A POCKET GUIDE TO AUSTRALIAN RENDERED ANIMAL PRODUCTS

Published by the
Australian Renderers Association Inc.

All members of the ARA are listed for your convenience on our website
www.ausrenderers.com.au

Association Contact Details
Executive Officer
Australian Renderers Association Inc.
PO Box 963
WARWICK, QLD 4370
AUSTRALIA

Phone: +61 7 4661 9911
Fax: +61 7 4667 0199
Email admin@ausrenderers.com.au

2017 Edition

Contents

AUSTRALIAN RENDERERS ASSOCIATION

The Australian Renderers Association (ARA) is the national body within Australia which represents the interests of producers and traders of rendered animal products at the State and Federal Government levels and any forum where there is a need for the industry to be represented. Whilst it does not become involved in commercial issues it nevertheless facilitates trade in rendered products domestically and internationally.

The ARA started as the Australian Meat & Bone Meal Shippers and Producers Association as the result of an initiative of Mr Brian Bartlett (first National President) in early 1976. Of particular concern to new members at the time were issues such as shipping freight rates and Federal Government restrictive controls on the export of meat and bone meal. Efforts to remove these controls, through persistence, eventually proved to be successful.

The name of the Association was changed in 1989 to its existing title - a name then more descriptive of the Association and its role. This coincided with the emergence of the BSE problem in the United Kingdom and strong proactive decisions were taken by the ARA to introduce Accreditation Workshops for the Hygienic Production of Rendered Products to train plant personnel and also the development

of a Code of Practice for Hygienic Rendering of Animal Products. To increase education in the industry, the first International Symposium was held in August 1991 and symposia have been held bi-annually since. As a flow on from the establishment of the Code of Practice, the ARA today accredits rendering establishments as complying with the Code.

The ARA conducts information workshops in Asia to assist animal feed manufacturers better understand the advantages of using safe Australian rendered products.

Australia has been awarded by the OIE their lowest possible risk category for the chance of BSE occurring in our national herd.

Australia leads the way internationally in hygienic rendering practices. Australia has developed and implemented, with assistance of the ARA, an Australian Standard for Hygienic Rendering of Animal Products – AS5008. The standard utilises HACCP (Hazard Analysis Critical Control Point) protocols to develop hygienic rendering practices.

Plants wishing to be accredited by the ARA must comply with the ARA Code of Practice for Hygienic Rendering which require compliance levels above and beyond the requirements of the Australian Standard and accredited plants are independently audited to ensure they comply with the requirements

of the Code of Practice.

Similarly, plants recycling fats and oils that wish to be accredited by the ARA must comply with the ARA Code of Practice for the Recycling of Used Cooking Fats and Oils for Animal Feed.

Purchasing from accredited suppliers will ensure buyers they are receiving products processed to exacting hygienic conditions.

A list of accredited plants including their country registrations and copies of the ARA Codes of Practice are available from the ARA website www.ausrenderers.com.au .

WHAT IS THE RENDERING PROCESS

Rendering is the process of separating the lipids or fats from meat tissue and water under the influence of heat and sometimes pressure. There are two principal methods of rendering:

1. In the wet rendering process the tissue is ground to a small particle size of about 12mm and preheated at around 95°C for between 5 and 60 minutes depending on the individual system. The heated slurry is then pressed or centrifugally separated into liquid and solid phases. The liquid which consists of lipids and water is then centrifugally separated into separate streams. The wet solids are dried then milled to a free flowing meal.
2. In the dry rendering process, the tissue is ground to a particle size of about

30~40mm then heated in a jacketed container, mechanical agitation is provided and the water evaporated either at atmospheric or increased pressure. The fat and solids are then separated over a screen. The fat is refined to remove any fine particles of solids remaining. The solids are pressed to remove excess fat then milled to a free flowing meal.

In either case continuous or batch processes may be utilised.

HYGIENIC RENDERING

The use of rendered products world-wide has been affected by hygiene concerns such as the spread of BSE, *Salmonella* in animal feeds and heat treatments imposed by various countries in international trade. In response the ARA has taken an active role in supporting members to produce safe products that are fit for purpose. The ARA has been particularly active in developing programs to assist members to control *Salmonella* in meat meal. The ARA has also contributed to activities to ensure that importing country requirements for heat treatments are negotiated and complied with and is an active member of Australia's TSE freedom-assurance program (TSEFAP).

Training

In 1991 the ARA introduced the workshop on hygienic rendering of animal products. This training program provides accreditation of individuals who successfully complete the workshop. Thirty-seven workshops had been conducted since 1991 and over 950 people have been accredited. The workshop focuses on:

- Growth and survival characteristics of micro-organisms relevant to rendering;
- HACCP-based quality assurance for rendering;
- Elimination of unwanted foreign matter in rendered products;
- ARA Code of Practice and the revised Australian Standard for Rendering;
- Domestic and overseas requirements for production of rendered products;
- Heat transfer in rendering systems;
- Hygienic design of rendering equipment.

Code of Practice

Following the introduction of the training workshop, the ARA developed its first Code of Practice for Hygienic Rendering of Animal Products in 1994. The Code of Practice includes provisions for rendering plants to be audited by approved independent auditors for compliance with the Code and to be accredited by the ARA. The audit program is managed by AusMeat, an internationally recognised Certification Body, and provides for plants to be recommended to the Department of Agriculture and Water Resources for listing for export to various countries. Establishments were first accredited in January 1995.

Since 1995 ninety-two establishments have been accredited by the ARA. In 2017 seventy-three accredited plants were operating and

subject to annual audits.

The Code of Practice was reviewed and reissued in December 1996. It was reviewed again in 2006 and was published in 2007. Another review resulted in an edition being published in 2011 the latest review has occurred for a new edition to be published in 2017.

Research

The ARA initiatives to assist members to improve the hygiene of rendered products were implemented in conjunction with CSIRO Division of Food Processing. CSIRO personnel helped to implement the ARA training workshop and developed a manual of hygienic construction of rendering equipment. CSIRO staff also conducted extensive microbiological testing programs at rendering plants and reported substantial improvements in the hygienic status of rendered product after the introduction of the training program and Code of Practice.

It has been demonstrated that *Salmonella* in raw material is reliably eliminated in the rendering process but that there may be post-processing contamination. This view is backed up by extensive tracking of *Salmonella* serotypes which show that the serotypes associated with meat and bone meal are not the common serotypes isolated from animal materials.

Heat treatment and market access

The ARA acknowledges that rendered products may be associated with biological hazards other than *Salmonella*. In particular biological hazards that are more heat resistant than *Salmonella* could be

associated with rendered product. Scientific and regulatory authorities in Australia have identified *Bacillus anthracis* as a heat-resistant potential biological hazard and the ARA Code of Practice includes requirements to comply with biological performance standards that validate that heat treatments are capable of eliminating *Bacillus anthracis*.

Heat treatments and the biosecurity of rendering processes are conditions for the export of meat meal to certain markets. The ARA has been involved with AQIS in preparing cases to justify that biological performance standards used by ARA members are equivalent to the heat treatments required by importing countries. As a result AQIS has negotiated market access based on ARA accreditation and compliance with the Australian Standard for the Hygienic Rendering of Animal Products.

BSE

No case of BSE has been identified in Australia and Australia is categorised as negligible BSE risk by the OIE. The ARA supports the coordinated efforts of state and federal authorities to maintain the BSE-free status. The national activities designed to maintain Australia free from BSE are coordinated by the TSEFAP which is managed by Animal Health Australia. The ARA is a member of the TSEFAP and has contributed, in particular, to TSEFAP activities that ensure that animal materials are not fed to ruminants and in taking part in programs which report results of audits of compliance with state regulations.

Impact of ARA hygienic rendering programs

All ARA accredited rendering plants test

their products for *Salmonella* according to the requirements of the ARA Code of Practice and Australian Standard for the Hygienic Rendering of Animal Products. Results of testing are reported to the ARA on annual basis. These reports have shown significant reductions in the incidence of *Salmonella* in meat meal since training and the accreditation of establishments was introduced. While most of the reduction in the incidence of *Salmonella* in meat meal was achieved in the first few years of operation of the ARA programs, the reductions have been maintained and further improvements are achieved consistently.

PRODUCTS AVAILABLE FROM THE RENDERING INDUSTRY

1.1 ANIMAL PROTEIN MEALS

Introduction

Proteins are compounds of large molecular weight and contain carbon, hydrogen, nitrogen and with a few exceptions sulphur. Amino acids are the fundamental structural units of proteins and are the end result of the complete hydrolysis of proteins. It is these amino acids that animals require in their diet, not the protein itself. There are 23 or more different amino acids. Essential amino acids are the amino acids that cannot be made in the body from other substances. The most limiting of these are lysine, tryptophan, threonine, methionine and cystine.

Animal protein meals are produced from the solid material remaining after being separated and sterilised from the fat portion

of animal tissues. The solid material is dried and then finely ground to produce free flowing meal.

Rendered animal protein meals are moderate to rich sources of protein, amino acids, energy, calcium, Phosphorus, essential fatty acids and other vital nutrients.

These materials contain restricted animal material and may not be fed to cattle, sheep, goats, deer and other ruminants but may be fed to monogastric animals such as pigs, poultry, dogs and cats and in aquaculture diets for some fish and prawns.

Major benefits of using animal protein meals are:-

- They contain moderate to high levels of amino acids like lysine, methionine and threonine.
- If processed correctly the amino acids are highly available.
- They are rich sources of available Phosphorus, calcium and trace minerals.
- They assist the substance of animal agriculture by transforming waste animal tissues into valuable products for further economic use.

- They are palatable when used in diets that are balanced for amino acids, especially lysine, methionine and cystine, tryptophan, threonine and (for blood meal) isoleucine.

Products

Meat and Bone Meal (MBM) is the protein residue after the moisture and fat have been extracted in the rendering process described earlier. It includes bone and tissue. It is golden to dark brown in colour, with a fresh meaty odour and is manufactured throughout the year.

The quality and composition of the raw materials used will have some effect on the quality of the finished product. Raw materials will vary at each plant, consequently the composition of MBM will vary plant by plant. MBM customers can manage this variability by identifying product from a particular plant or from a number of plants with MBM of similar composition for their purchases.

Processing temperatures and methods have the greatest effect on amino acid digestibility. Australian MBM is available in various categories, Pure Beef / Bovine, Pure Sheep / Ovine, Pure Pig / Porcine, or mixed species and may include goat and deer.

Typical analysis of MBM

Protein	50% (or as specified)
Fat	12%
Fibre	3%
Ash	32%
Calcium	2.2 x Phosphorus level
Phosphorus	4%
Moisture	8%
Pepsin Digestibility	86%
Amino Acid (%)	50% MBM
Aspartic Acid	4.1
Threonine	2.2
Serine	3.1
Glutamic Acid	6.7
Proline	4.4
Glycine	6.2
Alanine	3.9
Valine	2.7
Methionine	0.7
Isoleucine	1.7
Leucine	3.6
Tyrosine	1.3
Phenylalanine	2
Lysine	2.6
Histidine	1
Arginine	3.9
Cystine & Cysteine	0.9
Tryptophan	0.4

Hydrolysed Feather Meal (FM) is derived by cooking the clean fresh feathers from slaughtered poultry either under pressure or other methods of hydrolysis sufficiently to break the cysteine bonds and produce a meal with a minimum of 75% pepsin digestibility. The prime factor that will influence the quality of hydrolysed poultry feathers will be the degree of hydrolysis. For meal produced using thermal hydrolysis too high a hydrolisation will produce an overcooked meal with reduced amino acid digestibility whereas too little hydrolisation will not cause enough breaking of the cysteine bonds and reduce availability of the amino acids. The physical properties of feather meal vary according to the feathers used; feathers of a light colour result in light golden brown meal; feathers of a dark colour result in a dark brown meal. Feather meal has a fresh odour.

Typical analysis of Feather Meal

Protein	80% (or as specified)
Fat	8%
Fibre	4%
Ash	4%
Moisture	8%
Pepsin Digestibility	76%

Amino Acid (%)	Feather Meal
Aspartic Acid	5.2
Threonine	4.4
Serine	9.6
Glutamic Acid	8.6
Proline	8.6
Glycine	5.7
Alanine	3.7
Valine	6
Methionine	0.6
Isoleucine	4
Leucine	6.4
Tyrosine	2.4
Phenylalanine	4
Lysine	1.7
Histidine	0.6
Arginine	5.9
Cystine & Cysteine	2.4
Tryptophan	0.6

Poultry Meal (PM) is derived from clean tissues of slaughtered poultry including bone after the moisture and fat have been extracted in the rendering process described earlier. It may contain whole birds exclusive of feathers except in such amounts unavoidable in good manufacturing process. The product should be treated with an antioxidant immediately after processing to ensure fat stability. It is golden to medium brown in colour, with a fresh poultry odour

and is pet food grade.

Typical analysis of Poultry Meal

Protein	65% (or as specified)
Fat	15%
Fibre	3%
Ash	15%
Moisture	8%
Pepsin Digestibility	88%

Amino Acid (%)	Poultry Meal
Aspartic Acid	5.7
Threonine	2.9
Serine	3.1
Glutamic Acid	8.8
Proline	4.1
Glycine	5.9
Alanine	4.4
Valine	3.8
Methionine	1.4
Isoleucine	3
Leucine	5.3
Tyrosine	2
Phenylalanine	2.9
Lysine	4.3
Histidine	1.4
Arginine	4.5
Cystine & Cysteine	1.2
Tryptophan	1.6

Blood Meal is a finely ground protein

residue derived from fresh blood collected during the slaughtering process. Moisture is removed from the crude blood by dewatering followed by ring, batch or disc drying. The drying method is the greatest single factor affecting the quality of the finished product, with ring drying producing a higher quality meal. Protein digestibility should be a minimum of 90%. Blood products are a rich source of essential amino acids for swine and poultry. Blood meal is a reddish brown colour with a fresh odour. It is insoluble in water.

Typical analysis of Blood Meal

Protein	85%
Fat	2%
Fibre	2%
Ash	5%
Moisture	8%
Pepsin Digestibility	92%

Amino Acid (%)	Blood Meal
Aspartic Acid	8.9
Threonine	4.7
Serine	4.8
Glutamic Acid	8
Proline	3.2
Glycine	3.6
Alanine	6.7
Valine	7
Methionine	1.2

Isoleucine	1
Leucine	10.2
Tyrosine	2.7
Phenylalanine	5.9
Lysine	7.9
Histidine	5.3
Arginine	3.5
Cystine & Cysteine	2.5
Tryptophan	1.6

Fish Meal from Australian rendering plants is the protein residue after the moisture and oil is have been extracted in the rendering process described earlier. It is typically produced from fish market raw material made up from whole fish, fish heads, fish bones and offal; there can also be small amounts of crab, prawns and lobsters. The fish is processed to comply with Australian hygienic rendering standards.

Typical analysis of Fish Meal

Protein	62%
Fat	16%
Fibre	2%
Ash	20%
Moisture	6%
Calcium	7%
Pepsin Digestibility	90%
Sand and salt	3%

Amino Acid (%)	Fish Meal
Aspartic Acid	6.8
Threonine	2.7
Serine	3.3
Glutamic Acid	7.4
Proline	4.0
Glycine	5.6
Alanine	3.9
Valine	3.1
Methionine	1.3
Isoleucine	2.5
Leucine	4.2
Tyrosine	1.9
Phenylalanine	2.4
Lysine	3.7
Histidine	1.7
Arginine	4.3
Cystine & Cysteine	0.9
Tryptophan	0.5

Specialised Protein Blends are blends of any of the meals described here and may also include fish meal. They are available from specialist blenders contactable from the ARA website.

Bone Meal is available from specialist renderers who may be located on the ARA website.

1.2 QUALITY CONTROL AND TESTS FOR ANIMAL PROTEIN MEALS

Protein:

Meat and bone meals are sold on protein content. While the majority are sold as 50% protein, meals can be sold containing other protein levels. Standard test method AOAC 990.03 Dumas.

Fat:

The fat content of meat and bone meal is the residual fat left in the product after centrifuging and pressing and usually averages 8 to 12 per cent. Standard test method AOAC 920.39.

Moisture:

The moisture content in meat and bone meal is the residual water after the raw material has been dried and it usually varies between 5 and 8 percent. Moisture content of meal is critical to meal quality. Standard test method AOAC 934.01.

Fibre:

Fibre is the relatively insoluble carbohydrate, such as cellulose and is due to remnants of vegetable material in the rendered offal. Standard test method AOAC 962.09.

Ash:

Ash is the percentage of residue (mineral matter) remaining after combustion at 600°C for two hours and reflects the ratio of bone to soft tissue in the raw material. Standard

test method AOAC 942.05.

Salmonella:

Salmonella are non-spore forming micro-organisms readily destroyed by the rendering process. However post-process contamination during handling, storage and transport can still occur just as it does with any feed ingredient. ARA accredited establishments abide by a code of practice to minimise post production contamination. Standard test method AOAC 989.13/966.08.

E. Coli:

E. Coli are non-spore forming micro-organisms readily destroyed by the rendering process. However post-process contamination during handling, storage and transport can still occur just as it does with any feed ingredient. ARA accredited establishments abide by a code of practice to minimise post production contamination. Standard test method AOAC 991.14.

Clostridium Perfringins:

Clostridium Perfringins are spore forming micro-organisms and are the micro-organism used in the Australian Standard to determine the ability of the rendering process to destroy spore forming bacteria of concern. The tests are conducted on an annual basis at the plant level to validate the effectiveness of the rendering process. Standard test method AS1766.2.8

Pepsin Digestibility:

This is the percentage of feedstuff taken into the digestive tract that is absorbed into the body. Standard test method AOAC 971.09.

Calcium/Phosphorus:

The high Phosphorus availability of MBM is one of its major nutritional advantages over vegetable proteins. Standard test method AOAC 935.13/965.17 15th.

Mesh Screen Test:

This test is to determine whether the material has been satisfactorily ground following drying. Standard test method 98% of the MBM should pass through a 2.00mm (US #10) mesh screen and 100% should pass through a 5.00mm mesh screen.

1.3 CLAIM SETTLING RULES ANIMAL PROTEIN MEALS

These Rules are provided as a base that can be used for settling protein claims OUTSIDE of a direct buyer/supplier contractual arrangement.

RULE 1

Protein - 1:1 pro rata on protein deficiency on first 3 percentage points then 3:1 pro rata on the next 2 percentage points and rejectable at 5% beneath contracted minimum protein specifications.

RULE 2

A blanket non-claimable tolerance is agreed to 0.5% protein. So protein down to and including 49.5% on a 50% grade is claim free. But protein lower is claimable and on the entire deficiency (e.g.. 49.3% result means claimable on the 0.7%)

EXAMPLES OF PROTEIN DEFICIENCIES:

MBM 50% contract at A$600 pmt delivered or C&F. Protein per unit value / percentage is A$12 pmt ($600/50).

a) Protein result of 48.6% so 1.4% deficiency is A$16.80 pmt (12 x 1.4).

b) Protein result of 46.4% then 1:1 pro rata on first 3% so A$36 pmt (12 x 3) + 3:1 pro rata on remaining 0.6% (equals A$ 21.60 pmt) - this means 3.4% deficiency is A$57.60 pmt .

c) Protein result of 44.8%. Product is rejectable. Separate negotiation between buyer and seller recommended.

Same rules apply for Bone meal, Poultry meal, Feather meal, Blood meal, Fish meal etc. THIS REMAINS UNCHANGED.

All other quality aspects (such as fat, ash, moisture, etc.) need to have separate agreed specifications and claim settling rules/ values between buyer and seller in the contract and then any excess/deficiency is recommended to be on a pro-rata basis of entire excess/deficiency against contract value.

All claim values are to be based on the applicable selling (by renderer or trader) trading terms.

The AOAC approved testing methods of KJELDAHL (wet chemistry) or DUMAS (Dry combustion) are to be used to determine protein levels in protein meals for claims.

2.1 FATS

Introduction

Animal tissue containing fat is converted to tallow by the process of rendering as described at the beginning of this handbook.

Depending on the source of raw materials for the rendering process the quality of the tallow varies.

Typical Tallow Specifications

Grades	TITRE **ºC min**	FFA % max	FAC max	R&B	MIU % max
Edible	41	0.75	5	0.2	0.5
Unrefined Edible Tallow	41	0.75	5	0.2	0.5
Top white	41	1	5	0.3	1
Pure Beef	41.5	1.5	11A	0.4	1
Good Soap	41.5	2.5	11B	0.5	1
Prime	42	2	17	0.5	1
Bleachable Fancy	40	4	21	1.5	1
Yellow Grease	25-37	15	37	n.s.	2.0
Feed Grade	40	15	37	n.s.	2.0
Bleached					
Extra Fancy	41	4	5	n.s.	1

n.s. not specified.

Tallow Grades

Edible Beef Tallow is made exclusively from the highest quality edible beef fat inspected by AQIS and processed for human consumption. Edible tallow is available deodorised or un-deodorised. Deodorised tallow does not alter the taste of foods, whereas un-deodorised tallow is used to enhance the flavour of foods.

Unrefined Edible Tallow (pure beef) for further processing is used for manufacture of shortening and margarine by the process of refining, deodorising and bleaching.

Industrial Tallow (top white, pure beef, good soap, prime and bleachable fancy) is commonly used in the oleo-chemical industry for use in the production of soaps and cosmetics. Industrial tallow is also extensively used as a feedstock in the manufacture of biodiesel and renewable diesel.

Yellow Grease sometimes referred to as Used Cooking Oil (UCO) is usually made up from restaurant greases (fats and oils from cooking) and from some rendering plants lower quality fats.

Feed Grade Fats are often stabilised blends of animal and vegetable fats. They may also contain acidulated vegetable soap stock blended with the tallow and oils. Feed Grade fats must comply with M&I 2% max.

Fat for Fuel. Because of their chemical composition, fats contain concentrated amounts of energy when burned. This energy can be used as a heat source in industrial boilers and furnaces. Rendered fats can be used as a feed stock for the production of biodiesel.

2.2 QUALITY CONTROL AND TESTS FOR FATS AND OILS

Test methods referred to are from American Oil Chemists Society.

Titre is the solidification point of the component fatty acids in degrees Celsius. A general classification for traded fats and oils, titre is related to physical hardness. Standard test method AOCS Cc 12-59.

FFA is Free Fatty Acid and is the percentage of titrable acid measured with standardised sodium hydroxide solution. These acids arise from hydrolysis of fats and oils. For tallow, they are reported as oleic acid. Standard test method AOCS Ca 5a-40.

FAC is a colour set for matching typical American fats. FAC is not a uniform or linear scale. Standard test method AOCS Cc 13a-43.

Lovibond colour is an international, rational colour scale based on standard red and yellow units for comparison of fats and oils colour. Lovibond AOCS "(Wesson") or BSI (U.K.) colour standards may be used. Automatic instruments may be used. Standard test method AOCS Cc 13b-45.

R&B colour is colour after refining and bleaching and is expressed in terms of Red on a 5.25" (133mm) cell according to AOCS Cc8d-55.

IV is the Iodine Value and may be determined by Gas Chromatography composition analysis or by titration methods. The IV provides the level of unsaturation. More saturated fats have lower values and are harder (higher slip melting points). Standard test method used is AOCS Cd 1d-92.

MIU is the total of results for moisture, insoluble impurities and unsaponifiable matter.

PV is the Peroxide Value and is a common way of assessing fat rancidity primarily caused by oxidation. Standard test method AOCS Cd 8b-90.

SV is the Saponification Value and is an estimate of the mean molecular weight of the constituent fatty acids in a fat sample. Standard test method AOCS Cd 3-25.

Polyethylene Test determines polyethylene and other plastic contaminants in fats and oils. Standard test method AOCS Ca 16-75

2.3 CLAIM SETTLING RULES FATS AND OILS

FOSFA rules apply to settling claims for fats and oils.

INCOTERMS 2010

The table on the following page lists the standard terms and conditions as agreed by the ICC in 2010, effective January 1 2011 for banks and UCP – LC negotiations.

INCOTERMS®2010											
	Rules for any mode of transport							Rules for sea and inland waterway transport			
	EXW	FCA	CPT	CIP	DAT	DAP	DDP	FAS	FOB	CFR	CIF
	Ex Works	Free Carrier	Carriage Paid To	Carriage & Insurance Paid To	Delivered at Terminal	Delivered at Place	Delivered Duty Paid	Free Alongside Ship	Free on Board	Cost & Freight	Cost, Insurance & Freight
SERVICES	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*	*Who Pays*
Export Packing	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Marking & Labelling	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Block and Brace	1	1	1	1	1	1	1	1	1	1	1
Export Clearance (Licence, EE/AES)	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Freight Forwarder Documentation Fees	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Seller	Seller
Inland Freight to Main Carrier	Buyer	2	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Origin Terminal Charges	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Buyer	Seller	Seller	Seller
Vessel Loading Charges	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Buyer	Seller	Seller	Seller
Ocean Freight / Air Freight	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Seller	Seller
Nominate Export Forwarder	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Seller	Seller
Marine Insurance	3	3	3	Seller	3	3	3	3	3	3	Seller
Unload Main Carrier Charges	Buyer	Buyer	4	4	Seller	Seller	Seller	Buyer	Buyer	4	4
Destination Terminal Charges	Buyer	Buyer	4	4	4	Seller	Seller	Buyer	Buyer	4	4
Nominate On-Carrier	Buyer	Buyer	5	5	5	5	Seller	Buyer	Buyer	Buyer	Buyer
Security Information Requirements	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer
Customs Broker Clearance Fees	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Buyer	Buyer	Buyer	Buyer
Duty, customs Fees, Taxes	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Buyer	Buyer	Buyer	Buyer
Delivery to Buyer Destination	Buyer	Buyer	5	5	5	5	Seller	Buyer	Buyer	Buyer	Buyer
Delivering Carrier Unloading	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer

Notes:

1 - Incoterms® 2010 do not deal with the parties obligations for stowage within a container and therefore, where relevant, the parties should deal with this in the sales

contract.

2 - FCA Sellers Facility - Buyer pays inland freight; other FCA qualifiers. Seller arranges and loads pre-carriage carrier and pays inland freight to the “F” delivery place.

3 - Incoterms® 2010 does not obligate the buyer nor must the seller to insure the goods, therefore this issue should be addressed elsewhere in the sales contract.

4 - Charges paid by Buyer or Seller depending on contract of carriage.

5 - Charges paid by Seller if through Bill of Lading or door-to-door rate to Buyers destination.

CONVERSION TABLES

TEMPERATURE CONVERSION TABLE

°C	°F	°C	°F
-40	-40	250	482
-30	-22	300	572
-20	-4	350	662
-10	14	400	752
0	32	450	842
10	50	500	932
20	68	550	1022
30	86	600	1112
40	104	650	1202
50	122	700	1292
60	140	750	1382
70	158	800	1472
80	176	850	1562
90	194	900	1652
100	212	950	1742
110	230	1000	1832
120	248	1050	1922
130	266	1100	2012
140	284	1150	2102
150	302	1200	2192
160	320	1250	2282
170	338	1300	2372
180	356	1350	2462
190	374	1400	2552
200	392	1450	2642

Temperature Conversion formulae
Deg C = (Deg F - 32) / 1.8
Deg F = (Deg C * 1.8) + 32

APPROXIMATE TALLOW DENSITY AT SELECTED TEMPERATURES

TEMP °C	DENSITY	TEMP °C	DENSITY	TEMP °C	DENSITY
45.0	0.89200	53.5	0.88622	61.5	0.88078
45.5	0.89166	54.0	0.88588	62.0	0.88044
46.0	0.89132	54.5	0.88554	62.5	0.88010
46.5	0.89098	55.0	0.88520	63.0	0.87976
47.0	0.89064	55.5	0.88486	63.5	0.87942
47.5	0.89030	56.0	0.88452	64.0	0.87908
48.0	0.88996	56.5	0.88418	64.5	0.87874
48.5	0.88962	57.0	0.88384	65.0	0.87840
49.0	0.88928	57.5	0.88350	65.5	0.87806
49.5	0.88894	58.0	0.88316	66.0	0.87772
50.0	0.88860	58.5	0.88282	66.5	0.87738
50.5	0.88826	59.0	0.88248	67.0	0.87704
51.0	0.88792	59.5	0.88214	67.5	0.87670
51.5	0.88758	60.0	0.88180	68.0	0.87636
52.0	0.88724	60.5	0.88146	68.5	0.87602
52.5	0.88690	61.0	0.88112	69.0	0.87568
53.0	0.88656				

Notes