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DAVID BROWN GEAR INDUSTRIES (PTY) LIMITED

QUALITY CONTROL PROCEDURE NO. BEQ 09.01.001

HANDLING, PRESERVATION, STORAGE & DELIVERY

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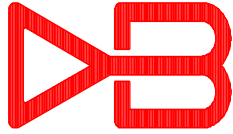
DAVID BROWN GEAR INDUSTRIES (PTY) LIMITED

QUALITY CONTROL PROCEDURE NO. BEP 09.01.001

HANDLING, PRESERVATION, STORAGE & DELIVERY

RECORD OF AMENDMENTS

REVISION NO.	DETAILS	SIGNATURE
0	<i>Original Issue</i>	<i>M. VINNICOMBE</i>



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HANDLING, PRESERVATION, STORAGE & DELIVERY

1.0 PURPOSE

1.1 *The purpose of this procedure is to document the method DBGI uses to manage the Handling, Preservation and delivery of components. This procedure also includes the packaging requirements for components leaving the company.*

2.0 SCOPE

2.1 *This procedure applies to all items/components received and manufactured in the company and the components being delivered by the company.*

3.0 REFERENCES

- 3.1. AFNOR NF B 54.154
- 3.2. AFNOR NF B 54.170
- 3.3. AFNOR NF B 54.172
- 3.4. British Standard BS 6566
- 3.5. APA PS 1.83
- 3.3. ISO 9001:2000 Section 7.5.5 Preservation of Product

4.0 RESPONSIBILITY AND AUTHORITY

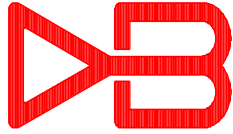
The responsibility and authority are defined in the procedures for the following:

- 4.1. Inspection
- 4.2. Stores
- 4.3. Production managers
- 4.4. Foremen
- 4.5. Purchasing department
- 4.6. Sales department

5.0 PROCESS

5.1 Goods Packaging (addendum one)

Information from the aforementioned reference documents have been used to enable David Brown Gear Industries (Pty) Limited to develop the following details for what the company believe are the standards required for the packaging of goods being sent both nationally and internationally.



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5.2 Painting procedure for steel and cast iron surfaces

5.2.1 General gear boxes (new and repair units)

5.2.1.1 Paint Specifications

The paints used are given below with the corresponding Plascon code numbers.

- a. Red Oxide etch primer SNK 2
- b. David Brown Blue Hammer HF
- c. **or Super Universal Enamel (Product Code NY1/G Range)
(Colour Code to SABS 1091/1975 - Cloud Grey F48)**

5.2.1.2 Application

5.2.1.2.1 Internal and External (by Supplier)

After fettling / fabrication / stripping (repair units), all gear box casings are to be cleaned by shot blasting to a surface finish of Sa 2.1/2 in accordance with 5.8 Surface preparation standards for painted steel surfaces.

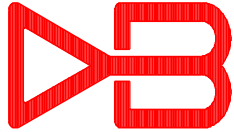
5.2.1.2.2 Internal (by David Brown)

All gearbox casings are washed inside with high pressure hot water detergent, then rinsed with high press cold water and finally painted with Red Oxide internally prior to assembly. Application is to be by brush.

5.2.1.2.3 External (by David Brown)

- a. After assembly and no load running test, the gear box is cleaned using a high pressure hot water detergent wash and then rinsed with a high pressure cold water rinse.
- b. After the gear box has dried, Red Oxide is applied to all non-moving parts. Application is by brush, roller or spray depending upon configuration and size of gear box. A one hour minimum drying time is allowed.
- c. The final coat of paint, as noted in Section 5.5.1.1 b or c, is applied by spray and brush.

5.2.1.2.4 Total paint thickness will be a minimum of 0.05 mm (50 microns) unless otherwise specified by the client.



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5.2.1.2.5 Application

Any ancillary equipment, such as lubrication systems, coupling guards, acoustic hoods, base plates, etc., is painted to the same specification using a Red Oxide primer followed by the paint, as noted in Section 5.2.1.1 b or c.

5.2.2 Radicon gear boxes

5.2.2.1 Paint Specifications

The paints used are given below with the corresponding Plascon code numbers.

- a. Red Oxide etch primer SNK 2
- b. David Brown Blue Hammer HF

5.2.2.2 Application

5.2.2.2.1 Internal and External (by Supplier)

After fettling, all gearbox castings to be painted with red oxide etch primer SNK 2 at the foundry. Application is to be by brush, spray or dipping methods to a minimum thickness of 30 microns.

NOTE : This specification to be adhered to by ALL suppliers of Radicon gear box castings to David Brown Gear Industries (Pty) Limited.

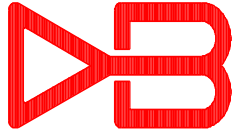
5.2.2.2.2 Internal (by David Brown)

All gearbox castings are painted with red oxide primer prior to assembly. Application is to be by brush.

5.2.2.2.3 External (by David Brown)

- a. After assembly and no load running test, the gearbox is washed with thinners, air dried and painted with red oxide where applicable.
- b. The final coat of Blue Hammer is applied by spray or brush to a minimum thickness of 30 microns.

5.2.2.2.4 Total paint thickness will be a minimum of 0.05 mm (50 microns).



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5.2.2.3 Ancillary Equipment

Any ancillary equipment, such as coupling guards, acoustic hoods, base plates, etc., is painted to the same specification using a red oxide primer followed by David Brown Blue Hammer.

5.2.3 Cast iron and steel gears

5.2.3.1 Paint specification

The paint used is given below with the corresponding Plascon code number.

- a. Red Oxide etch primer SNK 2
- b. David Brown Blue Hammer HF

5.2.3.2 Application

5.2.3.2.1 By supplier

After fettling, all gear castings to be cleaned by shot blasting to a surface finish of Sa 2.1/2 in accordance with 5.8. Surface preparation standards for painted steel surfaces. The cleaned surfaces are then to be painted with Red Oxide etch primer SNK at the foundry. Application is to be by brush, spray or dipping methods to a minimum thickness of 30 microns.

5.2.3.2.2 Ancillary Equipment

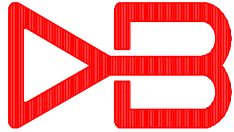
An ancillary equipment, such as guards, drip tanks, etc., are to be painted to the same specification followed by a final coat of Blue Hammer to a minimum dry coat film thickness of 30 microns.

5.2.4 L-Series Gear boxes

5.2.4.1 Paint specifications

The paints used are given below :

- a. Plascon Red Oxide etch primer SNK 2
- b. Plascon Hammer Finish HF 7 gray
- c. Plascon Hammer Finish HF 132788 blue.
- d. Finnigan's Hammerite.



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5.2.4.2 Application

5.2.4.2.1 Internal and external (by Supplier)

After fettling, all castings to be cleaned by shot blasting to a surface finish of Sa 2.1/2 in accordance with 5.8 Surface preparation standards for painted steel surfaces. The cleaned surfaces are then to be painted with red oxide etch primer SNK at the foundry. Application is to be by brush, spray or dipping methods to a minimum thickness of 30 microns.

5.2.4.2.2 External (by David Brown)

After assembly, the case, guards and bedplate are to be painted with Plason HF 7 and the covers are to be painted with Plascon HF 132788. Application to be by brush or spraying to achieve a minimum dry coat film thickness of 30 microns.

5.2.4.2.3 Corrosive Environments (External)

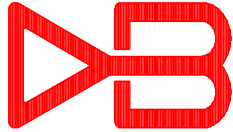
In certain applications, e.g. coastal conditions or where the client specifies that the gear case must be provided with protection from corrosive media, then all external surfaces are to be painted with Finnigan's Hammerite. Application to be by brush or spraying to achieve a minimum dry coat film thickness of 100 microns.

5.3. Standard protection procedure for gear units, loose gears and components for despatch or storage (less than six months)

5.3.1 Deviations from standard protection procedure on units to be lubricated using synthetic oils

The general, mineral oils are not compatible with synthetic lubricants. For this reason the use of mineral oils on the internal surfaces of units, which are to be lubricated with synthetic oils or greases, should be minimized. The following deviations from the standard protection procedures in the following specifications are therefore necessary on such units :

- a. When test running, the appropriate synthetic lubricant must be used unless specific instructions are issued from engineering to the contrary.
- b. After test running, units incorporating dip / splash lubrication will be preserved internally as for a mineral lubricated unit.



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5.3.2 Completed gear boxes (heavy engineering)

Test run in accordance with David Brown Gear Industries (Pty) Limited BEP.08.30.101., David Brown Gear Industries (Pty) Limited grade 6E (Full E.P. oil to be used or the lubricant specified for load test requirements) and drain.

- a. Said operation to be verified by inspection. Route card / Q.C.P. to be signed off accordingly.
- b. Pour the prescribed amount of Vapour Corrosion Inhibitor (VCI) into the box. See Appendix A for amounts of VCI to use and Appendix B for suppliers of VCI.
- c. Coat all unpainted external surfaces with Shell Ensis V. Cover or wrap shaft extensions not fitted with couplings, with Denso Tape. Blank off any flanged openings with steel plates and rubber gaskets. Fill any exposed tapped holes with heavy grease. Fill any labyrinth covers with NLGI 3 grease. Blank off any ventilators with Denso Tape.

5.3.3 Large loose shafts and gears

Coat with Shell Ensis V. Protect oil seal track diameters and other important shaft diameters with Denso tape and where required, wooden laths.

5.3.4 Radicon complete gear boxes and spares

5.3.4.1 Solid foot, helical worm, shaft mounted and larger units

Test run and drain. Protect external unpainted surfaces and bores on shaft mounted units with Shell Ensis V.

5.3.4.2 Loose worm gears and wheel shafts

Dip in Crocell.

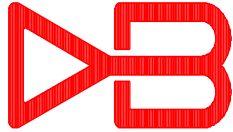
5.3.4.3 Gear cases, covers and housings

Paint un-machined external areas. Protect unpainted areas with Shell Ensis V.

5.3.4.4 Oil seals, bearings, etc.

Wrap in grease proof paper and carton. Protect against movement during transit.

5.4. **Standard protection procedure for gear units, loose gears and components for storage at David Brown Gear Industries (Pty) Limited or facilities under their direct control**

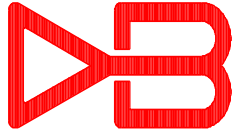


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5.4.1 Main gear unit and barring gear unit

- 5.4.1.1 Test run in accordance with David Brown Gear Industries (Pty) Limited BEP.08.30.101., David Brown Gear Industries (Pty) Limited grade 6E (Full E.P. oil to be used or the lubricant specified for load test requirements) and drain.
- a. Said operation to be verified by inspection. Route card / Q.C.P. to be signed off accordingly.
 - b. Pour the prescribed amount of Vapour Corrosion Inhibitor (VCI) into the box. See Appendix A for amounts of VCI to use and Appendix B for suppliers of VCI.
 - c. Coat all unpainted external surfaces with Shell Ensis V or Valvoline Tectyl 506 EH 506 EH. Cover or wrap shaft extensions not fitted with couplings, with Denso Tape. Blank off any flanged openings with steel plates and rubber gaskets. Fill any exposed tapped holes with heavy grease. Fill any labyrinth covers with NLGI 3 grease. Blank off any ventilators with Denso Tape.
 - d. Cover or wrap shaft extensions, not fitted with couplings, with Denso tape. Blank off all flanged openings with steel plate and rubber gasket. Fill all exposed tapped holes with NLGI 3 grease. Fill all labyrinth covers with NLGI 3 grease.
- 5.4.1.2 Stores units at site in a suitable dry vibration free building on wooden sleepers or suitable pallet.
- 5.4.1.3 Rotate shafts at intervals of 30 days maximum and record this having been done into the logbook.
- 5.4.1.4 At intervals not exceeding six (6) months, remove the inspection covers and inspect the internal surfaces for evidence of corrosion. Refit the inspection covers. Record the inspection in a logbook.
- 5.4.1.5 At intervals of one year, remove the top inspection cover and replenish the VCI with the amount shown in Appendix A. Replace the inspection cover. Record the amount of VCI added in a logbook.
- 5.4.1.6 Ensure that no dust, moisture and water penetrates the units.
- 5.4.1.7 Where practical cover units with polythene sheets.

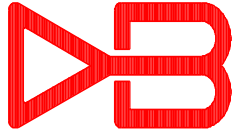


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5.4.2 Mill pinion shaft assembly (see addendum Two)

- 5.4.2.1 Coat all external unpainted surfaces with Valvoline Tectyl 506 EH. Spray internals of pedestal bearings with Valvoline Tectyl 502 C. Fill all exposed tapped holes with NLGI 3 grease. Smear all “O” rings with a NLGI 3 grease. Cover gear teeth with wooden laths and steel bands.
- 5.4.2.2 Where the assembly is required to be stored for a period in excess of 6 months coat all machine surfaces with Shell Bitumen compound.
- 5.4.2.3 Store pinion shaft assemblies at site in a suitable dry vibration free building on wooden sleepers or suitable pallet.
- 5.4.2.4 Rotate the shafts 1 half revolution at intervals of 30 days maximum and record this having been done into the logbook, if it is unlikely that the units will be rotated in the normal course of events after construction.
- 5.4.2.5 Ensure that no dust, moisture and water penetrates the units.
- 5.4.2.6 Where practical cover units with polythene sheets.
- 5.4.2.7 If a half coupling is fitted then a ‘V’ block is to be placed under the body of the coupling. This is mandatory if the assembly is to be exported.
- 5.4.2.8 Prior to installation, which is recommended that the pinion bearing caps be removed and a visual inspection of the bearings be performed. Any evidence of rusting or bearing damage should be reported to DBGI.
- 5.4.2.9 In the case of a Mill Pinion Shaft (without bearings) being stored for a period of greater than 6 months the following long-term storage process will apply.
 - 5.4.2.9.1 Paragraph 5.7.2.2 applies.
 - 5.4.2.9.2 Mill Pinion Shaft to be stored in a wooden crate as per addendum 2.
 - 5.4.2.9.3 Store crated Mill Pinion Shaft in a suitable building or under cover.
 - 5.4.2.9.4 Where storage indoors is not possible cover the crate of the Pinion Shaft with polythene sheets and / or tarpaulins. This covering should be visually inspected on a monthly basis to ensure no damage has occurred and the pinion shaft remains protected.
 - 5.4.2.9.5 Paragraph 5.7.2.5 applies.
 - 5.4.2.9.6 At intervals of 12 months the wooden crate should be opened the pinion shaft removed and cleaned of all shell bitumen compound and the pinion shaft inspected for signs of rust. After the inspection is



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completed the pinion shaft shall be recoated with shell bitumen compound. All tapped holes shall be re-smearred with NLGI 3 grease and the pinion shaft re-crated.

5.4.2.9.7 A logbook of all inspections shall be kept during the entire storage period.

5.4.3 Girth gear

5.4.3.1 Spray all unpainted surfaces with Valvoline Tectyl 506 EH. For components requiring storage for periods greater than 6 months, coat all unpainted surfaces with Shell Bitumen Compound. Cover each segment with wood to protect gear teeth, flange and joint faces from damage. Cover the wood with plastic.

5.4.3.2 DBGI strongly recommend that the equipment is stored indoors or under cover.

5.4.3.3 Where storage indoors is not possible each gear segment should be covered with polythene sheets and / or tarpaulins. This covering should be visually inspected on a monthly basis to ensure no damage has occurred and the gear remains protected.

5.4.3.4 Coat all loose bolts, nuts and washers with Valvoline Tectyl 506 EH, or smear with NLGI 3 grease and pack in suitable container. The container must be appropriately marked for the gear halves in question.

5.4.3.5 Smear NLGI 3 grease into all mounting holes, all drilled holes and all tapped holes that are in each half of the girth gear.

5.4.3.6 For long-term storage on site the gear segments should be stored in the following manner.

5.4.3.6.1 Paragraph 5.7.3.1 applies.

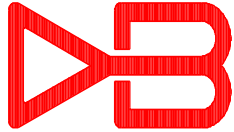
5.4.3.6.2 Paragraph 5.7.3.2 applies.

5.4.3.6.3 Paragraph 5.7.3.3 applies.

5.4.3.6.4 Paragraph 5.7.3.5 applies.

5.4.3.6.5 Store segments on a concrete floor that is about 150mm thick. Support the segment rim with trestles and ensure that the segment is flat after the supports have been installed. Store gear in the horizontal position and do not store on top of each other.

5.4.3.6.6 DBGI do not recommend storage in the vertical position. Coat all unpainted surfaces with shell bitumen compound on regular intervals of 12 months.



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5.4.3.6.7 The gear must be inspected on a monthly basis for the ingress of rust and a logbook of these inspections per month must be kept during the entire storage period.

5.4.4 Lubrication system

5.4.4.1 Drain all oil from the lubrication system. Spray internals with Shell Ensis U and all unpainted external surfaces with Shell Ensis V. Blank off all flanged openings with suitable steel plats and rubber gaskets. Fill all exposed tapped holes with NLGI 3 grease.

5.4.4.2 Store lubrication units at site in a suitable building on wooden sleepers or suitable palette.

5.4.4.3 Ensure that no dust, moisture and water penetrates the units.

5.4.4.4 Where practical cover units with polythene sheets.

5.4.4.5 Take care to lift units only by the lifting lugs provided. Do NOT lift the units by using the lubrication pipes. This will cause excessive damage to the instruments and bend the supply pipes.

5.4.5 Couplings

5.4.5.1 Coat all unpainted surfaces with Shell Ensis V. Smear any rubber components (e.g. cone rings or “O” rings of Falk couplings) with silicon grease.

5.4.5.2 Pack into suitable containers appropriately marked.

5.4.6 Oil seals and bearings

5.4.6.1 Wrap large bearings in Denso Tape or small bearings and oil seals in greaseproof paper.

5.4.6.2 Pack in suitable containers and protect against movement.

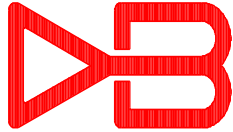
5.4.7 Coupling guards

5.4.7.1 Coupling guards shall be painted on all surfaces.

5.4.7.2 No other treatment is required.

5.4.8 Units and components stored outside

5.4.8.1 If units and components are stored outside for any specific reason, they must be properly protected against dust, moisture, rain and the sun.



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5.4.8.2 All units must be placed on wooden sleepers or suitable palettes and covered with polythene sheets and / or tarpaulins properly secured. It is recommended that a weekly inspection be carried out to ensure that units are still in a good condition and protective covering in place. All other protective procedures prescribed above must still be carried out.

5.5. Surface preparation standards for painted steel surfaces

5.5.1 Preparation grades by means of scraping and wire-brushing

5.5.1.1 Prior to treatment, the steel surface will have been cleaned of dirt and grease and (if applicable) any heavy layers of rust will have been removed by chipping.

5.5.1.2 St 2

Thorough scraping and wire-brushing-machine-brushing-grinding, etc. The treatment shall remove loose mill scale, rust and foreign matter. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It should then have a faint metallic sheen.

5.5.1.3 St 3

Very thorough scraping and wire-brushing-machine-brushing-grinding, etc. Surface preparation as for St 2, but much more thoroughly. After removal of dust, the surface shall have a pronounced metallic sheen.

5.5.2 Preparation grades by means of blast cleaning

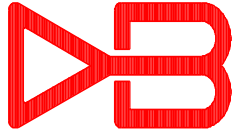
5.5.2.1 As in 2.1, it is to be assumed that prior to treatment the steel surface has been cleaned of dirt and grease and that the heavier layers of rust (if applicable) have been removed.

5.5.2.2 Sa 1

Light blast cleaning, loose mill scale, rust and foreign matter shall be removed. Finally, the surface is cleaned with a vacuum cleaner, etc.

5.5.2.3 Sa 2

Thorough blast cleaning. Almost all mill scale, rust and foreign matter shall be removed. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. The surface finish shall then be grayish in colour.



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5.5.2.4 Sa 2½

Very thorough blast cleaning. Mill scale, rust and foreign matter shall be removed to the extent that the only traces remaining are slight stains in the form of spots or stripes. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. The surface finish shall then have a slight metallic colour.

5.5.2.5 Sa 3

Blast cleaning to pure metal. Mill scale, rust and foreign matter shall be removed completely. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. The surface finish shall then have a uniform metallic colour.

5.5.2.6 Certificate of Conformity to be supplied for preparation grades “Sa 1” to “Sa 3”.

5.5.2.7 Inclusive to all preparation grades, shall be a requirement to apply the corresponding primer within four hours of preparation completion.

5.6. Standard protection procedure for assembled gear units in long-term storage or installed awaiting commissioning

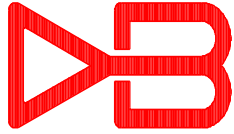
5.6.1 Procedure prior to despatch (to be done at David Brown Gear Industries)

5.6.1.1 Test run using the correct grade of mineral oil. Drain the oil and remove the top cover. Spray all internal surfaces with Shell Ensis U. Replace the top cover. Coat all external unpainted surfaces with Shell Ensis V. Cover or wrap shaft extensions, not fitted with couplings with Denso Tape. Blank off all flanged openings with steel plates and rubber gaskets. Fill all exposed tapped holes with NLGI 3 grease. Fill all labyrinth covers with NGLI 3 grease (where applicable).

5.6.1.2 Supplementary, if specifically requested by the client, wrap gear unit in polythene sheeting and pack securely in a wooden crate to protect against damage in transit.

5.6.2 Procedure for long-term storage on site

5.6.2.1 Off-load gear unit on site and store on wooden pallets or sleepers, preferably in a dry building or shed. Alternatively, if the unit is to be stored outdoors, cover with a heavy-duty tarpaulin to ensure that no dust, moisture or water penetrates the units.



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5.6.2.2 At intervals not exceeding 30 days, uncover the gear unit (and unpack if crated). Then rotate the input shaft to ensure that the output shaft completes at least one full revolution.

5.6.2.3 At intervals not exceeding six months, the inspection covers should also be removed and the internal surfaces examined for evidence of corrosion. After inspection the internals should be re-protected as 5.8.1.1. above. All covers, etc. should be replaced and the unit

protected as originally supplied. A record of these events to be kept in a log book.

5.6.3 Procedure for installation awaiting commissioning

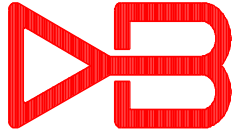
5.6.3.1 Install gear unit in accordance with manufacturer's instructions. Fill gear case to correct oil level with specified grade of mineral oil. Note, it is not necessary to clean the internal surface since the Shell Ensis is compatible with the specified lubricant.

5.6.3.2 Should the period between installation and commissioning be delayed for whatever reason, then the inputs haft must be rotated every 30 days to ensure that the output shaft complete at least one full revolution. The inspection covers should also be removed and the internal surfaces examined for corrosion which, if present must be remedied with the assistance of David Brown Gear Industries (Pty) Limited Engineering Services Department. All inspection covers would be replaced and a record of all inspections should be kept in a log book.

5.6.3.3 The gear unit should be protected from dust, moisture or water ingress by means of a tarpaulin whilst waiting commissioning.

6 APPLICABLE DOCUMENTS

6.1. None



ADDENDUM ONE

GOODS PACKAGING

GENERAL INFORMATION

1.1. Principles of physico-chemical protection

Physico-chemical protection isolates from the action of agents causing deterioration, such as:

- water
- water vapour
- salt air
- heat and cold
- sunlight
- electrolytic effects

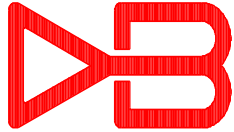
1.2. Sensitivity of equipment to corrosion

Equipment is vulnerable to chemical deterioration. This deterioration takes the form of smudging or of oxidation that may make the equipment unusable or alter its properties. It depends on the nature of the component metals in the equipment or of the coatings applied to protect it.

Classification of metals in order of decreasing need of protection against corrosion (as per specification US MIL P 116)

- a. Steel, iron and all alloys except stainless steel, bare and critical
- b. Brass, bronze
- c. Stainless steel

This list should not be regarded as an exhaustive classification intended to compare the corrosion characteristics of metals and alloys. It is therefore important that the customer or the builder of the equipment inform the packing contractor of the composition of the equipment and the risks incurred.



ADDENDUM ONE

GOODS PACKAGING

1.3. Climatic environment of the equipment

Packaged equipment may be exposed for highly variable lengths of time to the climatic conditions of its place of storage or mode of transport.

Places of storage is either **maritime and other conditions** (approximately 5% of David Brown Gear Industries (Pty) Limited's products) or **tropical conditions** (approximately 95% of David Brown Gear Industries (Pty) Limited's products)

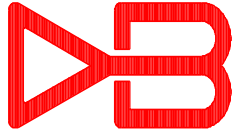
The duration for which the protection may have to be effective may be for either **24 months or more, under the particular contract worked out**. Packaging classes will therefore be chosen according to these two parameters.

TYPES OF PROTECTION

2.1. Contact protection

Before any contact protection is applied, it is essential for the equipment to be cleaned, i.e. made free of pollution in the form of oil, dust, moisture, oxides, fingerprints, etc. Contact protection will then be provided, as appropriate, by one of the following products;

- P1** Corrosion-proofing substance leaving a flexible bituminous film after the evaporation of a solvent. To be used only on parts that need not be taken from stock for use.
- P2** Corrosion-proofing substance leaving a flexible bituminous film after the evaporation of a solvent. To be used only on parts that need not be taken from stock for use.
- P19** Corrosion-proofing substance leaving an adherent waxy film after the evaporation of a solvent. Used on exposed machined parts. Must be removed by a petroleum solvent before the equipment is used.



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ADDENDUM ONE

GOODS PACKAGING

P20 Corrosion-proofing oil having rust-inhibiting properties in the vapour phase. Used inside closed systems (gear gases, engines, tanks, etc.) compatible with lubricating oils.

This list is not exhaustive, other products may be used where appropriate.

2.2. Use of desiccants (Silicon bags)

The bags of desiccant will be immobilized inside the packaging and care shall be taken that they are not in direct contact with the equipment. To improve the effectiveness of the desiccant, the bags will be distributed as uniformly as possible inside the vapour-tight envelope.

2.3. Quantity of desiccant

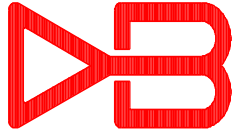
Experience shows that there are practically no harmful effects of moisture below 40% R.H. at 15°C, or 5 g of water per m³ of air. To maintain this value, bags of desiccant are placed inside the vapour-tight envelopes. For storage for very long periods, periodic inspections are mandatory, and the desiccant can be replaced in the course of these inspections.

The number of units of desiccant is calculated using the following formula :

$$nU = 0.7 p STF + XK$$

Where :

- nU** = is the number of French units of desiccant to use
0,7 = is a coefficient applying to the permeability of the barrier materials, reflecting the ratio between actual and laboratory conditions of use.
P = is the permeability of the material g/m²/24 hours, measured at 38°C and 95% relative humidity.
S = is the area of the barrier in m²; the area to be used is the inside surface of the first envelope regarded as tight to water vapour starting from the equipment.
T = is the period of storage in years.



ADDENDUM ONE

GOODS PACKAGING

F	=	is the climatic factor, taken from the appended figure 3; the factor to use is the highest encountered in the various regions through which the packaged equipment is to pass on its way to its ultimate destination.
K	=	is the mass of hygroscopic insert materials, in kilograms
X	=	a coefficient that depends on the type of material
	2	for dry wood (-20%)
	1	for hair felt, cellulose-based materials, cardboard and other materials not categorized below
	0.75	for agglomerated fibres (horsehair, synthetic or vegetable fibres, agglomerated with rubber)
	0.25	for glass fibres
	0.06	for synthetic foam and rubber
	1.CP	from 10 to 60% humidity

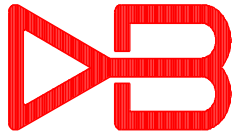
2.4. Mechanical protection

The purpose of mechanical protection is to isolate the equipment from such environmental factors as :

- the bending, torsional, and shear stresses caused by stacking, handling, and transport
- the impacts caused by falls during handling
- vibrations caused by transport.

The choice of method of mechanical protection must be guided by the following three parameters :

- i. Vulnerability of the equipment to mechanical stresses
- ii. Mechanical environment of the equipment during handling, transport, and storage.
- iii. Unbalance (center of gravity not at center of packaging)



ADDENDUM ONE

GOODS PACKAGING

2.4.1. Vulnerability of equipment to mechanical stresses

This vulnerability may be of various kinds :

- Structural (for compression, bending, torsional, or shear forces)
- Surface (sensitivity to abrasion of exterior coatings)
- To impacts and vibrations (resistance to the dynamic stresses caused by falls of the packaging and by vibrations during transport.)

2.4.2. Mechanical environment

This depends on the storage, handling and transport equipment used :

- During storage, packaging is subjected to vertical stresses during stacking. The packaging is made so as to resist forces applied to the side panels.
- During handling operations, the packaging may fall. The maximum admissible height of fall is inversely proportional to the weight of the parcel.
- During transport operations, packaging is subjected to vibrations and impacts.

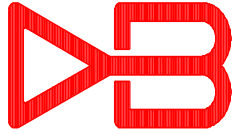
2.4.3. Implementation of mechanical protection

Mechanical protection will therefore be of several orders :

- Protection by inserts and immobilization
- Protection against abrasion
- Protection against impacts and vibrations

2.4.4. Protection by inserts and immobilization

This integrates the equipment with its container. Immobilization may be effected by bolting, hoping, inserts, stuffings, etc.



ADDENDUM ONE

GOODS PACKAGING

2.4.5. Protection from impacts and vibrations

- a) Protection against impacts isolates the equipment from its container by suspension systems.
- b) Protection against vibrations isolates the equipment from its container by damping systems.

2.4.6. Inserts for internal immobilization

To ensure the coherence of the whole, all moving or cantilevered parts inside an item of equipment must be immobilized or supported by means provided by the manufacturer.

TYPE OF PACKAGING

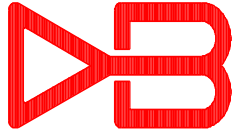
3.1. Saddles and bases

a. Equipment concerned

- Oversized equipment that, because free of mechanical and physico-chemical vulnerability, need not be packaged in crates.
- Any other equipment that is heavy and / or bulky and not very vulnerable.

b. Mechanical protection

This will be provided by saddles made of wood, metal, or possibly some combination of both, attached to the equipment (in particular by metallic belts)



ADDENDUM ONE GOODS PACKAGING

3.2. Palletization

Mechanical protection is provided by the platform on the bottom surface, the other surfaces are protected by shrink or stretch films or by binding with plastic or metallic straps.

a. **Equipment concerned**

Equipment of which the mechanical vulnerability is not such as to require packaging in a crate or case and of which the structure allows grouping, pallets will be preferred for the grouping of small items not vulnerable to crushing (roughs, raw materials).

b. **Physico-Chemical protection**

All parts vulnerable to corrosion must be protected by the manufacturer, who will in particular take responsibility for draining, rinsing, drying and protection.

3.3. Packaging in crates

a. **Equipment concerned**

Fabricated equipment of which the shape or fragility rules out saddles or bundles and mechanical and electrical assemblies.

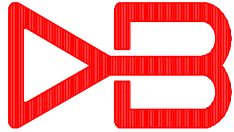
b. **Physico-chemical protection**

All parts vulnerable to corrosion must be protected by the manufacturer, who will in particular take responsibility for draining, rinsing, drying and protecting.

c. **Mechanical protection**

For the categories designated above, the equipment will be immobilized by inserts appropriate to the nature of the equipment, fixed to the crate :

- By the placement of a saddle or frame on the platform of the crate
- Or by bearing against surfaces that cannot be bent out of shape



ADDENDUM ONE

GOODS PACKAGING

3.4. Packaging in packing cases

a. **Equipment concerned**

Any assembly needing mechanical and possibly chemical protection, the levels of protection applied will allow for the specific sensitivity of the equipment. Electric motors, motor-reducers sets and any metallic or structural part having sensitive machined surfaces.

b. **Physico-chemical protection**

All parts vulnerable to corrosion must be protected by the manufacturer, who will in particular take responsibility for draining, rinsing, drying and protecting.

c. **Mechanical protection**

For all subcategories, the equipment will be immobilized inside an outer case, either by inserts in the case or by grouping internal crates or cases. Protruding parts of the equipment will be covered to eliminate any risk of damage to the vapour-tight envelope. All accessible parts at risk of corrosion must be given surface protection (grease, rust-proofing paint, anti-corrosion film, self-adhesive fabric, etc.) provided by the manufacturer or completed, on request, by the packer. Inaccessible and internal parts must be protected by the manufacturer (draining, rinsing, etc.)

3.5. Packaging to protect against impacts and vibrations

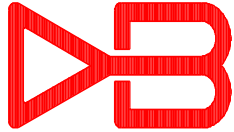
a. **Equipment concerned**

Assembly of which the mechanical fragility requires special protection by damping.

b. **Physico-chemical protection**

The protection indices :

- contact protection
- water vapour tightness



ADDENDUM ONE

GOODS PACKAGING

c. **Mechanical protection**

The equipment will be secured and damped inside the crate or case, the nature of which will vary according to the subcategory chosen. The damping devices must be chosen according to the geometrical characteristics of the equipment (shape, weight, fragility) and the technical data communicated by the manufacturer. The immobilization and damping systems may consist of elastic materials, slabs, blocks, wedges, brackets, mattresses, air cushions, or mechanical devices acting in contact with the part, a support, or an internal case.

Direct damping, or damping on dunnage board, of equipment inside a crate. The external packing case is made of unplanned wood with closed joints or of plywood.

NOTE : This type of case may include some “solid” panels or reinforcing devices to allow for handling.

3.6. Containerization

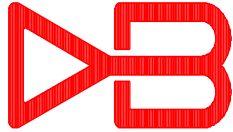
This notion of containerization is not a method of industrial packaging as specified in the above-mentioned categories, but an additional means of handling, transport and / or grouping.

a. **Mechanical stresses**

The pre-packaging cases used inside the containers are not designed to be stacked.

b. **Immobilization requirements**

Since the packer is responsible for securing inside the container, he must take every precaution to ensure that the cases of equipment are perfectly immobilized and proper securing is ensured. He must take account of the maximum allowable loads and their distribution and correctly position the center of gravity.



ADDENDUM ONE

GOODS PACKAGING

3.7. Use of Cardboard

This consists essentially of two-layer or three-layer cardboard. Several grades may be used, depending on the volumes and net weights of the equipment to be packaged. These grades are measured in “kg” and “tests”, which are indices of dynamic perforation and vertical compression. Some cardboards are “moisture resistant”.

CONSTITUTION OF TRANSPORT CASES

4.1. Grades of packaging wood

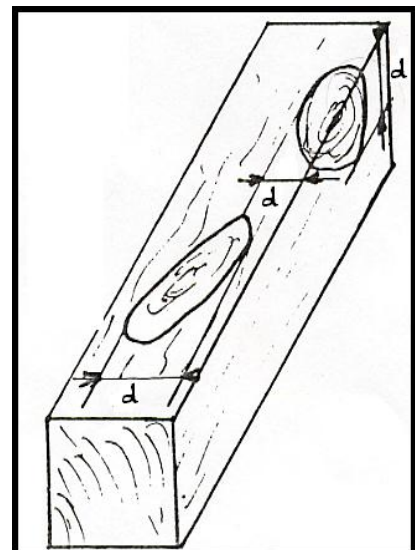
The grade of wood used for industrial packaging is based on the specification of the converted timber regularly available from European / South Africa softwood sawmills. The following will be used :

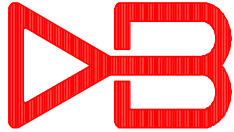
- Grade 2 : Frame or structure - for load-bearing elements
- Grade 3 : Case, shuttering - for non-load-bearing elements

4.2. Structural elements less than 6m long (load-bearing)

4.2.1. Measurement of knots

Given the mechanical strength required, knots are measured perpendicular to the centerline.





ADDENDUM ONE

GOODS PACKAGING

4.2.2. Sound, tight knots

Their diameters must not exceed :

- ⊕ On sides :
 - ½ of width of sides for width < 90 mm
 - 45 mm up to a width of 150 mm
 - 1/3 of width of sides for width > 150 mm

There is no limit on their number

- ⊕ On edges :
 - ½ of width of edge (thickness of part)

4.2.3. Black, loose knots

- ⊕ Unacceptable in parts < 27 mm thick
- ⊕ Tolerated under the same conditions as sound, tight knots

4.2.4. Split ends

- ⊕ Not allowed if > twice the width of the part or 8% of its length (above 2m)

4.2.5. Pockets of resin

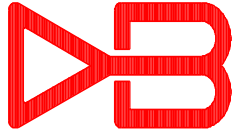
- ⊕ Not allowed if > 80 mm.

4.2.6. Inbark

- ⊕ Allowed provided the mechanical strength of the part is not impaired.

4.2.7. Wane

- ⊕ Allowed on parts more than 4m long



ADDENDUM ONE

GOODS PACKAGING

4.2.8. Deterioration of wood

- ⊕ Allowed : bluish colouring, non-activated pitting on one side
- ⊕ Not allowed : hard rot, rot, burls, activated, black pitting

4.3. Dimensions of wood

4.3.1. Thickness of wood

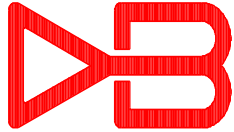
The thicknesses of the boards and battens used will depend on the dimensions of the case, the weight and type of equipment, and the inserts.

With allowance for these parameters, the thicknesses will be as follows :

NET WEIGHT	THICKNESS OF BOARDS BEFORE PLANNING	THICKNESS OF BATTENS BEFORE PLANNING
Up to 500 kg	18 mm to 22 mm	18 mm to 22 mm
500 kg to 2 tons	18 mm to 22 mm	22 mm to 25 mm
2 tons to 5 tons	22 mm to 25 mm	25 mm to 32 mm
5 tons to 10 tons	25 mm	25-32 mm or 38 mm
10 tons to 15 tons	25 mm or 32 mm	32 mm or 38 mm
15 tons and over	32 mm or 38 mm	38 mm

CONSTRUCTION OF CASES

Among the types of packaging, several types of case, each having its own design features, are distinguished. For each type, it is possible to distinguish various ways of production, which will depend on the characteristics of the equipment to be packaged and how it is handled, transported and stored.



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ADDENDUM ONE

GOODS PACKAGING

5.1. Platform or bell case

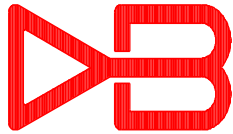
Making it possible to position, protect and immobilize the equipment on the platform before the panels are assembled.

5.2. Assembled cases

The panels are assembled before the packaging operation.

Barring special waivers, all platforms or case bottoms will have sills to facilitate handling. Slings structures will take account of the gross mass and will be positioned according to the center of gravity.

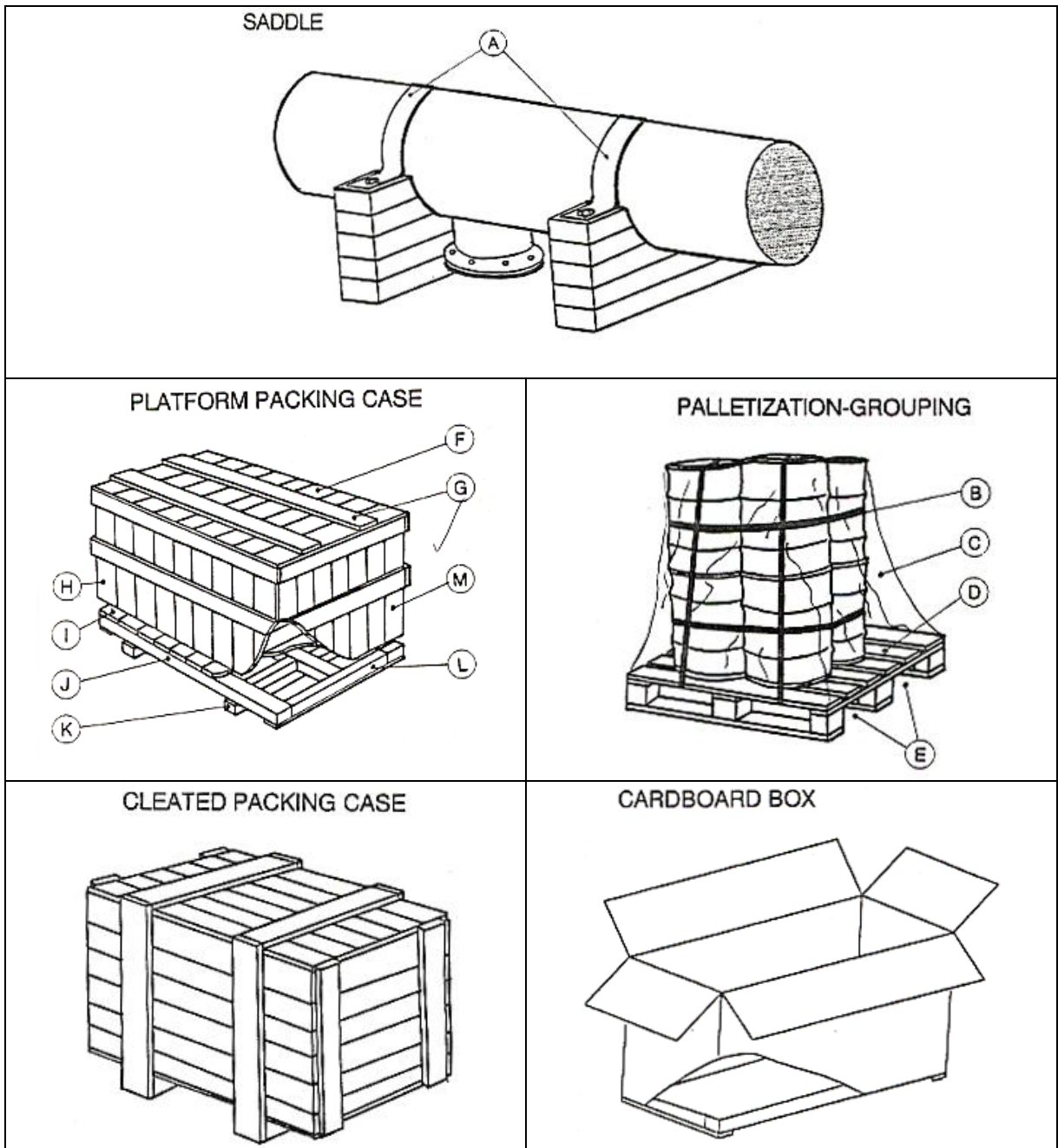
- All cases exceeding 5 tons gross mass will have angle irons at their slinging points.
- To avoid the wrenching of side panels during handling by forklift truck, when the said panels are fitted, their bottoms should be raised 5 to 10 mm above the bottom of the platform.

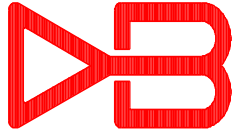


ADDENDUM ONE

GOODS PACKAGING








DIAGRAMS OF PACKAGING

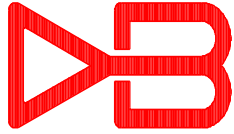




ADDENDUM ONE
GOODS PACKAGING







GRAPHIC SYMBOLS

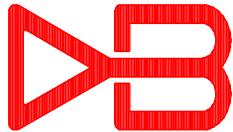
KEY	SYMBOL	FUNCTION
Keep away from moisture	 iso 7000/n° 0626	Indicates that the transport packaging must be kept in a dry environment
Center of gravity	 iso 7000/n° 0627	Indicates the center of gravity of the transport packaging
Do not roll	 iso 7000/n°0628	Indicates that the transport packaging must not be rolled
No trolley this side	 iso 7000/n° 0629	Identifies locations on transport packaging where trolleys or trucks must not be placed
Storage limits	 iso 7000/n° 0630	Indicates limited storage capability of transport packaging
Clamp sides	 iso 7000/n° 0631	Shows where clamps should be placed for handling of transport packaging
Temperature limits	 iso 7000/n° 0632	Indicates temperature limits between which transport packaging must be kept



ADDENDUM ONE
GOODS PACKAGING

GRAPHIC SYMBOLS

KEY	SYMBOL	FUNCTION
Fragile Handle with care	 iso 7000/n° 0621	Indicates : a. That the content of the transport packaging is fragile b. That it must be handle with care
Use no hoods	 iso 7000/n° 0622	Indicates that hooks may not be used to lift the transport packaging
Top	 iso 7000/n°0623	Indicates correct upright position of transport packaging
Keep away from heat	 iso 7000/n° 0624	Indicates that the transport packaging must be kept away from heat
Keep away from heat and radioactivity	 iso 7000/n° 0615	Indicates that the content of the packaging may be damaged or rendered completely unusable by heat or penetrating radiation
Sling here	 iso 7000/n° 0625	Shows where slings should be attached to lift the transport packaging



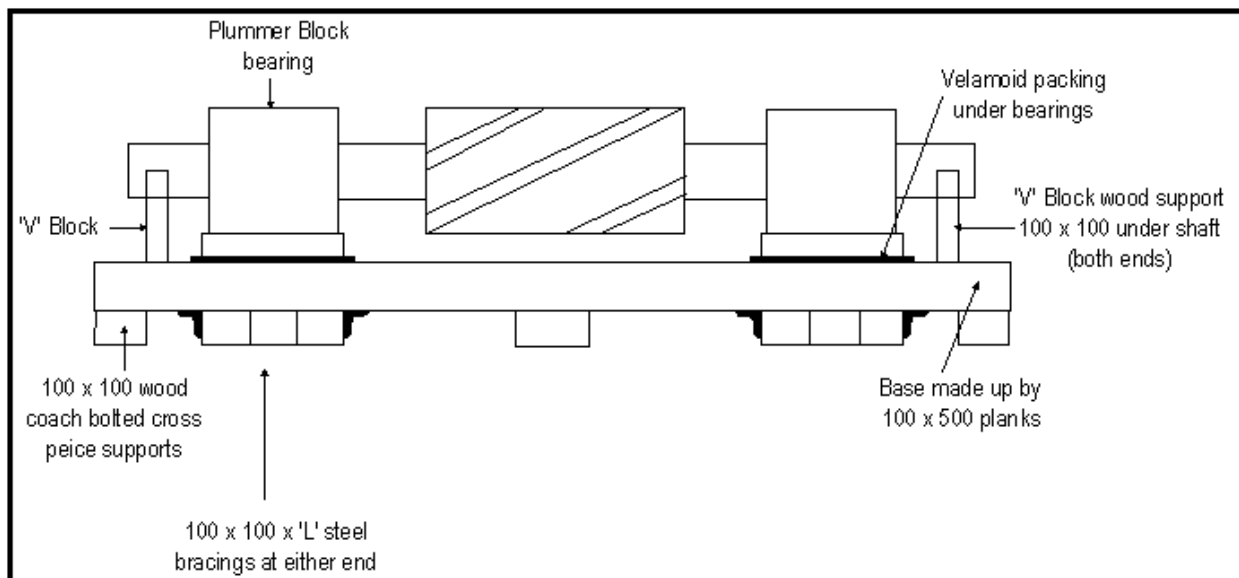
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ADDENDUM TWO

MILL PINION CRATING

PACKAGING FOR LOCAL MARKETS

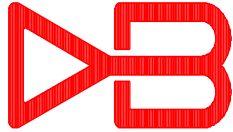
All surfaces to be protected as per Section 5.7.3.



PACKAGING FOR INTERNATIONAL MARKETS

As per above with the additional of surrounding by crating or box, which has a cross, braced reinforced lid and sides made of 100 x 100 wood.

NOTE : Where otherwise not stated then addendum one applies.



APPENDIX A
AMOUNTS OF VCI CONCENTRATE TO ADD TO VARIOUS UNITS

Table A1 and Table A2 below lists the amount of VCI concentrate to add to standard TPT units. For units not listed, calculate the amount as follows :

$$\text{Amount required (liter)} = 2 \times \text{internal case volume in m}^3$$

(external case dimensions are sufficiently accurate for this purpose)

Then round this figure up to the closest of the following amounts :

- 0.1 liter (100 ml)
- 0.2 liter (200 ml)
- 0.5 liter (500 ml)
- 1 liter
- 2 liter
- 5 liter

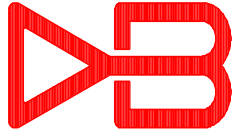
and thereafter in multiples of 5 liters.

TABLE A1 – QUANTITIES OF VCI IN LITERS FOR L SERIES UNITS

SIZE	SPS	DPS	TPS	DRA	TRA
40	0.5	0.5	0.5	0.5	0.5
45	0.5	0.5	0.5	0.5	0.5
50	0.5	1	1	1	1
56	1	1	1	1	1
63	1	2	2	2	1
69	2	2	2	2	2
76	2	2	5	2	2
83	2	5	5	2	5
91	2	5	5	2	5
100	2	5	5	2	5

TABLE A2 – QUANTITIES OF VCI IN LITERS FOR RADICON UNITS

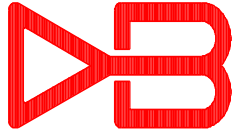
DU, CU OR RHU SIZE	LITERS OF VCI
400	0.1
600	0.1
800	0.1
10"	0.2
12"	0.5
14"	1
17"	1
24"	2



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APPENDIX B
SUPPLIERS OF VCI CONCENTRATE

COMPANY	PentaKem	Vaportec
ADDRESS	PO Box 1677 Vanderbijlpark 1900	PO Box 8573 Edenglen 1613
TELEPHONE NUMBER	(016) 987-1640	(011) 606-4000
PRODUCT	Corrogard VCI concentrate	V8545 Solvent based VCI



Documents

Booking out slip

Internal Sales Order

Customer Requirements

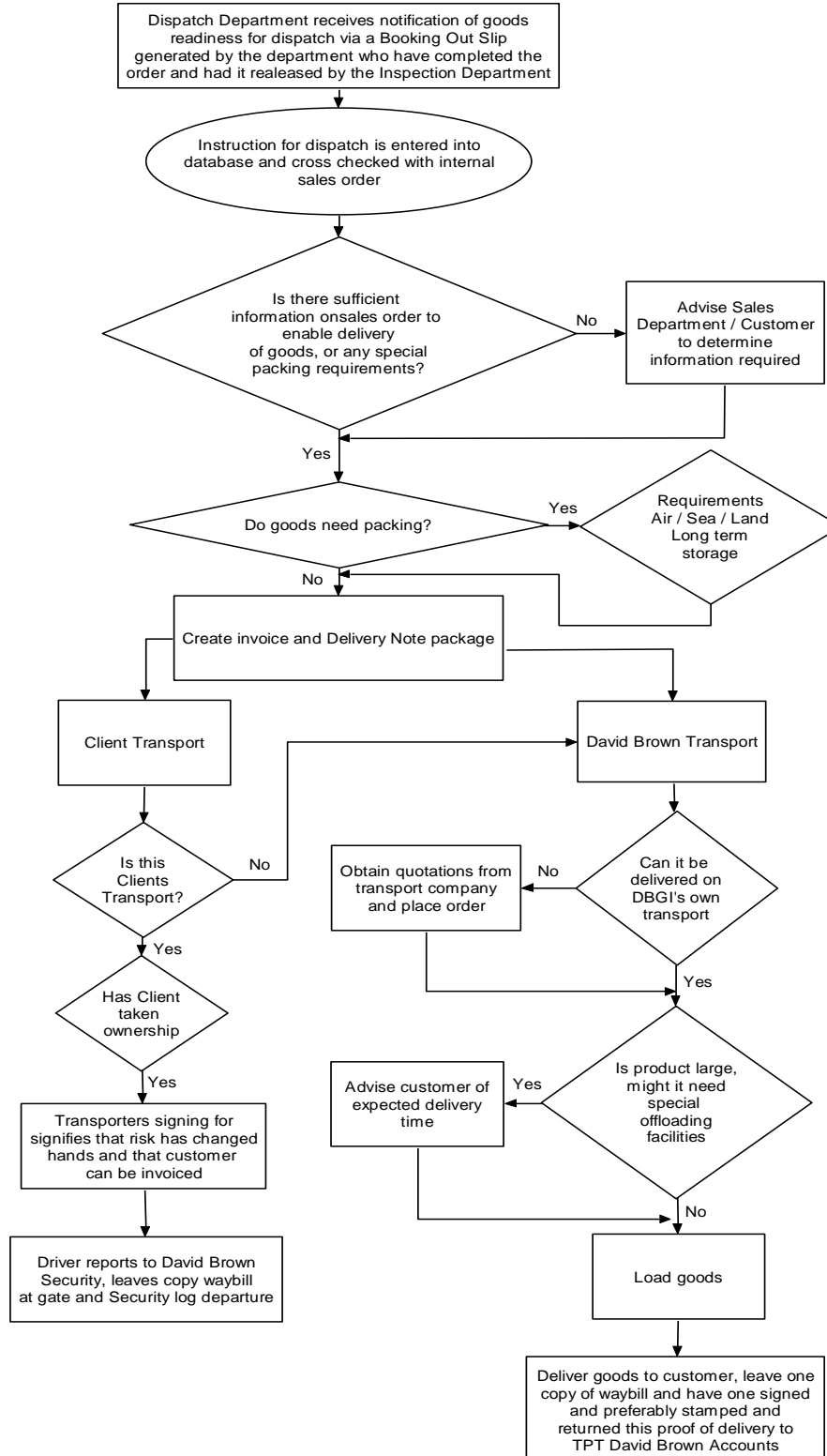
Invoice Delivery Note

Transport Company quote

Signed Delivery Note

Waybill

STORES : Handling, Preservation, Storage and delivery



Responsibility

Inspectors

Stores Controller

Sales

Stores Assistant

Transport Supervisor

Transport Supervisor

Transport Supervisor