (i.e., hermetically sealed);
 - (b) for concentrated potassium amide solutions (1% or greater), operating pressure of 1.5-60 MPa [15-600 atmospheres (atm)]; for dilute potassium amide solutions (less than 1%), operating pressure of 20-60 MPa (200-600 atm); and
 - (c) a capacity greater than 8.5 m³/h (5 cubic feet per minute).
 - 4.3. Water-hydrogen sulfide exchange tray columns constructed from fine carbon steel (such as ASTM A516) with a diameter of 1.8 m (6 ft.) or greater to operate at a nominal pressure of 2 Mpa (300 psi) or greater, except columns which are specially designed or prepared for the production of heavy water. Internal contactors of the columns are segmented trays with an effective assembled diameter of 1.8 m (6 ft.) or greater, such as sieve trays, valve trays, bubble cap trays, and turbogrid trays designed to facilitate countercurrent contacting and constructed of materials resistant to corrosion by hydrogen sulfide/water mixtures, such as 304L or 316 stainless steel.
 - 4.4. Hydrogen-cryogenic distillation columns having all of the following applications:
 - (a) designed to operate with internal temperatures of -238 °C (35 K) or less;
 - (b) designed to operate at internal pressure of 0.5 to 5 MPa (5 to 50 atmospheres);
 - (c) constructed of fine-grain stainless steels of the 300 series with low sulphur content or equivalent cryogenic and H₂-compatible materials; and
 - (d) with internal diameters of 1 m or greater and effective lengths of 5 m or greater.
 - 4.5. Ammonia synthesis convertors, ammonia synthesis units in which the synthesis gas (nitrogen and hydrogen) is withdrawn from an ammonia/hydrogen high-pressure exchange column and the synthesized ammonia is returned to said column.
5. **IMPLOSION SYSTEMS DEVELOPMENT EQUIPMENT**
 - 5.1. Flash x-ray generators or pulsed electron accelerators with peak energy of 500 keV or greater, as follows, *except accelerators that are component parts of devices designed for purposes other than electron beam or x-ray radiation (electron microscopy, for example) and those designed for medical purposes:*
 - (a) Having an accelerator peak electron energy of 500 keV or greater but less than 25 MeV and with a figure of merit (K) of 0.25 or greater, where K is defined as:

$$K = 1.7 \times 10^3 V^{2.65} Q,$$
 where V is the peak electron energy in million electron volts and Q is the total accelerated charge in coulombs if the accelerator beam pulse duration is less than or equal to 1 μs ; if the accelerator beam pulse duration is greater than 1 μs , Q is the maximum accelerated charge in 1 μs [Q equals the integral of i with respect to t , over the lesser of 1 μs or the time duration of the beam pulse ($Q = \int i dt$), where i is beam current in amperes and t is time in seconds]; or

- (b) Having an accelerator peak electron energy of 25 MeV or greater and a peak power greater than 50 MW. [Peak power = (peak potential in volts) \times (peak beam current in amperes).]

Technical Note:

Time duration of the beam pulse - In machines, based on microwave accelerating cavities, the time duration of the beam pulse is the lesser of 1 μ s or the duration of the bunched beam packet resulting from one microwave modulator pulse.

Peak beam current - In machines based on microwave accelerating cavities, the peak beam current is the average current in the time duration of a bunched beam packet.

- 5.2. Multistage light gas guns or other high-velocity gun systems (coil, electromagnetic, electrothermal, or other advanced systems) capable of accelerating projectiles to 2 km per second or greater.
- 5.3. Mechanical rotating mirror cameras
Mechanical framing cameras with recording rates greater than 225,000 frames per second; streak cameras with writing speeds greater than 0.5 mm per microsecond; and parts, including specially designed synchronizing electronics and specially designed rotor assemblies (consisting of turbines, mirrors, and bearings).
- 5.4. Electronic streak and framing cameras and tubes as follows:
- (a) Electronic streak cameras capable of 50 ns or less time resolution and streak tubes therefor;
 - (b) Electronic (or electronically shuttered) framing cameras capable of 50 ns or less frame exposure time;
 - (c) Framing tubes and solid-state imaging devices for use with cameras controlled in sub-item (b) above, as follows:
 - (1) proximity focused image intensifier tubes having the photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;
 - (2) gate silicon intensifier target (SIT) vidicon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;
 - (3) Kerr or pockel cell electro-optical shuttering; or
 - (4) Other framing tubes and solid-state imaging devices having a fast-image gating time of less than 50 ns specially designed for cameras controlled by sub-item (b) above.
- 5.5. Specialized instrumentation for hydrodynamic experiments as follows:
- (a) Velocity interferometers for measuring velocities in excess of 1 km per second during time intervals less than 10 μ s. (VISARs, Doppler laser interferometers, DLIs, etc.);
 - (b) manganin gauges for pressures greater than 100 kilobars; or
 - (c) quartz pressure transducers for pressures greater than 100 kilobars.
- 6. EXPLOSIVES AND RELATED EQUIPMENT**
- 6.1. Detonators and multipoint initiation systems (exploding bridge wire, slapper, etc.)
- (a) Electrically driven explosive detonators as follows:
 - (1) exploding bridge (EB);
 - (2) exploding bridge wire (EBW);
 - (3) slapper; and
 - (4) exploding foil initiators (EFI).

- (b) Arrangements using single or multiple detonators designed to nearly simultaneously initiate an explosive surface (over greater than 5 000 mm²) from a single firing signal (with an initiation timing spread over the surface of less than 2.5 μ s).

Description clarification: The detonators of concern all utilize a small electrical conductor (bridge, bridge wire, or foil) that explosively vaporizes when a fast, high-current electrical pulse is passed through it. In nonslapper types, the exploding conductor starts a chemical detonation in a contacting high-explosive material such as PETN (pentaerythritoltetranitrate). In slapper detonators, the explosive vaporization of the electrical conductor drives a "flyer" or "slapper" across a gap, and the impact of the slapper on an explosive starts a chemical detonation. The slapper in some designs is driven by magnetic force. The term "exploding foil" detonator may refer to either an EB or a slapper-type detonator. Also, the word "initiator" is sometimes used in place of the word "detonator".

Detonators using only primary explosives, such as lead azide, are not subject to control.

6.2. Electronic components for firing sets (switching devices and pulse discharge capacitors)

6.2.1. Switching devices

- (a) Cold-cathode tubes (including gas krytron tubes and vacuum spraytron tubes), whether gas filled or not, operating similarly to a spark gap, containing three or more electrodes, and having all of the following characteristics:
- (1) Anode peak voltage rating of 2500 V or more,
 - (2) Anode peak current rating of 100 A or more,
 - (3) Anode delay time of 10 μ s or less, and
- (b) Triggered spark-gaps having an anode delay time of 15 μ s or less and rated for a peak current of 500 A or more;
- (c) Modules or assemblies with a fast switching function having all of the following characteristics:
- (1) Anode peak voltage rating greater than 2000 V;
 - (2) anode peak current rating of 500 A or more; and
 - (3) turn-on time of 1 μ s or less.

6.2.2. Capacitors with the following characteristics:

- (a) Voltage rating greater than 1.4 kV, energy storage greater than 10 J, capacitance greater than 0.5 μ F, and series inductance less than 50 nH; or
- (b) Voltage rating greater than 750 V, capacitance greater than 0.25 μ F, and series inductance less than 10 nH.

6.3. Firing sets and equivalent high-current pulse generators (for controlled detonators), as follows:

- (a) Explosive detonator firing sets designed to drive multiple controlled detonators covered under item 6.1. above;
- (b) Modular electrical pulse generators (pulsers) designed for portable, mobile, or ruggedized use (including xenon flash-lamp drivers) having all the following characteristics:
- (1) capable of delivering their energy in less than 15 μ s;
 - (2) having an output greater than 100 A;
 - (3) having a rise time of less than 10 μ s into loads of less than 40 ohms. (Rise time is defined as the time interval from 10% to 90% current amplitude when driving a resistive load);

- (4) enclosed in a dust-tight enclosure;
 - (5) no dimension greater than 25.4 cm (10 in.);
 - (6) weight less than 25 kg (55 lb.); and
 - (7) specified for use over an extended temperature range (-50°C to 100°C) or specified as suitable for aerospace use.
- 6.4. High explosives or substances or mixtures containing more than 2% of any of the following:
- (a) Cyclotetramethylenetetranitramine (HMX);
 - (b) Cyclotrimethylenetrinitramine (RDX);
 - (c) Triaminotrinitrobenzene (TATB);
 - (d) Any explosive with a crystal density greater than 1.8 g/cm³ and having a detonation velocity greater than 8000 m/s; or
 - (e) Hexanitrostilbene (HNS).

7. NUCLEAR TESTING EQUIPMENT AND COMPONENTS

- 7.1. Oscilloscopes and transient recorders and specially designed components as follows: plug-in units, external amplifiers, pre-amplifiers, sampling devices, and cathode ray tubes for analog oscilloscopes.
- (a) Non-modular analog oscilloscopes having a "bandwidth" of 1 GHz or greater;
 - (b) Modular analog oscilloscope systems having either of the following characteristics:
 - (i) a mainframe with a "bandwidth" of 1 GHz or greater; or
 - (ii) Plug-in modules with an individual "bandwidth" of 4 GHz or greater;
 - (c) Analog sampling oscilloscopes for the analysis of recurring phenomena with an effective "bandwidth" greater than 4 GHz;
 - (d) Digital oscilloscopes and transient recorders, using analog-to-digital conversion techniques, capable of storing transients by sequentially sampling single-shot inputs at successive intervals of less than 1 ns (greater than 1 giga-sample per second), digitizing to 8 bits or greater resolution and storing 256 or more samples.

Technical Note: "Bandwidth" is defined as the band of frequencies over which the deflection on the cathode ray tube does not fall below 70.7% of that at the maximum point measured with a constant input voltage to the oscilloscope amplifier.

- 7.2. Photomultiplier tubes with a photocathode area of greater than 20 cm² having an anode pulse rise time of less than 1 ns.
- 7.3. High-speed pulse generators with output voltages greater than 6 V into a less than 55-ohm resistive load, and with pulse transition times less than 500 ps (defined as the time interval between 10% and 90% voltage amplitude).

8. OTHER

- 8.1. Neutron generator systems, including tubes, designed for operation without an external vacuum system and utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction.
- 8.2. Equipment related to nuclear material handling and processing and to nuclear reactors as follows:
- 8.2.1. Remote manipulators that provide mechanical translation of human operator actions by electrical, hydraulic, or mechanical means to an operating arm and terminal fixture that can be used to provide remote actions in radiochemical separation operations and "hot cells". The manipulators have a capability to penetrate 0.6 m or more (2 ft. or more) of cell wall or, alternatively, bridge over the top of a cell wall with a thickness of 0.6 m or more (2 ft. or more);

- 8.2.2. High-density (lead glass or other) radiation shielding windows greater than 0.3 m (1 ft.) on a side and with a density greater than 3 g/cm³ and a thickness of 100 mm or greater; and specially designed frames therefor;
- 8.2.3. Radiation-hardened TV cameras specially designed or rated as radiation hardened to withstand greater than 5×10^4 grays (Si) (5×10^6 rad (Si)) without operational degradation and specially designed lenses used therein.
- 8.3. Tritium, tritium compounds, and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1000, *except a product or device containing not more than 40 Ci of tritium in any chemical or physical form.*
- 8.4. Facilities or plants for the production, recovery, extraction, concentration, or handling of tritium, and equipment as follows:
 - (a) Hydrogen or helium refrigeration units capable of cooling to -250°C (23 K) or less, with heat removal capacity greater than 150 watts; or
 - (b) Hydrogen isotope and purification systems using metal hydrides as the storage, or purification medium.
- 8.5. Platinized catalysts specially designed or prepared for promoting the hydrogen isotope exchange reaction between hydrogen and water for the recovery of tritium from heavy water or for the production of heavy water.
- 8.6. Helium in any form isotopically enriched in the helium-3 isotope, whether or not mixed with other materials or contained in any equipment or device, *except products or devices containing less than 1 g of helium-3.*
- 8.7. Alpha-emitting radionuclides and equipment containing such radionuclides as follows:

All alpha-emitting radionuclides having an alpha half-life of 10 days or greater but less than 200 years, including compounds and mixtures containing these radionuclides with a total alpha activity of 1 curie per kilogram (37 GBq/kg) or greater, *except for devices containing less than 100 millicuries (3.7 GBq) of alpha activity per device.*

ANNEX APPENDIX: Detailed Specifications for Machine Tools
(Item 1.2. in List of Nuclear Dual-Use Export Controls)

- 1.2. "Numerical control" units, specially designed "motion control boards" for "numerical control" applications on machine tools, "numerically controlled" machine tools, specially designed "software," and technology as follows:
 - (a) "Numerical control" units for machine tools, as follows:
 - (1) Having more than four interpolating axes that can be coordinated simultaneously for "contouring control" or
 - (2) Having two, three, or four interpolating axes that can be coordinated simultaneously for "contouring control" and one or more of the following conditions are fulfilled:
 - (i) Capable of "real-time processing" of data to modify the tool path during the machining operation by automatic calculation and modification of "part program" data for machining in two or more axes by means of measuring cycles and access to source data;
 - (ii) Capable of receiving directly (on-line) and processing computer-aided design (CAD) data for internal preparation of machine instructions; or
 - (iii) Capable, without modification, according to the manufacturer's technical specifications, of accepting additional boards that would permit increasing the number of interpolating axes that can be coordinated simultaneously for "contouring control," above the control levels, even if they do not contain these additional boards.

- (b) "Motion control boards" specially designed for machine tools having one or more of the following characteristics:

- (1) Providing interpolation in more than four axes;
- (2) Capable of "real time processing" described in (a) (2) (i); or
- (3) Capable of receiving and processing CAD data as described in (a) (2) (ii) above.

Note 1: Subitems (a) and (b) do not control "numerical control" units and "motion control boards" if:

- (a) *Modified for and incorporated in uncontrolled machines; or*
- (b) *Specially designed for uncontrolled machines.*

Note 2: "Software" (including documentation) for "numerical control" units that may be exported must be:

- (a) *In machine executable form only; and*
- (b) *Limited to the minimum necessary for the use (i.e., installation, operation, and maintenance) of these units.*

- (c) Machine tools, as follows, for removing or cutting metals, ceramics, or composites, which, according to the manufacturer's technical specifications, can be equipped with electronic devices for simultaneous "contouring control" in two or more axes:

Technical Note:

1. *The c-axis on jig grinders used to maintain grinding wheels normal to the work surfaces is not considered a contouring rotary axis.*
2. *Not counted in the total number of contouring axes are secondary parallel contouring axes, e.g., a secondary rotary axis, the center line of which is parallel to the primary rotary axis.*
3. *Axis nomenclature shall be in accordance with International Standard ISO 841, "Numerical Control Machines Axis and Motion Nomenclature."*
4. *Rotary axes do not necessarily have to rotate over 360°. A rotary axis can be driven by a linear device, e.g., a screw or a rack-and-pinion.*

- (1) Machine tools for turning, grinding, milling, or any combination thereof that:
 - (i) Have two or more axes that can be coordinated simultaneously for "contouring control", and
 - (ii) Have any of the following characteristics:

- (A) Two or more contouring rotary axes;
- (B) One or more contouring "tilting spindles";

Note: (c)(1)(ii)(B) applies to machine tools for grinding or milling only.

- (C) "Camming" (axial displacement) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

Note: (c)(1)(ii)(C) applies to machine tools for turning only.

- (D) "Run out" (out-of-true running) in one revolution of the spindle less (better) than 0.0006 mm TIR.

- (E) The "positioning accuracies," with all compensations available, are less (better) than:

- (1) 0.001° on any rotary axis

- (2) (a) 0.004 mm along any linear axis (overall positioning) for grinding machines

- (b) 0.006 mm along any linear axis (overall positioning) for milling or turning machines

Note: (c)(1)(ii)(E)(2)(b) does not control milling or turning machine tools with a positioning accuracy along one linear axis, with all compensations available, equal to or greater (worse) than 0.005 mm.

Notes:

- (1) Sub-item (c) does not control cylindrical external, internal, and external-internal grinding machines having all of the following characteristics:
 - (a) Not centreless (shoe-type) grinding machines;
 - (b) Limited to cylindrical grinding;
 - (c) A maximum workpiece outside diameter or length of 150 mm;
 - (d) Only two axes that can be coordinated simultaneously for "contouring control"; and
 - (e) No contouring c-axis.
- (2) Sub-item (c) does not control machines designed specifically as jig grinders having both of the following characteristics:
 - (a) Axes limited to x, y, c, and a, where the c-axis is used to maintain the grinding wheel normal to the work surface, and the a-axis is configured to grind barrel cams and
 - (b) A spindle "run-out" not less (not better) than 0.0006 mm.
- (3) Sub-item (c) does not control tool or cutter grinding machines having all of the following characteristics:
 - (a) Shipped as a complete system with "software" specially designed for the production of tools or cutters;
 - (b) No more than two rotary axes that can be coordinated simultaneously for "contouring control";
 - (c) "Run-out" (out-of-true running) in one revolution of the spindle not less (not better) than 0.0006 mm TIR; and
 - (d) The "positioning accuracies", with all compensations available, are not less (not better) than:
 - (i) 0.004 mm along any linear axis for overall positioning; or
 - (ii) 0.001° for any rotary axis.
- (2) Electrical discharge machines (EDM);
 - (i) Of the wire feed type that have five or more axes that can be coordinated simultaneously for "contouring control";
 - (ii) Non-wire EDMs that have two or more contouring rotary axes and that can be coordinated simultaneously for "contouring control".
- (3) Other machine tools for removing metals, ceramics, or composites:
 - (i) By means of:
 - (A) Water or other liquid jets, including those employing abrasive additives;
 - (B) Electron beam; or
 - (C) "Laser" beam; and
 - (ii) Having two or more rotary axes that:
 - (A) Can be coordinated simultaneously for "contouring control"; and
 - (B) Have a "positioning accuracy" or less than (better than) 0.003°.

(d) "Software"

(1) "Software" specially designed or modified for the "development," "production," or "use" of equipment, controlled by sub-categories (a), (b) or (c) above;

(2) Specific "software," as follows:

(i) "Software" to provide "adaptive control" and having both of the following characteristics:

(A) For "flexible manufacturing units" (FMUs) that consist at least of equipment described in (b)(1) and (b)(2) of the definition of "flexible manufacturing units"; and

(B) Capable of generating or modifying in "real time processing", "part program" data by using the signals obtained simultaneously by means of at least two detection techniques, such as:

- (1) Machine vision (optical ranging);
- (2) Infrared imaging;
- (3) Acoustical imaging (acoustical ranging);
- (4) Tactile measurement;
- (5) Inertial positioning;
- (6) Force measurement;
- (7) Torque measurement.

Note: This sub-item does not control "software" that only provides rescheduling of functionally identical equipment within "flexible manufacturing units" using prestored "part programs" and a prestored strategy for the distribution of the "part programs".

(ii) "Software" for electronic devices other than those described in sub-items (a) or (b) that provides the "numerical control" capability of the equipment controlled in sub-item 1.2.

(e) Technology

(1) "Technology" for the "development" of equipment controlled by sub-items (a), (b) or (c) above, (f) or (g) below, and of the sub-item (d).

(2) "Technology" for the "production" of equipment controlled by sub-items (a), (b) or (c) above, (f) or (g) below;

(3) Other "technology":

(i) For the "development" of interactive graphics as an integrated part in "numerical control" units for preparation or modification of "part programs";

(ii) For the "development" of integration "software" for incorporation of expert systems for advanced decision support of shop floor operations into "numerical control" units.

(f) Components and parts for machine tools controlled by sub-item (c) as follows:

(1) Spindle assemblies, consisting of spindles and bearings as a minimal assembly, with radial ("run-out") or axial ("camming") axis motion in one revolution of the spindle less (better) than 0.0006 mm TIR;

(2) Linear position feedback units (e.g., inductive-type devices, graduated scales, "laser," or infrared systems) having, with compensation, an overall "accuracy" better than $800 + (600 \times L \times 10^{-3})$ nm, where L equals the effective length in mm of the linear measurement; *except* measuring interferometer systems, without closed or open loop feedback, containing a "laser" to measure slide movement errors of machine tools, dimensional inspection machines, or similar equipment;

- (3) Rotary position feedback units (e.g., inductive-type devices, graduated scales, "laser," or infrared systems) having, with compensation, an "accuracy" less (better) than 0.00025° of arc; *except* measuring interferometer systems, without closed or open loop feedback, containing a "laser" to measure slide movement errors of machine tools, dimensional inspection machines, or similar equipment;
- (4) Slide way assemblies consisting of a minimal assembly of ways, bed, and slide having all of the following characteristics:
 - (i) A yaw, pitch, or roll of less (better) than 2 seconds of arc TIR (Ref. ISO/DIS 230-1) over full travel;
 - (ii) A horizontal straightness of less (better) than $2\ \mu\text{m}$ per 300 mm length; *and*
 - (iii) A vertical straightness of less (better) than $2\ \mu\text{m}$ over full travel per 300 mm length;
- (5) Single-point diamond-cutting tool inserts having all of the following characteristics:
 - (i) A flawless and chip-free cutting edge when magnified 400 times in any direction;
 - (ii) A cutting radius out-of-roundness less (better) than 0.002 mm TIR (also peak-to-peak); *and*
 - (iii) A cutting radius between 0.1 mm and 5.0 mm, inclusive.
- (g) Specially designed components or sub-assemblies, capable of upgrading, according to the manufacturer's specifications, "numerical control" units, motion control boards, machine tools, or feedback devices to or above the levels controlled in sub-items (a), (b), (c), (f)(2), or (f)(3):
 - (1) Printed circuit boards with mounted components and "software" therefor;
 - (2) "Compound rotary tables".

Technical Note: Definition of Terms

"accuracy" - Usually measured in terms of inaccuracy, defined as the maximum deviation, positive or negative, of an indicated value from an accepted standard or true value.

"adaptive control" - A control system that adjusts the response from conditions detected during the operation (Ref. ISO 2806-1980).

"camming" (axial displacement) - Axial displacement in one revolution of the main spindle measured in a plane perpendicular to the spindle faceplate at a point next to the circumference of the spindle faceplate (Ref. ISO 230 Part 1-1986, paragraph 5.63).

"compound rotary table" - A table allowing the workpiece to rotate and tilt about two non-parallel axes, which can be coordinated simultaneously for "contouring control".

"contouring control" - Two or more "numerically controlled" motions operating in accordance with instructions that specify the next required position and the required feed rates to that position. These feed rates are varied in relation to each other so that a desired contour is generated (Ref ISO/DIS 2806-1980).

"digital computer" - Equipment which can, in the form of one or more discrete variables:

- a. Accept data;
- b. Store data or instructions in fixed or alterable (writable) storage devices;
- c. Process data by means of a stored sequence of instructions which is modifiable; and
- d. Provide output of data.

N.B.: Modifications of a stored sequence of instructions include replacement of fixed storage devices, but not a physical change in writing or interconnections.

"flexible manufacturing unit (FMU)" [sometimes also referred to as "flexible manufacturing system" (FMS) or "flexible manufacturing cell (FMC)"]

An entity which includes a combination of at least:

- a. A "digital computer" including its own "main storage" and its own related equipment; and
- b. Two or more of the following:
 1. A machine tool described in Section 1.2.;
 2. A dimensional inspection machine described in Section 1.3.;
 3. A "robot" controlled by Section 1.6.;
 4. Digitally controlled equipment controlled by Section 3.4.

"laser" - An assembly of components which produce coherent light that is amplified by stimulated emission of radiation.

"main storage" - The primary storage for data or instructions for rapid access by a central processing unit. It consists of the internal storage of a "digital computer" and any hierarchical extension thereto, such as cache storage or non-sequentially accessed extended storage.

"microprogram" - A sequence of elementary instructions, maintained in a special storage, the execution of which is initiated by the introduction of its reference instruction into an instruction register.

"motion control board" - An electronic assembly specially designed to provide a computer system with the capability to coordinate simultaneously the motion of axes of machine tools for "contouring control".

"numerical control" - The automatic control of a process performed by a device that makes use of numeric data usually introduced as the operation is in progress (Ref. ISO 2382).

"part program" - An ordered set of instructions in a language and in a format required to cause operations to be effected under automatic control, which is either written in the form of a machine program on an input medium or prepared as input data for processing in a computer to obtain a machine program (Ref. ISO 2806-1980).

"positioning accuracy"

Of "numerically controlled" machine tools is to be determined and presented in accordance with paragraph 2.13, in conjunction with the requirements below:

(a) Test conditions (ISO/DIS/230/2, paragraph 3):

- (1) For 12 hours before and during measurements, the machine tool and accuracy measuring equipment will be kept at the same ambient temperature. During the premeasurement time, the slides of the machine will be continuously cycled identically to the way they will be cycled during the accuracy measurements;
- (2) The machine shall be equipped with any mechanical, electronic, or software compensation to be exported with the machine;
- (3) Accuracy of measuring equipment for the measurements shall be at least four times more accurate than the expected machine tool accuracy;
- (4) Power supply for slide drives shall be as follows:
 - (i) Line voltage variation shall not be greater than $\pm 10\%$ of nominal rated voltage;
 - (ii) Frequency variation shall not be greater than ± 2 Hz of normal frequency;
 - (iii) Lineouts or interrupted service are not permitted.

(b) Test Program (paragraph 4):

- (1) Feed rate (velocity of slides) during measurement shall be the rapid traverse rate;

N.B.: In the case of machine tools which generate optical quality surfaces, the feed rate shall be equal to or less than 50 mm per minute;

- (2) Measurements shall be made in an incremental manner from one limit of the axis travel to the other without returning to the starting position for each move to the target position;
 - (3) Axes not being measured shall be retained at mid-travel during test of an axis.
- (c) Presentation of test results (paragraph 2):

The results of the measurements must include:

- (1) "positioning accuracy" (A) and
- (2) The mean reversal error (B).

"program" - A sequence of instructions to carry out a process in, or convertible into, a form executable by an electronic computer.

"real-time processing" - Processing of data by an electronic computer in response to an external event according to time requirements imposed by the external event.

"robot" - A manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use "sensors" and has all the following characteristics:

- a. Is multifunctional;
- b. Is capable of positioning or orienting material, parts, tools or special devices through variable movements in three-dimensional space;
- c. Incorporates three or more closed or open loop servo-devices which may include stepping motors; and
- d. has "user-accessible programmability" by means of teach/playback method or by means of an electronic computer which may be a programmable logic controller, i.e., without mechanical intervention.

N.B.: The above definition does not include the following devices:

- a. Manipulation mechanisms which are only manually/teleoperator controllable;
- b. Fixed sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed stops, such as pins or cams. The sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic or electrical means;
- c. Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is mechanically limited by fixed, but adjustable, stops, such as pins or cams. The sequence of motions and the selection of paths or angles are variable within the fixed program pattern. Variations or modifications of the program pattern (e.g. changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;
- d. Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. The program is variable, but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;
- e. Stacker cranes defined as Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contents of those bins for storage or retrieval.

"run out" (out-of-true running) - Radial displacement in one revolution of the main spindle-measured in a plane perpendicular to the spindle axis at a point on the external or internal revolving surface to be tested (Ref. ISO 230 Part 1-1986, paragraph 5.61).

"sensors" - Detectors of a physical phenomenon, the output of which (after conversion into a signal that can be interpreted by a controller) is able to generate "programs" or modify programmed instructions or numerical program data. This includes "sensors" with machine vision, infrared imaging, acoustical imaging, tactile feel, inertial position measuring, optical or acoustic ranging or force or torque measuring capabilities.

"software" - A collection of one or more "programs" or "microprograms" fixed in any tangible medium of expression.

"tilting spindle" - A tool-holding spindle that, during the machining process, alters the angular position of its centre line with respect to any other axis.

"user-accessible programmability"

The facility allowing a user to insert, modify or replace "programs" by means other than:

- (a) A physical change in wiring or interconnections; or
- (b) The setting of function controls including entry of parameters.

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CONTENTS

INHOUD

| No. | Page No. | Gazette No. | No. | Bladsy No. | Koerant No. |
|--|----------|-------------|--|------------|-------------|
| GOVERNMENT NOTICES | | | GOEWERMENSKENNISGEWINGS | | |
| Agriculture, Department of | | | Arbeid, Departement van | | |
| <i>Government Notices</i> | | | <i>Goewermenskennisgewings</i> | | |
| R. 1770 Marketing Act (59/1968): Prohibition of the sale of mohair accepted through the board or to registered persons: Revocation..... | 1 | 16021 | R. 1750 Wet op Arbeidsverhoudinge (28/1956): Meubelnywerheid, Suidwestelike Distrikte: Hernuwing van Hoofdooreenkoms ... | 8 | 16021 |
| R. 1773 Marketing Act (59/1968): Oilseeds Scheme: Levies and special levies: Amendment..... | 1 | 16021 | R. 1751 do.: do.: Wysiging van Hoofdooreenkoms | 9 | 16021 |
| | | | R. 1763 Wet op Arbeidsverhoudinge (28/1956): Leernywerheid, Republiek van Suid-Afrika: Hernuwing van Ooreenkoms vir die Algemene Goedere Seksie | 10 | 16021 |
| | | | R. 1764 Wet op Mannekragopleiding (56/1981): Akkreditering van die Opleidingsraad vir die Juweliers- en Edelmetaalnywerheid... | 11 | 16021 |
| | | | R. 1791 Loonwet (5/1957): Loonvasstelling 476: Bedryfsuitrustingnywerheid, Sekere Gebiede: Verbeteringskennisgewing..... | 12 | 16021 |
| Finance, Department of | | | Finansies, Departement van | | |
| <i>Government Notices</i> | | | <i>Goewermenskennisgewings</i> | | |
| R. 1743 Customs and Excise Act (91/1964): Amendment of Schedule No. 1 (No. 1/1/693) | 2 | 16021 | R. 1743 Doeane- en Aksynswet (91/1964): Wysiging van Bylae No. 1 (No. 1/1/693) | 2 | 16021 |
| R. 1744 do.: Amendment of Schedule No. 1 (No. 1/2/80) | 3 | 16021 | R. 1744 do.: Wysiging van Bylae No. 1 (No. 1/2/80) | 3 | 16021 |
| R. 1745 do.: Amendment of Schedule No. 3 (No. 3/270) | 3 | 16021 | R. 1745 do.: Wysiging van Bylae No. 3 (No. 3/270) | 3 | 16021 |
| R. 1752 Customs and Excise Act (91/1964): Amendment of Schedule No. 1 (No. 1/1/694) | 4 | 16021 | R. 1752 Doeane- en Aksynswet (91/1964): Wysiging van Bylae No. 1 (No. 1/1/694) | 4 | 16021 |
| R. 1753 do.: Amendment of Schedule No. 4 (No. 4/163) | 4 | 16021 | R. 1753 do.: Wysiging van Bylae No. 4 (No. 4/163) | 4 | 16021 |
| Health, Department of | | | Gesondheid, Departement van | | |
| <i>Government Notices</i> | | | <i>Goewermenskennisgewings</i> | | |
| R. 1746 Medical, Dental and Supplementary Health Service Professions Act (56/1974): The South African Medical and Dental Council: Regulations defining the scope of the profession of biokinetics. | 5 | 16021 | R. 1746 Wet op Geneeshere, Tandartse en Aanvullende Gesondheidsdiensberoepes (56/1974): Die Suid-Afrikaanse Geneeskundige en Tandheelkundige Raad: Regulasies: Omvang van die beroep biokinetika omskryf..... | 5 | 16021 |
| R. 1765 Hazardous Substances Act (15/1973): Regulations: Aerial application of agricultural remedies: Correction notice | 7 | 16021 | R. 1765 Wet op Gevaarhoudende Stowwe (15/1973): Regulasies: Lugtoediening van landboumiddels: Verbeteringskennisgewing..... | 7 | 16021 |
| R. 1766 Chiropractors Homeopaths and Allied Health Service Professions Act (63/1982): Declaration | 7 | 16021 | R. 1766 Wet op Chiropraktisyne, Homeopate en Verwante Gesondheidsdiensberoepes (63/1982): Verklaring | 7 | 16021 |
| R. 1767 do.: Chiropractors, Homeopaths and Allied Health Service Professions Council: Regulations: Amendment | 8 | 16021 | R. 1767 do.: Raad vir Chiropraktisyne, Homeopate en Verwante Gesondheidsdiensberoepes: Regulasies: Wysiging | 8 | 16021 |
| Independent Broadcasting Authority | | | Handel en Nywerheid, Departement van | | |
| <i>Government Notice</i> | | | <i>Goewermenskennisgewings</i> | | |
| R. 1771 Independent Broadcasting Authority (Temporary Community Broadcasting Licences) Regulations, 1974: Applications | 13 | 16021 | R. 1789 Wet op die Nie-proliferasie van Wapens van Grootsekaalse Vernietiging (87/1993): Verklaring van sekere missieltegnologie en verwante items tot beheerde goedere en beheermaatreëls wat op sodanige goedere van toepassing is | 16 | 16021 |
| | | | R. 1790 do.: Verklaring van sekere herverwante dubbeldoelige toerusting, materiale en verwantetegnologie-items tot beheerde goedere en beheermaatreëls wat op sodanige goedere van toepassing is | 43 | 16021 |
| Labour, Department of | | | | | |
| <i>Government Notices</i> | | | | | |
| R. 1750 Labour Relations Act (28/1956): Furniture Manufacturing Industry, South-Western Districts: Renewal of Main Agreement..... | 8 | 16021 | | | |
| R. 1751 do.: do.: Amendment of Main Agreement | 9 | 16021 | | | |
| R. 1763 Labour Relations Act (28/1956): Leather Industry, Republic of South Africa: Renewal of Agreement for the General Goods Section..... | 10 | 16021 | | | |

| No. | | Page No. | Gazette No. | No. | | Bladsy No. | Koerant No. |
|---------|---|-------------|----------------|---------|---|---------------|----------------|
| R. 1764 | Manpower Training Act (56/1981): Accreditation of the Jewellery and Precious Metal Industry Training Board | 11 | 16021 | | Landbou, Departement van | | |
| R. 1791 | Wage Act (5/1957): Wage Determination 476: Business Equipment Industry, Certain Areas: Correction notice | 12 | 16021 | | Goewermentskennisgewings | | |
| | Posts and Telecommunications, Department of | | | R. 1770 | Bemarkingswet (59/1968): Sybokhaarskema: Verbod op die verkoop van sybokhaar behalwe deur bemiddeling van die Sybokhaarraad of aan geregistreerde persone: Herroeping | 1 | 16021 |
| | Government Notice | | | R. 1773 | Bemarkingswet (59/1968): Oliesadeskema: Heffings en spesiale heffings: Wysiging | 1 | 16021 |
| R. 1742 | Government Notice No. R. 1463 of 26 August 1994: Correction notice | 12 | 16021 | | Onafhanklike Uitsaai-owerheid | | |
| | Trade and Industry, Department of | | | | Goewermentskennisgewing | | |
| | Government Notices | | | R. 1771 | Onafhanklike Uitsaai-owerheid (Tydelike Gemeenskapsuitsaailisensies) Regulasies, 1994: Aansoeke | 13 | 16021 |
| R. 1789 | Non-Proliferation of Weapons of Mass Destruction Act (87/1993): Declaration of certain missile technology and related items as controlled goods and control measures applicable to such goods | 16 | 16021 | | Pos- en Telekommunikasiewese, Departement van | | |
| R. 1790 | do.: Declaration of certain nuclear-related dual-use equipment, materials and related technology items as controlled goods and control measures applicable to such goods | 43 | 16021 | | Goewermentskennisgewing | | |
| | | | | R. 1742 | Goewermentskennisgewing No. R. 1463 van 26 Augustus 1994: Verbeteringskennisgewing | 12 | 16021 |